



Natural Environment Study

Rockhampton Regional Council

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1.0 Introduction

1.1 Background

Rockhampton Regional Council (RCC) is undertaking a series of studies to inform the forthcoming planning scheme review and identify potential constraints and issues with council's Priority Infrastructure Plan (PIP). RPS have been commissioned to undertake a study of the region's natural environment to identify key areas for biodiversity and conservation purposes. The study will also analyse the impacts that the protection of these area will have on areas identified for development in the PIP, and provides strategic policy recommendations.

1.2 Project Justification

RRC comprises the previous local governments of Livingstone, Fitzroy, Mount Morgan and Rockhampton. The region contains a diverse natural environment containing large areas of high value ecological features, including national parks, threatened ecological communities, and significant fauna species. While the current legislative and planning framework affords protection to many natural areas, limitations may preclude the protection of other important and sensitive environments. It is therefore important that such limitations are identified and considered for appropriate protection and management during the future planning scheme review. The adoption of a single approach and consistent mapping overlays will enhance the efficiency of planning and management decisions in the region.

The identification of additional lands for the conservation of natural features and values may create new development outcomes for lands within the PIP. This could include curtailing or restricting any further development or changing the sequence of development on specific sites/areas. As a consequence of these changes, amendments to the PIP may be necessary.

The study will review the current legislative and policy framework at all three levels of government and make recommendations for protection and management of the region's natural environment.

Additional outcomes of the protection of important natural areas include positive benefits for maintaining scenic amenity, water quality and cultural heritage sites and values in the region.

1.3 Objectives and Aims

The aim of this report is to identify the location and quantum of land that has environmental features, and fulfils ecological function such as:

- Provision of habitat for rare and threatened flora and fauna;
- Representations of threatened ecological communities;
- Connectivity through the landscape and biodiversity corridors for flora and fauna dispersals and maintenance of ecosystem processes and genetic diversity;
- Buffering of sensitive ecosystems and features; and
- Patches that provide habitat for a diversity of flora and fauna.

The environmental values of land-based natural areas will be determined in order to make appropriate strategic recommendations for the protection, management and planning of natural areas across the region, and to identify conflicts with the PIP. Additionally, the impacts of the designation of environmental features will be assessed to estimate the land area affected and the associated impact on population generation within the PIP.

2.0 Methods

2.1 Background Review

A detailed review of available legislation (Federal, State and Local) and best practice literature was undertaken to identify land with natural features and values that require protection throughout Council's administrative area. The following documentation was reviewed:

- Current planning schemes (Livingstone Shire Planning Scheme 2005, Rockhampton City Plan 2009, Mount Morgan Town Plan 2005, Fitzroy Shire Planning Scheme 2007);
- Rockhampton Region 2050 policy document;
- Method for mapping EPA terrestrial biodiversity and wetland conservation State interest in IPA planning (EPA 2008);
- Planning Assumptions Reports for Livingstone, Fitzroy and Rockhampton, and a Preliminary Draft PIP for Mount Morgan;
- Central Queensland Strategy for Sustainability – 2004 and Beyond (Fitzroy Basin Association, 2005).
- Regional Ecosystems and Remnant mapping (Version 6.0; Department of Environment and Resource Management (DERM));
- High Value regrowth mapping (Version 2.0; DERM);
- Essential Habitat (Version 3.0; DERM); and
- Biodiversity Planning Assessment for the Brigalow Belt (Version 1.3; DERM) and Central Queensland Coast (Version 1.3; DERM).

RPS liaised with the Department of Sustainability, Environment, Water, Population and Community (DSEWPoC), and the Queensland Department of Environment and Resource management (DERM) to ensure that issues of National, State and Regional interest were either being addressed under current legislative frameworks, and to identify mechanisms where these issues can be addressed under local planning instruments.

2.2 Data Analysis

RPS, in partnership with Terranean, undertook a review of available spatial data, studies, and reports to identify areas of environmental significance. The review aimed to identify:

- Areas where environmental features and values appear;
- Areas where environmental features and values have been diminished or removed but provide important corridors and linkages that connect land with similar or complementary environmental features and values; and
- The provision of appropriate buffers to separate areas with environmental features and values from incompatible land uses or activities.

During the desktop review, each GIS dataset was systematically examined to classify its usefulness for assessing the environmental values of the study area. Datasets selected for use were used to construct a project specific GIS database with common coordinate systems in ArcGIS. The following datasets have been included in the GIS database to date:

- Regional Ecosystems and Remnant Mapping (version 6);
- High Value Regrowth Mapping (version 2);
- Essential Habitat mapping (version 3);
- Biodiversity Planning and Assessments (BPA) for the Brigalow Belt (Version 1.3) and Central Queensland Coast (Version 1.3);
- Threatened species records (Wildnet Database 2010); and
- Current and future land use.

The biophysical value of natural areas within the region was determined using five key indicators, condition, patch size, and connectivity, outlined in **Table 2.1**.

Table 2.1: Biophysical Indicators

INDICATOR	DESCRIPTION
Condition	The condition of vegetation based on remnant status, as identified on the DERM RE mapping gives an indication on the quality of the vegetation present. Areas with remnant vegetation received a higher biophysical value rating than areas with little or no vegetation.
Connectivity	The degree to which a vegetated tract is connected to other vegetated tracts impacts the usefulness of a tract within a corridor. Tracts with a higher level of connectivity received a higher biophysical value rating.
Tract Size	The size of a continuous tract of vegetation affects the value of the tract. Tracts part of a larger tract of vegetation received a higher biophysical value rating.
Ecosystem Diversity	The diversity of ecosystems present gives an indication of habitat complexity. Tracts with a greater diversity received a higher biophysical value rating.
Threatened Species Habitat	Areas providing habitat for multiple threatened flora and fauna species receive a higher threatened species habitat rating.

The indicators were modeled, and assigned a rating of Very High, High, Moderate, Low or Very Low, to allow for determination of an areas overall biodiversity value. The detailed methodology and ratings for each of the indicators is outlined in the **Sections 2.2.1 to 2.2.3**.

2.2.1 Tract Size

The size of a continuous vegetation tract affects the ecosystem functionality of an area, with larger areas generally having greater diversity of species and habitats. Areas consisting of large patches are allocated a higher score than those in small tracts. To determine the tract size, remnant and regrowth data supplied by DERM was analyzed to calculate areas of contiguous vegetation. Islands were given a very high rating regardless of size. **Table 2.3** outlines the ratings for tract size. Areas of contiguous vegetation outside of the RRC study area were not included within the analysis.

Table 2.2: Tract Size

RATING	TRACT SIZE
Very High	Vegetation tracts > 100 000 Ha
High	Vegetation tracts 50 000 – 100 000 Ha
Moderate	Vegetation tracts 500 – 50 000 Ha
Low	Vegetation tracts 10 - 500 Ha
Very Low	Vegetation tracts < 10 Ha

2.2.2 Connectivity

The degree to which each vegetation tract is connected to other tracts is an important consideration when determining the ecological value. A recursive minimum spanning tree algorithm was used to calculate this measure. The algorithm first calculated distance from each polygon to every other polygon by finding closest points on the boundaries. This data was stored as a non-Euclidean distance matrix and provided an efficient means for determining distances between polygons. A minimum spanning tree was calculated using a recursive algorithm that operates on the distance matrix. The output from the minimum spanning tree was analysed using second recursive function which calculates attributes such as:

- Nearest habitat node;
- Maximum gap between patches in the shortest path to the closest habitat node;
- Number of gaps in the path between to nearest habitat node; and
- Total (sum of) gap(s) to the nearest node.

These parameters were stored against the vegetation patch polygons as a GIS attribute table. The data was clipped using a 20m corridor for main roads and highways in order to split large polygons that were only tenuously connected across major routes. The ratings applied to islands were increased by one rating. **Table 2.4** outlines the rankings assigned for connectivity. Areas of contiguous vegetation outside of the RRC study area were not included within the analysis.

Table 2.3: Connectivity

RATING	CONNECTIVITY
Very High	Habitat node (tracts of vegetation > 40 000ha
High	Total cleared distance to habitat node is < 50m
Moderate	Total cleared distance to habitat node is 50m – 100m
Low	Total cleared distance to habitat node is 100m – 400m
Very Low	Total cleared distance to habitat node is > 400m

2.2.3 Condition

The status of remnant vegetation present in the region gives a preliminary indication of the quality of the vegetation present in the area. Areas of remnant vegetation receive a condition higher rating than areas of regrowth and non-remnant vegetation. To determine the remnant status of vegetation, several fields in the RE mapping were analyzed and the dataset classified into the condition ratings outlined in **Table 2.5**.

Table 2.4: Condition

RATING	CONDITION
Very High	Remnant vegetation
High	Remnant: Disturbed
Moderate	Non-remnant: Regrowth
Low	Non-remnant: Plantation
Very Low	Non-remnant: Cleared

2.2.4 Threatened Species Habitat

The presence of multiple threatened species gives an indication of areas with habitat resources suitable for supporting threatened species populations. This rating is based on Criteria A of the Biodiversity and Planning Assessment for the Brigalow Belt and Central Queensland Coast, and rates areas based on the known presence of Endangered, Vulnerable or Near Threatened species listed under the *Nature Conservation Act 1992* (NCA) or the *Environmental Protection and Biodiversity Act 1994* (EPBC). Criteria A uses endangered, vulnerable, and near threatened flora and fauna records and applies a buffer that is twice the precision of the record. The buffers then provide a definition of threatened species habitat for each species recorded.

Additionally, Wildnet species records were assessed using a modified version of the BPA Criteria A methods. Changes included introducing a minimum buffer of 300m, and a maximum buffer of 2km. Wildnet records were utilised to allow for additional records identified since the publication of the BPA data. Where the Wildnet data resulted in changes to the original BPA data, the newer data was incorporated.

Table 2.5: Threatened Species Habitat

RATING	THREATENED SPECIES HABITAT
Very High	An area within a remnant unit that has precise records or core habitat for one or more endangered or two or more vulnerable or rare taxa. Consistent with BPA Criteria "A" Very High
High	An area within a remnant unit that has records for core habitat for one vulnerable or one rare taxon. Consistent with BPA Criteria "A" High
Moderate	A buffer area within a remnant unit that has records for one or more EVR taxa, or an area within a remnant unit that fall outside of a buffer area for EVR taxa, or an area within a remnant unit that represents Essential Habitat. Consistent with BPA Criteria "A" Medium
Low	all other remnant vegetation, consistent with BPA Criteria "A" Low. All other regrowth vegetation.
Very Low	Cleared

2.2.5 Ecosystem Diversity

The number of ecosystems present within an area is an indication of habitat complexity. Complexity of habitats is likely to influence the ecological function of an area, and therefore areas which contain many ecosystems are of higher value than areas which are not as complex.

To determine the ecosystem diversity, the Simpsons Index outlined in Criteria F of the Biodiversity and Planning Assessment for the Brigalow Belt and Central Queensland Coast was used. The Simpson's Index value allocates each area with a measure of "richness and evenness" The Simpson's Index is calculated by buffering each RE polygon and calculating area and proportion of total REs in the bioregion.

Table 2.6: Ecosystem Diversity

RATING	ECOSYSTEM DIVERSITY
Very High	Simpsons Index >75%
High	Simpsons Index 50% - 75%
Moderate	Simpsons Index 25% - 50%
Low	Simpsons Index <25%
Very Low	Polygon is not an RE (Cleared or non-remnant)

2.2.6 Overall Biophysical Attribute Rating

To effectively combine the criteria to create a Biophysical ranking, all data was converted to a common vector format and coordinate system. The five criteria were geometrically combined to form a single polygon coverage. The topology of the output geometries were checked to ensure that no polygons overlapped. Each biophysical input received a score of one to five, with 1 assigned to very low and 5 assigned to very high. The scores associated with each criteria were combined to achieve a biophysical attribute rating. The ratings are outlined in **Table 2.7**.

Table 2.7: Overall Biophysical Rating

RATING	SCORE
Very High	>20
High	16-20
Moderate	11-15
Low	6-10
Very Low	<6

2.2.7 PIP Overlay

Tract size and vegetation connectivity measures were initially utilized to identify the quantum of vegetation cover within and outside the Priority Infrastructure Area (PIA). These data sets were correlated with existing zoning and digital aerial photography to ascertain current land use, validation of vegetation presence and opportunities for vegetation retention and connectivity with larger vegetation tracts.

An initial assessment of the impacts of vegetation retention on development expectation anticipated by the PIP was undertaken at this point.

A more detailed and rigorous assessment of the impact of the designation of environmental features was undertaken by overlaying overall biophysical rating mapping over the PIP and again correlating these data sets against existing zoning future development intentions (identified in the four Priority Infrastructure Plan Planning Assumption Reports) and digital aerial photography. Estimates of the land area affected and impact on population generation were undertaken; and options for land management practices made for each vegetation tract assessed.

2.2.8 Protection and Prioritisation Assessment

Natural areas throughout the region were assessed and prioritised based on their biophysical rating and the level of protection that current planning and legislative tools provide (**Table 2.7**). This prioritisation identifies natural areas to be considered for protection during the review of the planning scheme. The prioritization combined biophysical and protection ratings to identify Natural Areas to be considered in future Conservation Strategies, and requiring additional protection through the planning instruments

Table 2.8: Current Protection Ratings

RATING	CURRENT PROTECTION
Very High	▪ Ramsar Wetlands ▪ World Heritage Areas ▪ National Parks ▪ State Reserves
High	▪ Endangered remnant vegetation ▪ Marine plants area ▪ Referable areas ▪ GBR wetland protection areas ▪ Fish habitat areas
Moderate	▪ Of concern remnant vegetation ▪ Least concern remnant vegetation ▪ Berserker Range Environmental Protection Area ▪ Yeppoon Road Corridor Environmental Protection Area (Former Rockhampton City Council) ▪ Conservation zone (Former Mount Morgan City Council)
Low	▪ Regrowth vegetation ▪ Open space zone (former Livingstone and former Fitzroy City Councils)
Very Low	▪ Currently zoned for development ▪ Not currently protected

A matrix which considered the biophysical attributes and the protection measures in place to protect areas from external activities was used to prioritise areas for management attention. **Table 2.8** outlines the matrix used to prioritise areas.

Table 2.9: Prioritisation Matrix

CURRENT PROTECTION RATING	VERY HIGH	L	L	L	M	M
	HIGH	L	L	L	M	M
	MEDIUM	L	L	M	H	H
	LOW	L	L	M	H	H
	VERY LOW	L	L	M	H	H
		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
BIOPHYSICAL RATING						

2.2.9 Limitations

There are several inherent limitations associated with using a purely desktop assessment that may affect the accuracy of the results produced through the data analysis including:

- GIS data has come from many sources and analyses are only as accurate as the data used;
- The age of the data may impact results as it may not reflect the current conditions of the area;
- RE and High Value Regrowth mapping is completed on a broad scale (1:100 000) at a minimum tract size (1ha);
- Assumptions such as remnant vegetation equaling good condition vegetation are not ground-truthed;
- There is an inherent spatial bias in ecological data which has been collected opportunistically, including threatened species records;
- There is a bias towards largely recognisable species such as Glossy Black Cockatoo, and the data may not be an accurate representation of the species assemblage in the study area;
- There is a lack of locally derived ecological studies and data to verify state wide mapping, and incorporate local ecological values; and
- Areas outside of the RRC boundary have not been considered, potentially reducing the biophysical ratings for tract size and connectivity.

3.0 Background Review

3.1 Environmental Data

A review of relevant environmental databases identified many areas of environmental significance. RRC spans 2 bioregions, the Brigalow Belt which dominates the region and Central Queensland Coast. Several areas are identified as being of international significance, including the Great Barrier Reef World Heritage Area and the Ramsar wetlands of Shoalwater and Corio Bays Area (**Figure 3.1**).

Several areas are already afforded protection under Local, State or Federal legislative mechanisms, including National Parks, Marine Parks, State Forests and Nature Refuges. Areas of high conservation significance include the Great Barrier Reef Marine Park, Byfield National Park, Mount Archer National Park, Mount Etna Caves National Park, Keppel Bay Islands National Park and Conservation Park, Mount Jim Crow National Park and Capricorn Coast National Park.

The region contains several Threatened Ecological Communities, protected under the *Environmental Protection and Biodiversity Conservation Act 1999*. These include:

- Brigalow (*Acacia harpophylla* dominant and co-dominant), listed as Endangered;
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, listed as Critically Endangered;
- Weeping Myall Woodlands, listed as Endangered;
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin, listed as Endangered;
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions, listed as Endangered.

Large areas of mapped remnant and regrowth vegetation occur throughout the study area, with varying levels of protection under the VMA. Sixteen Regional Ecosystems with an endangered VMA status are mapped in the region with an additional nine having an endangered biodiversity status.

The region has a floristic and faunal diversity with over 3000 native flora and fauna species recorded including more than 120 threatened and near-threatened species. The region contains important populations of numerous federally and state listed species such as Yellow Chat (*Dawson*) (*Epthianura crocea macgregori*), Squatter Pigeon (*Geophaps scripta scripta*), Northern Quoll (*Dasyurus hallucatus*), Yakka Skink (*Egernia rugosa*), Marlborough Blue (*Cycas ophiolitica*) and Black Ironbox (*Eucalyptus raveretiana*). Extensive wetlands (covering almost 10% of the region) provide habitat for many migratory waders that roost and forage in these habitats before annual migrations to the northern hemisphere.

The region hosts extensive marine areas that are critical for numerous species of conservation significance. Corio Bay is a mapped Fish Habitat Area and Shoalwater Bay Conservation Park is a Dugong Protection Area. The Great Barrier Reef Marine Park provides important breeding habitat for marine fauna including several endangered species of turtle such as the Loggerhead Turtle (*Caretta caretta*).

The Fitzroy River is the region's major waterway and a key ecological feature. The river delta and flood plain are considered to be nationally important wetlands, and the river is mapped as a Fish Habitat Area. The Fitzroy River delta hosts one of 3 known populations of the critically endangered Yellow Chat (Dawson). Several other nationally significant wetlands occur within the region including Broad Sound, Dismal Swamp – Water Park Creek, Hedlow Wetlands, Island Head Creek - Port Clinton Area, Iwasaki Wetlands and Yeppoon - Keppel Sands Tidal Wetlands.

3.2 Current Planning Scheme and Policies

Rockhampton Regional Council currently administers four planning schemes (Livingstone, Fitzroy and Mount Morgan local government authority planning schemes). The general principals of land management are generally consistent between the four former administrations. However, the difference between the local ecosystems and importance within the planning provisions which is placed on various environmental aspects varies between the schemes. For example, Livingstone places much emphasis on its coastal location and incorporates fairly strict controls on developments in identified key areas of visual significance, but this is not the case for the remaining three schemes. Livingstone has a large tourist economy which relies on the visual and amenity side of the area, and as such, importance has been placed on protecting this aspect of the environment within the provisions of the planning scheme.

By contrast, heritage is valued highly within the Mount Morgan area. Planning provisions within that planning scheme aim to protect and enhance the cultural and heritage aspects of the township to ensure its intrinsic value is protected within the realms of the tourism economy and for the visual amenity and heritage for residents.

Zoning and development codes for specific developments also contain generalised environmental provisions – servicing, bushfires, landscaping, flood avoidance requirements etc.

The Livingstone Planning scheme includes riparian management provisions intertwined within its development codes.

3.2.1 Rockhampton 2050

The Rockhampton 2050 document is a forward planning strategic document which intends to ensure that future growth and development issues are addressed to ensure that Rockhampton Regional Council develops in a sustainable and equitable manner. Priority Initiative 3 Environment addresses:

- Regional environmental assets;
- Natural environment;
- Environmental conservation and preservation; and
- Environmental enhancement and climate change; carbon pollution reduction and energy efficiency.

Indigenous issues are addressed in a number of sections throughout the document. However, section 6.5 Human and Social Development – Strategy 2 Support and celebrate diversity advocates increased knowledge of diversity including awareness of indigenous values.

The Rockhampton 2050 document discusses the formation of teams to ensure that the aims of the strategies are fulfilled. These teams should collaborate closely with the strategic planners compiling the new planning scheme to ensure the relevant provisions are highlighted and dealt with appropriately within the planning framework.

3.3 Review of PIP

The Rockhampton Regional Council comprises the previous local governments of Livingstone, Fitzroy, Mount Morgan and Rockhampton. Detailed Planning Assumptions Reports have been prepared for Livingstone, Fitzroy and Rockhampton. The Mount Morgan Priority Infrastructure Plan appears to be a preliminary draft.

The purpose of this report is to identify consistencies and opportunities for application over the entire region (**Tables 3.1 – 3.4**). The documentation contains many similarities in structure and intent. However, there are a number of significant inconsistencies which will require resolution if there is to be a consistent approach to Natural Environmental planning and the production of a Council wide Priority Infrastructure Plan (PIP).

3.4 Literature Review

A literature review was undertaken to identify corridor requirements. Essentially, large scale ecological corridors are primary landscape connections that provide habitat and dispersal opportunities for a wide range of flora and fauna (Bennett, 2003; DEC, 2004). Corridors are regarded as essential landscape components for maintaining ecosystem function and a diversity of native flora and fauna species (Noss, 1987; Beier & Noss, 1998; Hilty et al., 2006). If designed appropriately, corridors are particularly important for facilitating species movement between otherwise isolated populations, which in turn promotes the necessary genetic exchange required to maintain viable long-term species populations (Tillman et al., 1997).

Effective ecological corridors are appropriate mitigation for habitat fragmentation as they facilitate the movement of fauna between fragmented habitats and promote genetic exchange between sub-populations. The primary purpose of ecological corridors is to connect at least two significant habitat areas (Beier & Loe, 1992; DEC, 2004). When designed correctly, ecological corridors should fulfil several key functions.

Ecological corridors operate on several scales including regional, sub-regional and local. Appropriate corridors widths are determined by many factors, including home range of species identified as potential users of the corridors, the length of the corridor, the topography and vegetation of the corridor and adjacent human activities and disturbances (Reed et al., 1975; Harrison, 1992; DEC, 2004). To function as a broad-scale landscape linkage, corridors must be wide enough to support many ecosystem processes and enable fauna and flora to move between larger reserves over an extended period of time (Hess & Fischer, 2001).

The recommended widths of corridors that are designed to operate on a regional scale ranges from a minimum of 500m in current literature. Sub-regional corridors are generally 300m wide, while local corridors can function at a width of 50m.

Table 3.1: Net Developable Area

Constraints/ Development Standards	Net Developable Area				
	Rockhampton City Council PIP	Livingstone Council PIP	Fitzroy Council PIP	Mt Morgan PIP	Proposed Development Standard
Waterway buffer	30m	25m	25m	NS	30m (DERM Standard)
Endangered and of concern Regional Ecosystem vegetation	Yes	Yes	Yes		yes
Remnant Vegetation			Yes		yes
Flood Hazard	overlay		Scheme		N/A
Marine and inland wetlands			Yes		yes
Environmentally sensitive areas	overlay				yes
Slope	15%	20%			15% Dept of Community Safety
Existing easements	Yes	Yes	Yes		yes
Government owned land (ex Public housing)		Yes	Yes		yes
Roads and Parks					
20% 12 dwg/developable ha	Mapped	R1 zone			Mapped as 12 dwg / developable ha
14 dwg/developable ha	Mapped		Town zone residential		Mapped as 14 dwg / developable ha
16 dwg/developable ha	Mapped				Mapped as 16 dwg / developable ha
10% 25 dwg/developable ha	Mapped	Park Residential	Town zone residential accommodation		Mapped as 25 dwg / developable ha
33 dwg/developable ha	Mapped				Mapped as 33 dwg / developable ha

Table 3.2: Calculation of Ultimate Population Density

Calculation of Ultimate Population Density				
Local Government Area	Lot Densities per Ha		Population Density per Dwelling	Proposed Development Standard
Rockhampton	Designated lot density	12/Ha 14/Ha 16/Ha 25/Ha 33/Ha 50/Ha 60/Ha 100/Ha	2.7 p/detached dwg 1.6 p/attached dwg 1.6 p/multiple dwg	2.7p/ detached dwg 1.6 p/attached dwg 1.6 p/multiple dwg 1.6 p/caravan
Livingstone	Density by zoning	Park Res 2/Ha R1 14/Ha R2 30/Ha R3 50/Ha	2.7 p/detached dwg 1.6 p/attached dwg 1.6 p/multiple dwg 1.6 p/caravan	
Fitzroy	Density by zoning	Park Res 2.5/Ha Town Res 14/Ha Town Res Accom. 50/Ha	2.8 p / detached dwg 1.7 p/attached, multiple, mixed use or other dwelling	
Mt Morgan			2.34 p/detached dwg 1.03 p/multiple dwg 1.96 p/other	

Table 3.3: Existing GFA and Employment Analysis

Existing GFA and Employment Analysis			
Local Government Area	Base Area of GFA	Floor Space Conversion Rates (GFA per employee)	Proposed PIP development Standard
Rockhampton	2008 Aerial Photography	Commercial Office – 25m ² Commercial Retail – 35m ² Commercial Other – 40m ² Special/Community Use – 80m ² Light Industry – 100m ² Heavy Industry – 200m ²	2009 Aerial Photography Commercial Office – 25m ² Commercial Retail – 35m ² Commercial Other – 40m ² Special/Community Use – 80m ²
Livingstone	2004 and 2009 Aerial Photography	Commercial Office – 25m ² Commercial Retail – 35m ² Mixed Use (Mixed Commercial or Mixed Residential & Mixed Commercial) – 30m ² Commercial Other – 40m ² Special/Community Use – 80m ² Industrial or Commercial Retail Showroom – 100m ²	Mixed Use (Mixed Commercial or Mixed Residential & Mixed Commercial) – 30m ² Light Industry or Commercial Retail Showroom – 100m ² Heavy Industry or Extractive Industry – 200m ²
Fitzroy	2005 Aerial Photography	Commercial Office – 25m ² Commercial Retail – 35m ² Commercial Other – 40m ² Special/Community Use – 80m ² Light Industry – 100m ² Industry and Extractive Industry – 200m ²	
Mt Morgan	No standard stated	No standard stated	

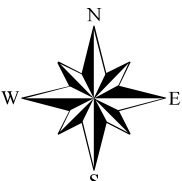
Table 3.4: Calculation of Ultimate Commercial GFA Capacity

Calculation of Ultimate Commercial GFA Capacity				
Local Government Area	Developable Area	Site Cover	GFA Ratio or Max Height	Proposed Development Standard
Rockhampton		As set by the Rockhampton City Plan 2005 CBD – 100% up to 3 storeys and 60% above 3 storeys Specialist sub regional centre – 80% Other centres, Highway Business Areas and any Local Shops/General Stores – 60%	CBD heights – 3 to 12 storeys as per Planning Scheme Map 3 All other parts of the city – max height of 2 storeys	
Livingstone	No standard stated			
Fitzroy				
Mt Morgan				

Figure 3.1 - Study Area

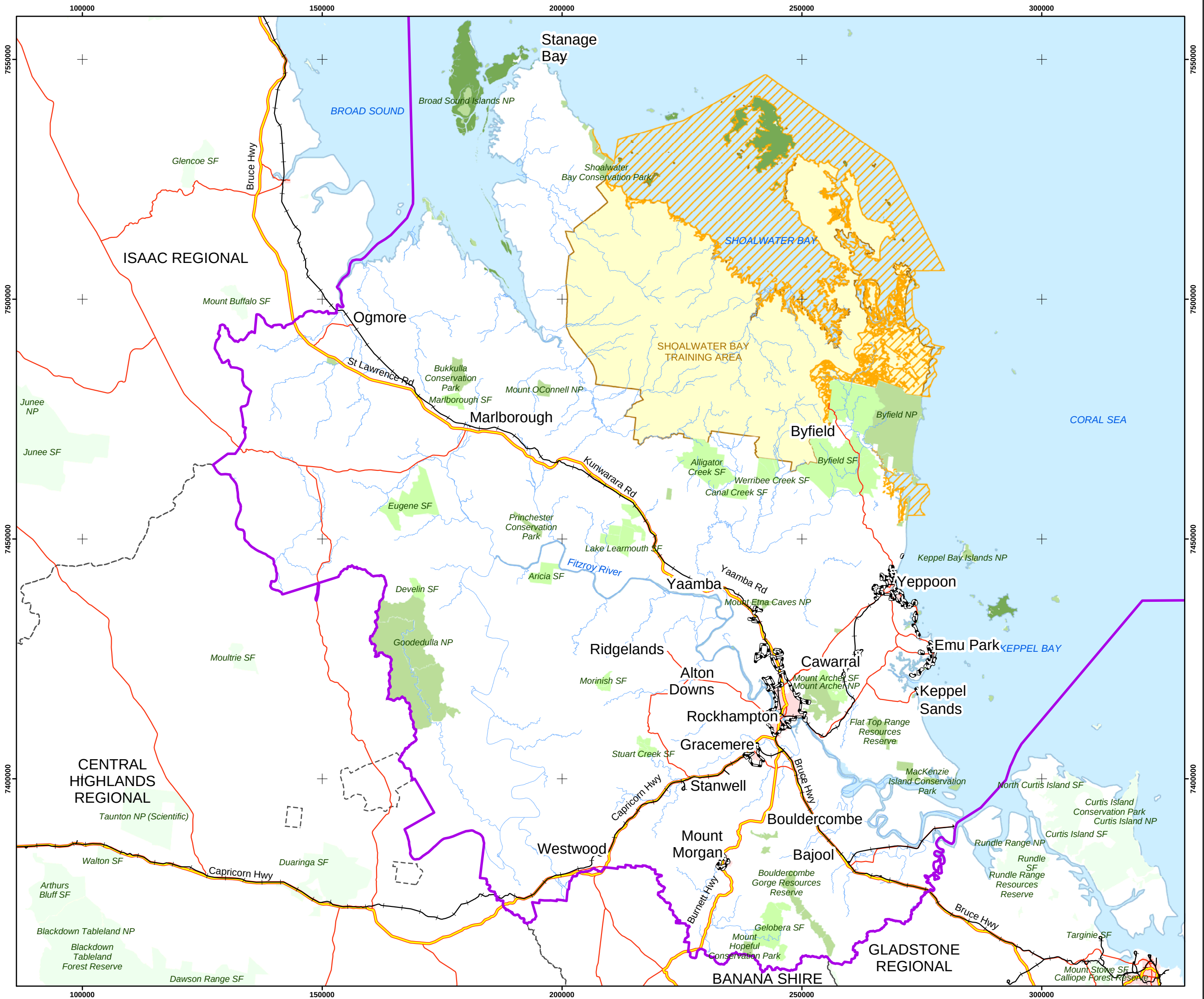


- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Shoalwater Bay Military Training Area
- Built Up Area
- Study Area
- PIA
- Local Government Boundary
- QLD Estate Outside Study Area
- State Forest
- National Park
- World Heritage Area
- RAMSAR Wetland



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Scale 1 : 730,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



4.0 Biophysical Values

4.1 Tract Size

A review of tract size across the study area identified that the northern extent of the study area is comprised of large areas of contiguous vegetation (>100 000ha), extending from the north of Yeppoon to Stanage Bay, including approximately 30% of the study area (**Appendix A**). These areas are very high value tracts, and incorporate large coastal regions, as well as Mount Mulgrave and the Normanby Ranges. Very high value tracts are generally associated with National Parks and conservation areas, including Byfield National Park, Werribee National Park, and Alligator Creek State Forest. These areas are capable of supporting a greater diversity of flora and fauna species, as well as species with large home ranges, and are therefore considered to be of very high environmental value. Additionally, all islands were assigned a Very High rating regardless of the island size.

High value tracts of vegetation (50 000 – 100 000ha) occur to the west of Marlborough, incorporating Eugene State Forest, Aricia State Forest, Lake Learmouth State Forest, and Goodeddulla National Park, as well as other large tracts of remnant vegetation. High value tracts comprise approximately 10% of the study area. Moderate value tracts occur throughout the study area, generally associated with areas of existing town centres, such as Rockhampton, Mount Morgan, Stanwell, and Emu Park. These tracts of vegetation include smaller conservation areas such as Stuart Creek State Forest, and Mt Archer State Forest, as well as tracts of remnant vegetation, and include 16% of the study area.

Scattered tracts rated as low and very low occur throughout the study area, and are associated with fragmented areas of remnant vegetation.

4.2 Connectivity

Large areas of very high connectivity occur throughout the study area, incorporating approximately 42% of the study area. These areas are often associated with areas identified as comprising very high and high rating tracts (**Appendix B**). Additionally, areas of very high connectivity often comprise riparian vegetation. Areas of high connectivity occur throughout the study area, to the south-west of Ogmoo, north and north-east of Mount Morgan, and east of Rockhampton, and include approximately 12% of the study area. These areas of high and very high connectivity provide landscape connections to facilitate dispersal for a wide range of flora and fauna species, whilst also providing habitat. Connectivity is vital for maintaining the genetic exchange required for viable, long-term species populations.

Areas of moderate to low value connectivity occurs throughout the study area. These areas are of ecological value as they provide local connections and stepping stone connectivity between habitat nodes. A large area of very low connectivity occurs surrounding Bajool, due to the fragmented nature of vegetation within this area.

4.3 Condition

Approximately 50% of the study area received a very high condition rating, as large areas of remnant vegetation occur throughout the study area (**Appendix C**). No undisturbed remnant vegetation was identified within the DERM supplied data. Small areas of moderate value vegetation occur, comprising regrowth vegetation. These areas account for less than 1% of the study area. Plantations are present in the north east of the study area, rated as low value. Scattered areas of very low condition occur throughout the study area, comprising areas not mapped by DERM as remnant or regrowth vegetation.

4.4 Threatened Species Habitat

A review of the Wildnet Database (DERM, 2010) identified 16 endangered, 40 vulnerable, and 28 near threatened flora and fauna species occurring within the RRC area. Several species have numerous recordings within the area, including the endangered Yellow Chat (Dawson), Black-throated Finch, and Marlborough Blue (*Cycas ophiolitica*). Glossy Black Cockatoo (*Calyptorhynchus lathami*) and Squatter Pigeon (*Geophaps scripta scripta*), both listed as vulnerable are also recorded several times.

Several scattered areas identified as very high and high value occur throughout the study area, particularly to the north of Byfield National Park. Areas identified as high and very high value are generally associated with tracts of remnant vegetation, often within existing conservation areas. These areas comprise point records, and are generally buffered by moderate value areas. Areas of very high and high value are considered to be critical habitat for threatened species. These isolated areas comprise approximately 6% of the study area.

Areas identified as moderate value for threatened species often buffer the isolated areas that are considered to be of high and very high value for threatened species. These areas, comprising approximately 12% of the study area, are considered to be of high ecological value, as they are currently providing habitat recourses for a range of threatened species.

The majority of the study area is considered to be of very low or low value for threatened species.

4.5 Ecosystem Diversity

The north east portion of the study area is comprised of areas of very high and high ecosystem diversity, indicating that these areas support large populations of a number of flora and fauna species. Additional areas of high ecosystem diversity occur to the south of Marlborough, at Mount Chalmers, and to the north of Ridgeland. Approximately 6% of the study area is rated as very high ecosystem diversity, while 26% is rated as high ecosystem diversity.

Approximately 3% of the study area is considered to be of moderate ecosystem diversity. A larger area occurs to the south west of Bajool, however the majority of are smaller tracts of vegetation. Isolated areas of low ecosystem diversity also occur throughout the study area.

The majority of the study area is rated as having very low ecosystem diversity, reflecting the lower diversity of species, and smaller species populations across non-vegetated portions of the study area.

4.6 Overall Biophysical Rating

The overall biophysical rating identifies several areas as very high value (**Figure 4.1**). This includes the large tracts of vegetation from Byfield to Stanage Bay that incorporates several conservation areas, as well as areas to the north and south of Marlborough. Approximately 25% (4,609,556ha) of the study area is rated as very high value. These areas are considered to be of the highest value, as they comprise large tracts of vegetation and are more likely to support large and diverse populations of numerous flora and fauna species.

Approximately 23% (417,042ha) of the study area is rated as having a high overall biophysical value, with areas such as Mount Morgan, and to the south west of Ogmoo mapped. Large areas between Keppel Sands and Rockhampton are also rated as high. These areas provide connectivity between areas of very high biophysical value, as well as providing important habitat for a range of native flora and fauna species.

Areas of very high and high value incorporate large tracts of least concern remnant vegetation. These areas also include tracts of Endangered regional ecosystems represented in tracts of high and very high biophysical value include 11.11.18, 11.3.1, 11.4.3, 8.3.2, and 8.2.13. Of Concern vegetation included in areas of high and very high value include 11.11.10, 11.3.4, 11.2.3, 8.11.6, 11.3.4, 8.2.4, 8.3.5, and 8.12.5.

Several areas of high and very high value are located within tidal areas along the coast line, particularly along Shoalwater Bay and Broad Sound. Additionally, areas that are constrained by steep slopes, such as the Normanby Ranges are also identified as very high and high value.

Given the constraints that steep slopes and flood affected areas pose to development, it is likely that these areas rate highly as they are undisturbed. The lack of the disturbance due to these constraints has attributed to the higher values of these areas.

Relatively small areas (29,976ha) of moderate value were identified within the region. Scattered areas rated as low (189,415ha or approximately 11%) occur throughout the study area. These areas are comprised of smaller tracts of remnant and regrowth vegetation, and are generally associated with areas of existing development, such as Rockhampton City and Stanwell. 710,722ha (39%) of the study area was identified as having a very low biophysical value.

Table 4.1 outlines the results for each criteria, as well as the overall biophysical assessment outcomes.

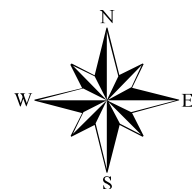
Table 4.1: Biophysical Assessment Results

Criteria	Very High		High		Moderate		Low		Very Low	
	ha	%	ha	%	ha	%	ha	%	ha	%
Connectivity	757722	41.91	222852	12.33	19015	1.05	56240	3.11	752282	41.61
Ecosystem Diversity	123804	6.85	480750	26.59	213376	11.80	39834	2.20	950345	52.56
Remnant Condition	919575	50.86	0	0	164014	9.07	7755	0.43	716766	39.64
Threatened Species	89546	4.95	18822	1.04	231277	12.79	818488	45.27	649978	35.95
Tract Size	545608	30.18	196050	10.84	282410	15.62	58058	3.21	725985	40.15
Total Biophysical	482690	26.7	419184	23.18	168361	9.31	30088	1.66	707786	39.15

Figure 4.1 - Overall
Biophysical Rating

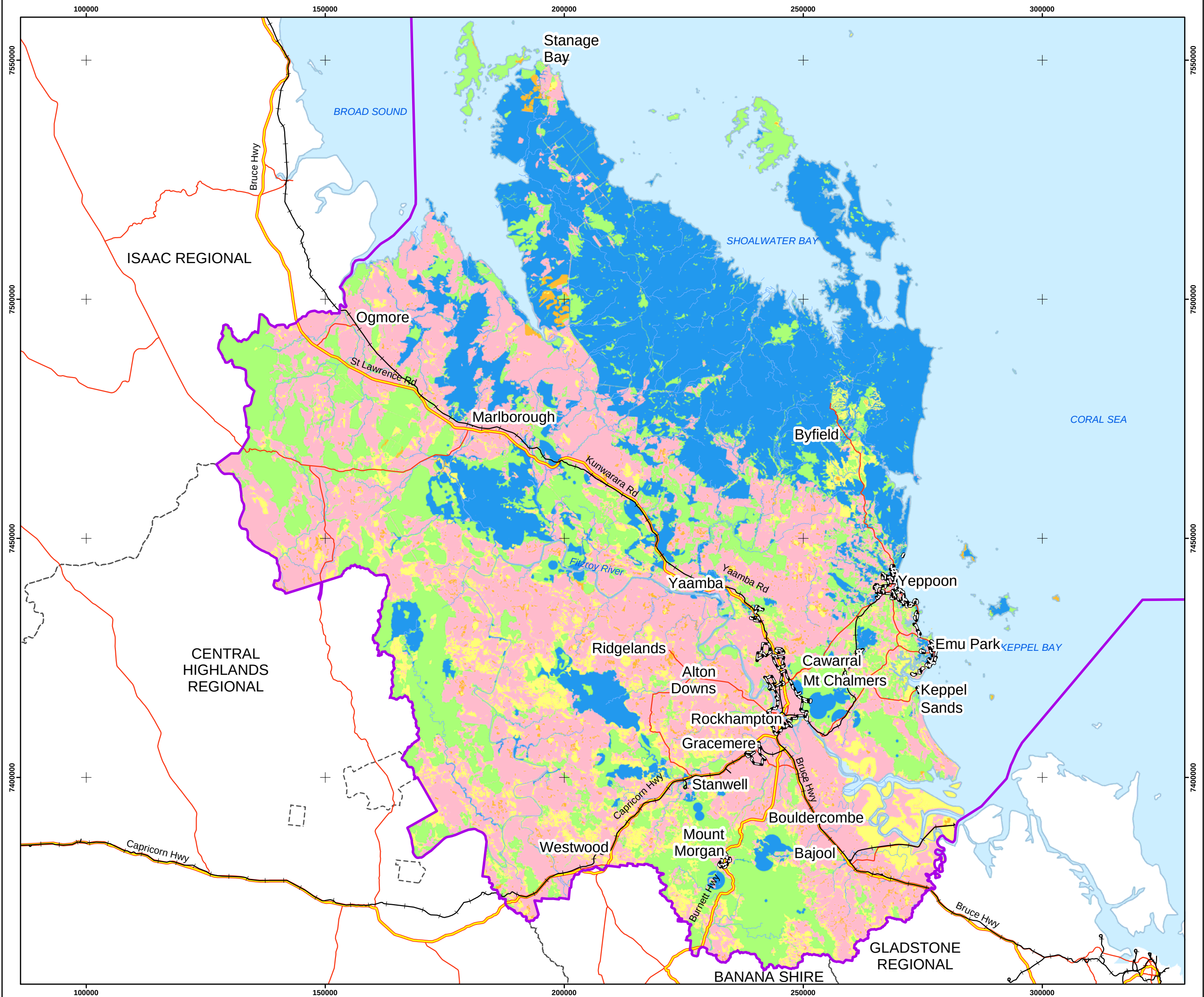


- Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Overall Biophysical Rating**
- Very High
 - High
 - Moderate
 - Low
 - Very Low



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Scale 1 : 730,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



5.0 PIP Implications

5.1 Preliminary Biophysical Review

A preliminary review of the PIA indicates that the majority of these areas are considered to have a very low biophysical value. Of note, however, the Bangalee PIA within Livingstone includes one small area of very high biophysical value, with scattered areas of moderate value. The PIA is bound by areas of high and very high biophysical value to the west. The Carrawal PIA (within Livingstone) is comprised of a mosaic of high, moderate, and very low biophysical value. It is also located within a tract mapped as high biophysical value that forms part of an ecological corridor.

Glendale incorporates an area of high and moderate biophysical value, including an ecological corridor through the centre of the PIA. The southern portions of the Emu Park PIA include areas of high, moderate and low biophysical value, however the majority of the PIA is considered to be of very low biophysical value. Similarly, while the majority of Keppel is considered to be of very low value, the north-west portion is mapped as high and moderate biophysical value. Taranganba, The Caves, and Yeppoon PIA's incorporate areas of high and moderate value. The majority of the Rockhampton City PIA is considered to have a very low value given the current level of disturbances. However, areas consisting of high and moderate occur to the north.

A review of the overall biophysical analysis also identified a viable ecological corridor occurring throughout the study area, comprising very high and high value areas.

5.2 Application of Criteria

Analysis of vegetation tract size and connectivity (refer **Section 2.2.2**) provide an opportunity to address the quantum of vegetation cover within and outside the Priority Infrastructure Area (PIA). The biophysical ratings described in **Section 4.0**, identifies areas of very high, high, moderate, low and very low value. As a general principle, areas of very high, high and moderate biophysical value should be conserved and not utilized for future development. Unfortunately, some areas with a very high and high biophysical rating are highly fragmented, and isolated from larger tracts of quality vegetation cover due to past agricultural and subsequent urban development practices. The long-term conservation of these areas will always be difficult; this does not abrogate Council, land owners and land users responsibility to protect areas and localities with statutory flora protection.

Through the use of the total biophysical ratings this report has identified natural areas to be considered for protection during the review of the planning scheme. Consequently, those areas identified as having very high, high and moderate total biophysical ratings may have impacts on the ability of land to achieving ultimate development envisaged in the PIP.

As Rockhampton Regional Council does not have a PIA or subsequent PIP analysis which covers the whole of the Regional Council area, this report relies on the analysis undertaken in the :

- Rockhampton City Priority Infrastructure Plan – Planning Assumption Report;
- Livingstone Shire Priority Infrastructure Plan – Planning Assumption Report;
- Fitzroy Shire Priority Infrastructure Plan – Planning Assumption Report; and
- Mount Morgan Priority Infrastructure Plan.

It is not the purpose of this report to review:

- The location of the IPA boundary. However, this may be a consequence of the recommendations of report;
- The desired standards of service for each trunk infrastructure network;
- Plans for trunk infrastructure for each network to service to service existing and future demand; or
- Any infrastructure schedule.

Rather this and subsequent reports will assess the:

- Implications of Natural Environmental features on achieving the assumptions about the type, scale, location and timing of development; and
- The implications of the outcomes of this analysis on achieving the estimates for future population and employment growth in a consolidated PIP for Rockhampton Regional Council.

The PIP's for Rockhampton, Livingstone, Fitzroy and Mount Morgan were produced under different administrative guidelines there are some differences in the assignment of base line criteria. Sections 3.1 Current Planning Scheme Policies and 3.2 Review of PIP above, discuss these issues in detail. For the purpose of this report the following criteria have been applied:

- Population density per dwelling type:
 - » 2.7 p/detached dwelling
 - » 1.6 p/attached dwelling
 - » 1.6 p/multiple dwelling
 - » 1.6 p/caravan
- Floor Space conversion rates:
 - » Commercial Office – 25m²
 - » Commercial Retail – 35m²
 - » Commercial Other – 40m²
 - » Special/Community Use – 80m²
 - » Mixed Use (Mixed Commercial or Mixed Residential & Mixed Commercial) – 30m²

- » Light Industry or Commercial Retail Showroom – 100m²
- » Heavy Industry or Extractive Industry – 200m²

5.3 Analysis

All moderate, high and very high vegetation tract and connectivity measures were analysed, and data on the quantum of vegetation cover within and outside the Priority Infrastructure Area (PIA) calibrated. Vegetation cover was then correlated with existing zoning and digital aerial photography to ascertain current land use, validation of vegetation presence and opportunities for vegetation retention and connectivity with larger vegetation tracts. An initial assessment of the impacts of vegetation retention on development expectation anticipated by the PIP was undertaken.

A more detailed and rigorous assessment of the impact of the designation of environmental features was undertaken by overlaying overall biophysical rating mapping over the PIP, and again correlating these data sets against existing zoning future development intentions (identified in the four Priority Infrastructure Plan Planning Assumption Reports) and digital aerial photography. Estimates of the land area affected and impact on population generation were undertaken; and options for land management practices made for each vegetation tract assessed.

A final assessment of the impact of the designation of environmental features was made as the data on the presence of multiple threatened species became available. The net impact of this was a general reduction in the overall significance of the biophysical rating of urban vegetation tracts. These modifications have been reflected in the outputs in Appendix G and H.

The PIP analysis indicates that in the order of 108.55 hectares of urban predominately residential land within the PIA for the four previous Council areas will be affected through the allocation of very high to moderate overall biodiversity ratings. The implication is that Natural Environment features will potentially reduce the ultimate population within the PIA by 3,517 equivalent persons. Alternatively, the equivalent are of important ecosystems will be lost, with further indirect impacts to remaining areas as a result of edge effects and disturbances such as weed infestation, additional light and noise, litter, and increased access.

The PIP analysis is included on **Appendix G**. The overall biophysical rating of each site was used to calculate the area impacted upon and assess the implications of achieving the estimates for future population and employment growth. The alpha reference refers to each of the former local government areas, and each map reference is designated on the overall biophysical rating maps included in **Appendix H**.

6.0 Strategic Policy Recommendations

6.1 PIP Areas

A review of the PIA indicated that several small areas of very high, high and moderate rating biophysical value occur within PIA's. It is feasible to form local scale ecological corridors to retain these areas within future development. Fifty metre wide corridors throughout the PIA are adequate for the protection of these sensitive areas, and will result in an effective local corridor network. It is recommended that these corridors will be incorporated into subsequent reconfiguration design. It is considered that this outcome will not sterilise development, however, there may be some loss in yield. Determining the exact impact cannot be determined at this stage as the total quantum will be a factor of development design, layout, building form and ownership methodologies utilised.

Additionally, a number of larger tracts of land were identified as having very high, high or moderate biophysical ratings within the PIA. Due to the size and configuration of these areas, it is recommended that these areas are retained as part of future development. Although there may be some loss in yield, this may be reduced and in some cases completely mitigated by environmentally sensitive development design, topographically responsive layout, light weight post and peer building forms, and innovative ownership methodologies.

As noted in the analysis, the bushland associated with Mount Archer National Park, generally to the east of Frenchville Rd Frenchville, Berserker Foothills and the Norman Road Residential Area of Rockhampton, requires a coordinated approach to balancing bushland protection against bush fire mitigation. There are a number of tracts of vegetation which connect back to Mount Archer National Park. Unfortunately due to existing land use and reconfiguration patterns, there is a significant fire risk between the National Park and dwelling stocks. It is recommended that Council review current land use patterns of development and examine opportunities to improve the safety and security of existing development and ascertained whether future development can be used as a mechanism to reduce the current risk to fire, while minimising the negative impacts on the integrity of the interface between urban development and the National Park. Until this determination is made it is not possible to make a recommendation on opportunities to conserve areas of high to very high biophysically rated land or whether significant bushfire buffers need to be established.

It is proposed that the overall biodiversity ratings form the basis of identification of vulnerable tracts of vegetation within the PIA and over potential urban development areas in close proximity to the PIA boundary. Land with a moderate, high or very overall biodiversity rating could be included in a vegetation protection development constraint. Any proposal to clear this land should be supported by a detailed biophysical impact assessment outlining conservation measures proposed, offset plantings and ongoing environmental support and management techniques proposed.

It is further recommended that where land is identified as having moderate, high or very high overall biodiversity rating, that efforts be made to conserve or create urban nature corridors with a minimum width of 50m to provide connectivity between tracts of urban vegetation.

6.2 Conservation Strategy

It is recommended that a conservation strategy is developed that identifies areas of high and moderate priority for protection. **Figure 6.1** outlines a proposed conservation strategy, identifying areas of high and medium priority for protection. Additionally, an indicative corridors network has been incorporated to promote the protection of linkages throughout the region. A waterways network has also been incorporated within the Conservation Strategy.

6.2.1 Corridors

An indicative network of large scale regional corridor locations has been identified throughout the study area. The indicative corridors are displayed at 4km wide, and are not considered suitable for implementation as a regional corridor network. Targeted corridor studies are required to identify a regional corridor network with a minimum width of 500m for implementation. Corridors are considered to be a high priority for conservation, as they will provide a linkage throughout the region. Areas of very high and high value within the corridor network are critical for maintaining ecological processes and providing regional connectivity. While portions of the indicative corridors are considered to be of low and very low biophysical value due to urban and rural land management, they are important to the establishment and protection of a functioning open-space network and facilitate important ecological processes such as dispersal. These areas are recommended as priority rehabilitation areas through planning schemes and processes, such as land acquisition and offsets.

6.2.2 Waterways

A network of local corridors based on waterways has been identified throughout the study area (**Figure 6.1**). These incorporate riparian areas that range from highly disturbed to intact remnant vegetation. Waterways are of high ecological value as they provide natural corridors throughout the landscape matrix. Riparian corridors also generally provide many functions including habitat diversity, food resources and water availability, as well as important breeding habitat for a range of species.

A nominal 50m buffer has been applied to the waterways, as this is an appropriate width to function as a local movement corridor. It is noted that it is not possible to achieve a 50m corridor to all waterways, particularly portions of the Fitzroy River within town centres. Additionally, portions of the waterways are identified as low biophysical value. These areas are recommended as priority rehabilitation areas.

6.3 Natural Area Protection and Prioritisation

Natural areas throughout the region were assessed and prioritized for future protection based on their biophysical rating and the level of protection that current planning and legislative tools provide (**Figure 6.1**). The assessment identified areas that have very high or high biophysical value, but are currently unprotected. These areas are a high priority for protection in the planning scheme review. While they are critical components of the region, areas with a very high protection rating (such as National Parks and World Heritage Areas) were considered to be of moderate priority because they already have a high level of protection. Areas considered to be low priority for protection have lower biophysical value, and are suitable for development. A management toolbox has been developed, and outlines a range of tools for each priority level (**Table 6.1**).

While areas within ecological corridors should be considered as high priority areas, they have not been identified in this assessment. Further targeted studies should be conducted to identify regional corridors at a property scale to ensure areas of high priority are accurately identified.

6.3.1 High Priority

Areas of high priority include areas which are not subject to environmental legislation, specific planning controls or other protection measures, but are of high conservation value. These areas are considered to be locally significant, and include tracts of remnant and regrowth vegetation, and areas supporting numerous flora and fauna populations. These areas should be enhanced and preserved within future planning schemes as core areas of a regional open space network to conserve biodiversity. These areas provide habitat for a range of flora and fauna species, and stepping stones between areas of very high value critical habitat for flora and fauna species, as well as linkages between large tracts of vegetation.

Permanent protection measures are recommended for these areas. It is recommended that these areas are targeted for acquisition to ensure conservation. Alternatively, these areas should be zoned to reflect their ecological values, or identified within an overlay map as high or very high value. Additional protection tools that may be suitable include the implementation of Vegetation Protection Orders or Voluntary Conservation Agreements. Where possible, dedication through the development assessment processes should target these areas. Toolbox A outlines a range of tools to protect high priority areas (**Table 6.1**).

6.3.2 Medium Priority

Areas which were rated as medium priority include areas subject to a strong legislative framework, such as National Parks, State Conservation Parks, World Heritage Areas, Referable wetlands, and Endangered Regional Ecosystems. These areas are constrained for future development by State and Federal legislation, and accordingly do not require additional protection through the planning scheme. Additionally, areas of moderate ecological value, with moderate to low protection are also considered as a medium priority.

Areas such as National Parks and World Heritage Areas provide important habitat for threatened species, and support a high diversity of flora and fauna. These areas provide breeding areas and habitat nodes for a range of species. Future planning schemes should reflect these values within an overlay map.

Areas of moderate biophysical value that are identified as a medium priority often provide habitat for a range of flora and fauna species. Additionally, these areas are often strategically located to buffer areas of very high and high ecological value. It is recommended that these areas are identified within a conservation overlay as they may contribute to a regional open space network, and provide a buffer to areas of very high and high biophysical value. Additionally, some areas may be suitable for a conservation zoning and vegetation protection orders. Where moderate priority areas occur within regional and local corridors, it is recommended that they are targeted for acquisition, or zoned for future protection. Areas within corridors should be considered for dedication through development assessment processes. Toolbox B outlines a range of tools to protect moderate priority areas (**Table 6.1**)

6.3.3 Low Priority

Areas which are rated as low priority are not currently protected under State of Local legislation. These areas are considered to have a low or very low biophysical rating, and are generally considered suitable locations for future development. However, where areas of low priority occur within conservation corridors, it is recommended that they are considered for future conservation to maintain regional connectivity. These areas should be targeted for dedication through development assessment processes.

Toolbox C outlines a range of tools to that are suitable for low priority areas (**Table 6.1**).

Table 6.1: Management Toolbox

Toolbox	Protection Tool	Recommendations
A	- Land Acquisition - Conservation Zoning - Voluntary Conservation Agreements - No intensification of current land use - Vegetation Protection Order - Dedication through the Development Assessment Process	- Permanent protection measures should be the first priority for these areas to ensure their long-term protection. - Consider changing zoning to conservation purposes. - Planning scheme maps should be developed to identify these areas conservation areas. - Dedication as public open space should be sought.
B	- Conservation zoning - Voluntary Conservation Agreements - No intensification of current land use - Identify and target areas within key regional corridors - Vegetation Protection Order - Land for Wildlife - Dedication through the Development Assessment Process	- Investigate potential for some areas to be rezoned as conservation zones. - Identify opportunities for implementation of Voluntary Conservation Agreements and Land for Wildlife Programs - Planning scheme maps should identify areas that are within regional corridors. - Vegetation Protection Orders should be considered. - For properties subject to development applications, dedication as public open space should be sought.
C	- Target areas within regional corridors for acquisition and rehabilitation - No intensification of current domain within regional corridors - Vegetation Protection Order where intact remnant vegetation occurs. - Dedication and rehabilitation of areas within regional corridors through the Development Assessment Process	- Planning scheme maps should identify areas within regional corridors. - Vegetation Protection Orders should be instated on vegetated areas

6.4 General Recommendations

6.4.1 Overlays

It is recommended that a biodiversity overlay is developed for the whole of the study area, that clearly identifies areas of very high, high, and moderate biophysical value. A performance objective should be developed that recommends vegetation in these areas be retained, and clearing be avoided. Additionally, buffers to areas of very high and high biophysical should be identified on this overlay. Where clearing is proposed, the application should be supported by an ecological assessment outlining the ecological values and conservation measures proposed, as well as mitigation measures such as offset plantings, and management techniques.

The overlay should also identify ecological corridors and waterways networks, as outlined in **Section 6.3**. Targeted studies should be conducted to clearly define regional and local scale ecological corridors, and identify a riparian corridor network. Development should seek to avoid clearing within ecological corridors and contribute to the dedications and rehab of these areas.

6.4.2 Additional Studies

It is recommended that additional studies are undertaken to ground-truth the overall biophysical ratings. Ground-truthing should initially focus on council reserves and parks that have received very high or high overall biophysical ratings to assess the accuracy of these ratings.

Additional studies should be conducted to identify an accurate ecological corridor network, including regional, local and riparian corridors.

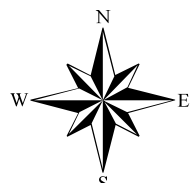
Throughout the study, a number of narrow, linear tracts of vegetation were noted to align with unconstructed or partly constructed roads in road reserves. Some of these tracts contain the only remaining examples of REs within the study area. It is recommended that council liaise with DERM to examine opportunities to develop methods for the conservation of remnant vegetation within these road reserves.

In addition, a number of individual trees were sited throughout the study area that is of a size that indicates their presence prior to European settlement. It is recommended council identify and conserve these trees through a VPO.

Rockhampton Regional Council
Natural Environment Study
Figure 6.1 - Prioritisation
For Protection

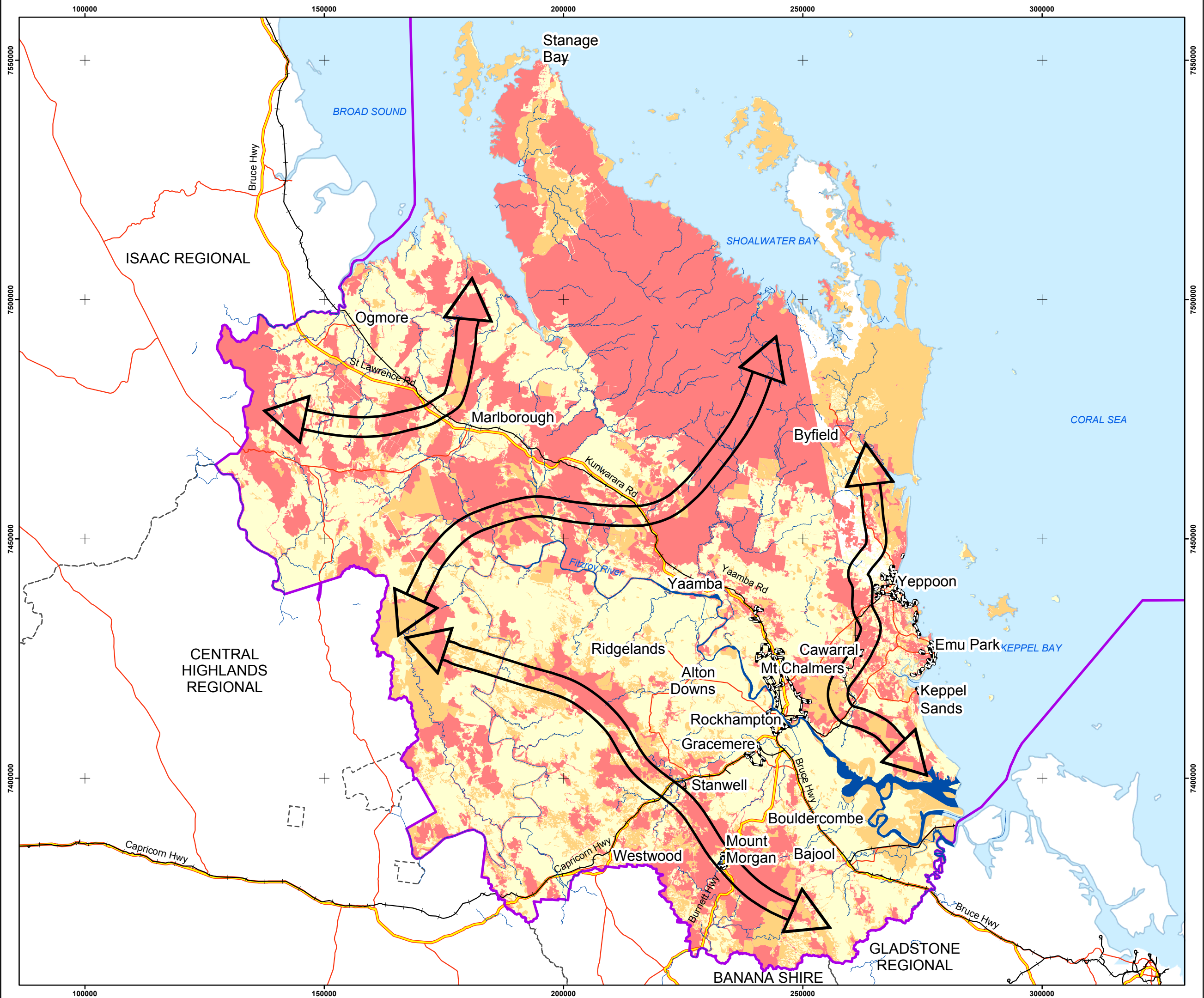


- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary
- Prioritisation Rating**
 - High
 - Medium
 - Low
- Corridors**
 - Riparian Corridor (50m)
 - Indicative Regional Corridor (4km)



0 35007000 14000 21000 28000 m

Scale 1 : 730,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



7.0 Indigenous Cultural Heritage Issues

7.1 Introduction

RPS advised RRC at the inception of this project that it was unlikely that an Indigenous Cultural Heritage features map could be produced as part of the project. There are two fundamental reasons for this approach:

- (a) It is not possible at present to produce a 'map' of Indigenous cultural heritage sites;
- (b) Further, no mapping exercise would abrogate Council's or any other individual or company's duty of care responsibility to the protection of Indigenous Cultural Heritage within the Rockhampton Regional Council Area.

Despite this, the *Aboriginal Cultural Heritage Act 2003* binds all persons, including the State, and is intended to provide effective recognition, protection and conservation of Aboriginal cultural heritage.

The study area substantially covered by the Darumbal Enterprises Native Title Claim. The external boundary of the area subject to the Darumbal People's registered Native Title Claim (QC 97/21), registration date 13 Feb 2008 is shown on **Appendix H**.

7.2 Aboriginal Cultural Heritage Act 2003

The following fundamental principles underlie the Act's main purpose:

- (a) The recognition, protection and conservation of Aboriginal cultural heritage should be based on respect for Aboriginal cultural and traditional practices;
- (b) Aboriginal people should be recognised as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage;
- (c) It is important to respect, preserve and maintain knowledge, innovations and practices of Aboriginal communities and to promote understanding of Aboriginal cultural heritage;
- (d) Activities involved in recognition, protection and conservation of Aboriginal cultural heritage are important because they allow Aboriginal people to reaffirm their obligations to "law and country";
- (e) There is a need to establish timely and efficient processes for the management of activities that may harm Aboriginal cultural heritage.

The Act defines Aboriginal cultural heritage as anything that is:

- (a) A significant Aboriginal area in Queensland; or
- (b) A significant Aboriginal object; or
- (c) Evidence, of archaeological or historic significance, of Aboriginal occupation of an area of Queensland.

A significant Aboriginal area or object must be particularly significant to Aboriginal people because of either or both of the following:

- (a) Aboriginal tradition;
- (b) The history, including contemporary history, of any Aboriginal Party for the area.

7.2.1 Due Diligence – The Precautionary Approach

The *Aboriginal Cultural Heritage Act 2003* requires that a person must exercise due diligence and reasonable precaution before undertaking an activity which may harm Aboriginal cultural heritage.

7.2.2 Aboriginal Cultural Heritage Duty of Care

Section 23(1) of the *Aboriginal Cultural Heritage Act 2003* states that a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage (the “cultural heritage duty of care”).

Section 23(2) of the *Aboriginal Cultural Heritage Act 2003* states that without limiting the matters that may be considered by a Court required to decide whether a person has complied with the cultural heritage duty of care in carrying out an activity, the Court may consider the following:

- (a) the nature of the activity, and the likelihood of its causing harm to Aboriginal cultural heritage;
- (b) the nature of the Aboriginal cultural heritage likely to be harmed by the activity;
- (c) the extent to which the person consulted with Aboriginal parties about the carrying out of the activity, and the results of the consultation;
- (d) whether the person carried out a study or survey, of any type, of the area affected by the activity to find out the location and extent of the Aboriginal cultural heritage, and the extent of the study or survey;
- (e) whether the person searched the database and register for information about the area affected by the activity;
- (f) the extent to which the person complied with cultural heritage duty of care guidelines;
- (g) the nature and extent of past uses in the area affected by the activity.

Australian Heritage Commission's publication *Ask First: A guide to respecting Indigenous heritage places and values* (2002), provides a practical guide for land developers, land users and managers, cultural heritage professionals and many others who may have an impact on Indigenous heritage. This publication advocates that consultation and negotiation with Indigenous stakeholders is the best means of addressing Indigenous heritage issues. It is also the first and simplest step that people need to be undertaken. *Figure 1 Processes for identifying and managing Indigenous heritage places*, provided a methodology to ensure that a development proponent has addressed their duty of care obligations, while also acknowledging and respecting the role and primacy of local Indigenous communities as the custodians of local Indigenous cultural heritage (see **Appendix I**).

7.3 Engagement

To facilitate the outcomes of the Act and to enhance the relationship between Rockhampton Regional Council and the Darumbal People it is recommended that Council consider establishing an open and informative dialogue that respects and enhances the role of the Darumbal people in the protection of their cultural heritage in response to the development process.

Such an approach would:

- (a) Improve governance and leadership within the Rockhampton Regional Council, the development industry and the general Rockhampton community and Darumbal Enterprises Pty Ltd; and
- (b) Increase economic and social participation of Darumbal Enterprises Pty Ltd in the development process; and
- (c) Promote personal responsibility in the duty of care obligations of the development community; and
- (d) Enhance positive and respectful engagement and behaviours between Rockhampton Regional Council, the development industry and the Darumbal Enterprises Pty Ltd.

It is considered appropriate that the Rockhampton Regional Council acknowledge that they will establish a cooperative relationship with the Darumbal people through the Darumbal Enterprises Pty Ltd - cultural heritage body, non-government organisations, the business and corporate sector and all levels of government in an effort to close the gap on the Darumbal people's positive, respectful and rightful place in the protection of Indigenous Cultural Heritage throughout the development process.

To achieve this outcome it is proposed that Rockhampton Regional Council consider identifying and establishing a mutually acceptable agreement between the Council and Darumbal Enterprises Pty Ltd. Such an agreement may take the form of an Indigenous Land Use Agreement. However, if this is not considered appropriate, a more informal arrangement may be established, particularly in the initial stages. This agreement could include initiatives and approaches that strengthen ongoing engagement between the Council and the Darumbal Enterprises Pty Ltd and other stakeholders in the development community, so that identification, protection and management of Indigenous cultural heritage are seen as a positive contribution to the whole of the Rockhampton community.

7.3.1 Community Governance and Leadership

In open consultation, cooperation and partnership with Darumbal Enterprises Pty Ltd, Council may wish to consider establishing a Working Group or Indigenous Consultative Committee. The advantages of such a Working Group are that it can provide a platform from which it would be possible to:

- Facilitate effective engagement with Darumbal Enterprises Pty Ltd to ensure mutual understanding of the processes and obligations of the Integrated Development Assessment System (IDAS);
- Develop an action plan to monitor and report on the Indigenous Cultural Heritage implications of proposed forward planning projects, local area plans and appropriate development assessment applications;

- Establish a safe and private forum where the Darumbal Enterprises Pty Ltd may feel confident to discuss or identify cultural heritage issues associated with land management and planning throughout the Rockhampton Regional Council Area;
- Develop a communications strategy to ensure stakeholders outside of the Working Group are aware of and understand the new approach; and
- Encourage behaviors which facilitate economic and wider social participation between Rockhampton Regional Council, the development industry and the general Rockhampton community and Darumbal Enterprises Pty Ltd.

An added benefit of this approach is that there is the opportunity to:

- Integrate local government service coordination and governance mechanisms to plan and deliver integrated services;
- To provide practical access and better coordination of local government services with Darumbal Enterprises Pty Ltd; and
- To provide a base for coordination of whole of government operations for all Indigenous issues throughout the whole of the Rockhampton Regional Council area.

7.4 Indigenous Community Development

7.4.1 Historical Heritage

The identification, mapping and management of places of historical significance to non-Traditional Owner Indigenous groups, Indigenous groups not associated with the traditional Owners, Torres Strait Islander community and the South Sea Islander community, is not simply a matter of compiling anecdotal, historical and archaeological evidence, then advocating their providence as being of cultural heritage significance of a place. The relationship of historically significant places post-European settlement to Traditional cultural places should not be ignored. There should be a referral process to Darumbal Enterprises to ensure that all traditional Owner protocols are addressed.

This process is separate, but complementary to the Indigenous Consultative Committee described above. Resolution of the identification, mapping and management of places of historical significance to non-Traditional Owner Indigenous groups, Indigenous groups not associated with the traditional Owners, Torres Strait Islander community and the South Sea Islander community could, along with many other issues, be resolved through the establishment of a Rockhampton Regional Council Reconciliation Action Plan.

7.4.2 Reconciliation

It is proposed that the establishment of a Rockhampton Regional Council Reconciliation Action Plan would be best achieved through the formation of a working group that would inform, guide and resolve issues relating to identifying items and places of historical significance generally associated with post-European settlement. As well as achieving equity and access to community, health, employment and recreation opportunities for Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region. The working group would play a significant role in facilitating Council's knowledge of the needs and aspirations of Traditional Owners, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region.

Further it would be a strategic platform from which to launch programs to promote social unity and a more informed understanding of issues that exist between Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region

Importantly, the working group would provide a mechanism for promoting key strategies but also a governance structure to ensure that the objectives proposed are implemented.

The principal objectives of the working group could be to:

- (1) Develop a Reconciliation Action Plan for the Rockhampton Regional Council area. This plan would be developed in consultation with Reconciliation Australia and the Rockhampton Darumbal Enterprises. There may be opportunities to also involve the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region.
- (2) To enhance communication, mutual understanding, respect and cooperation between Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region, the Rockhampton Regional Council and the wider Rockhampton regional area community.
- (3) Identify and promote areas of unity, harmony and shared aims between Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region.
- (4) Identify those areas of difference that create community discomfort and disharmony; and identify ways to resolve or mitigate these issues for Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region.
- (5) Provide advice to the Rockhampton Regional Council on how mutually agreed outcomes of the Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community of the Rockhampton Region can be represented in the Rockhampton Regional Council's policies, local laws and programs.
- (6) Identify and maximise opportunities presented through partnerships with other community, business and government agencies to secure funding and service provision for Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community and the South Sea Islander community within the Rockhampton Region.

7.4.3 Reconciliation Action Plan

Reconciliation is a process to support the ongoing commitment and dialogue between both the Aboriginal and Torres Strait Islander people and the wider community and through this process, develop greater understanding and mutual respect. The success of reconciliation will be determined by the ability of Aboriginal and Torres Strait Islander people to overcome the injustices of the past and move forward as one community.

The purpose of developing a Reconciliation Action Plan is to support both the Rockhampton Region Aboriginal and Torres Strait Islander community and Rockhampton Regional Council in the process of building a community that recognises and respects the rights of Indigenous Australians and creates a place where they are respected and valued community members.

A Reconciliation Action Plan that is developed in partnership with Aboriginal and Torres Strait Islander people will provide the community the opportunity to determine its own destiny and how best to achieve this. A Reconciliation Action Plan is a commitment by all parties to work together to meet the long term aspirations of the Aboriginal and Torres Strait Islander people and build a strong and vibrant community.

The Reconciliation Action Plan should be drafted incorporating the latest Census Data, and information collected from Darumbal Enterprises, and the wider Aboriginal and Torres Strait Islander community through a working group established to maximise the relevancy of the information, and positive ownership of the document for all stakeholders.

The Reconciliation Action Plan should also be strategically aligned to Federal and State Government Policy, including 'Closing the gap on Indigenous disadvantage: the challenge for Australia' and Council adopted Strategic documents.

Reconciliation Australia have developed the framework for Reconciliation Action Plans as a means of continuing the process of reconciliation and 'Closing the Gap': to close the 17-year gap in life expectancy between Indigenous and non-Indigenous Australians.

The proposed process for development of the RAP includes the establishment of a working group within a framework with a strong monitoring, reviewing and reporting process.

The Reconciliation Australia web site (www.reconciliation.org.au) provides a framework for the preparation of Reconciliation Action Plans. The site provides access to the Reconciliation Action Plan Toolkit, and templates for Statement of Commitment, Reconciliation Action Plan Template and Reconciliation Action Plan Reporting Template. It also has resources for School Statement of Commitment and School Reconciliation Action Plan Model. Reconciliation Australia also provided professional support and guidance when preparing a Reconciliation Action Plan.

It is proposed that any Reconciliation Action Plan recognise Darumbal Enterprises as the Traditional Owners who have lived in this land and with ritual, story and law bound themselves to it, acknowledge the obligations they embrace and pay respects to those who carry on those traditions today.

The development and implementation of a Rockhampton Regional Council Reconciliation Action Plan should be designed to meet the needs and aspirations of the Darumbal Enterprises the Darumbal Traditional Owners, and the wider Aboriginal and Torres Strait Islander community including the Fitzroy Basin Elders Committee (FBEC); the South Sea Islander Community in Rockhampton and on the Cap Coast especially the Joskeleigh community; and other indigenous family groups with links to this country but are not associate with Darumbal Enterprises.

Although a Reconciliation Action Plan should recognise the currency of the Darumbal Enterprises native title claim, the Reconciliation Action Plan should have no bearing on the external boundary of the area subject to the Darumbal People's registered native title claim (QC97/21). Registration date 13 February 2008.

Outputs from the Reconciliation Action Plan process can include:

1. Establishment of an Indigenous Community Development Officer service.

This officer should be able to:

- (i) identify and assist in the development and improvement of the quality of life for Indigenous Australians in the Rockhampton Regional area;
- (ii) identify the needs and aspirations of the Indigenous Australian community in the Rockhampton Regional Council area and ensure honest and open relationships with members of this community;
- (iii) recognise and support the Indigenous Australian Community;
- (iv) build strong community relations community in the Rockhampton Regional Council area;
- (v) develop strategies to increase and enhance the process of reconciliation in the community in the Rockhampton Regional Council area;
- (vi) provide the opportunity for and cultural development to occur by Indigenous Australian Community for the Indigenous Australian community; and
- (vii) ensure access and equity for the Indigenous Australian Citizens to Council services.

2. Indigenous Land Use Agreement

Identify advantages and opportunities for the establishment of Indigenous Land Use Agreement.

3. Employment

Facilitating pathways to employment for indigenous community by assisting members of Aboriginal and Torres Strait Islander communities to:

- (i) make informed career choices;
- (ii) apply for further study, traineeships, apprenticeships or other employment;
- (iii) partner with service providers to deliver a program designed to increase employability skills of recipients;
- (iv) prepare employment applications and resumes, interview tips and personal presentation, your rights at work, career pathways and volunteering; and
- (v) provide participants with an insight into employment options currently available and enable them to develop skills and knowledge to be competitive in the job market.

8.0 Conclusion

RRC contains a diverse natural environment, comprising many areas of ecological significance. A review of the overall biophysical value identified that approximately 50% of the study area are considered to be of very high or high value, including areas to the north of Byfield, and south of Marlborough. These areas are generally comprised of large tracts of vegetation, and provide suitable habitat for a wide range of native flora and fauna species, including threatened species. Additionally, these areas form an ecological corridor throughout the region.

The PIP analysis indicates that in the order of 108.55 hectares of urban predominately residential land within identified PIA, for the four previous Council areas, will be affected through the allocation of very high to very high Total Biodiversity Ratings, with the potential to reduce the ultimate population within the PIA by 3517 equivalent persons.

The majority of the PIA areas are considered to have low to very low biophysical value. However, several small areas within the PIA are mapped as very high or high value. It is recommended that a series of 50m local ecological corridors are utilised to protect and enhance these areas. Additionally, large very high and high value tracts were identified for retention within the PIA. It is recommended that these areas are identified as future conservation areas.

The review identified areas of low and very low biophysical value as suitable for future development. These areas are considered to be a low priority for protection

While the current legislative and planning framework affords protection to many areas that are of very high or high biophysical value, several areas are currently unprotected. Areas of very high and high value that are currently unprotected have been identified as a high priority for protection and management during the future planning scheme review. Permanent protection measures should be a high priority for these areas, and the planning scheme review should consider identifying these areas within a conservation overlay. Additionally, these areas should be zoned to reflect their ecological values.

Areas that are of very high biophysical value, but are also protected under State or Federal legislation have been identified as a medium priority for protection. These areas are constrained for future development by State and Federal legislation, and accordingly do not require additional protection through the planning scheme. Additionally, areas of moderate ecological value, with moderate to low protection are also considered as a medium priority. These areas should be considered for dedication through development assessment processes.

Areas which are rated as low priority are not currently protected under State or Local legislation. These areas are considered to have a low or very low biophysical rating, and are considered suitable locations for future development.

Additionally, indicative corridor locations were identified as high priority for conservation, as they provide a linkage throughout the region. Targeted corridor studies should be conducted to identify property scale regional corridors within these areas. A riparian corridor network, buffered by 50m was also identified as a high priority for conservation.

Additional recommendations include developing a biodiversity overlay that clearly identifies areas of very high, high, and moderate biophysical value, as well as corridors and waterway networks, with performance objectives to encourage retention of vegetation, and buffering of very high and high value areas.

It is recommended that additional studies are undertaken to ground-truth the overall biophysical ratings, as well as high priority areas. Ground-truthing should initially focus on council reserves and parks that have received very high or high overall biophysical ratings to assess the accuracy of these ratings. Targeted corridor studies should be conducted to accurately map property scale local and regional corridors.

Appendix A

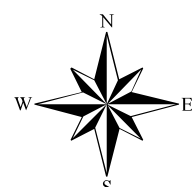
Biophysical Tract Size

Tract Size Rating

Rockhampton Regional Council Area

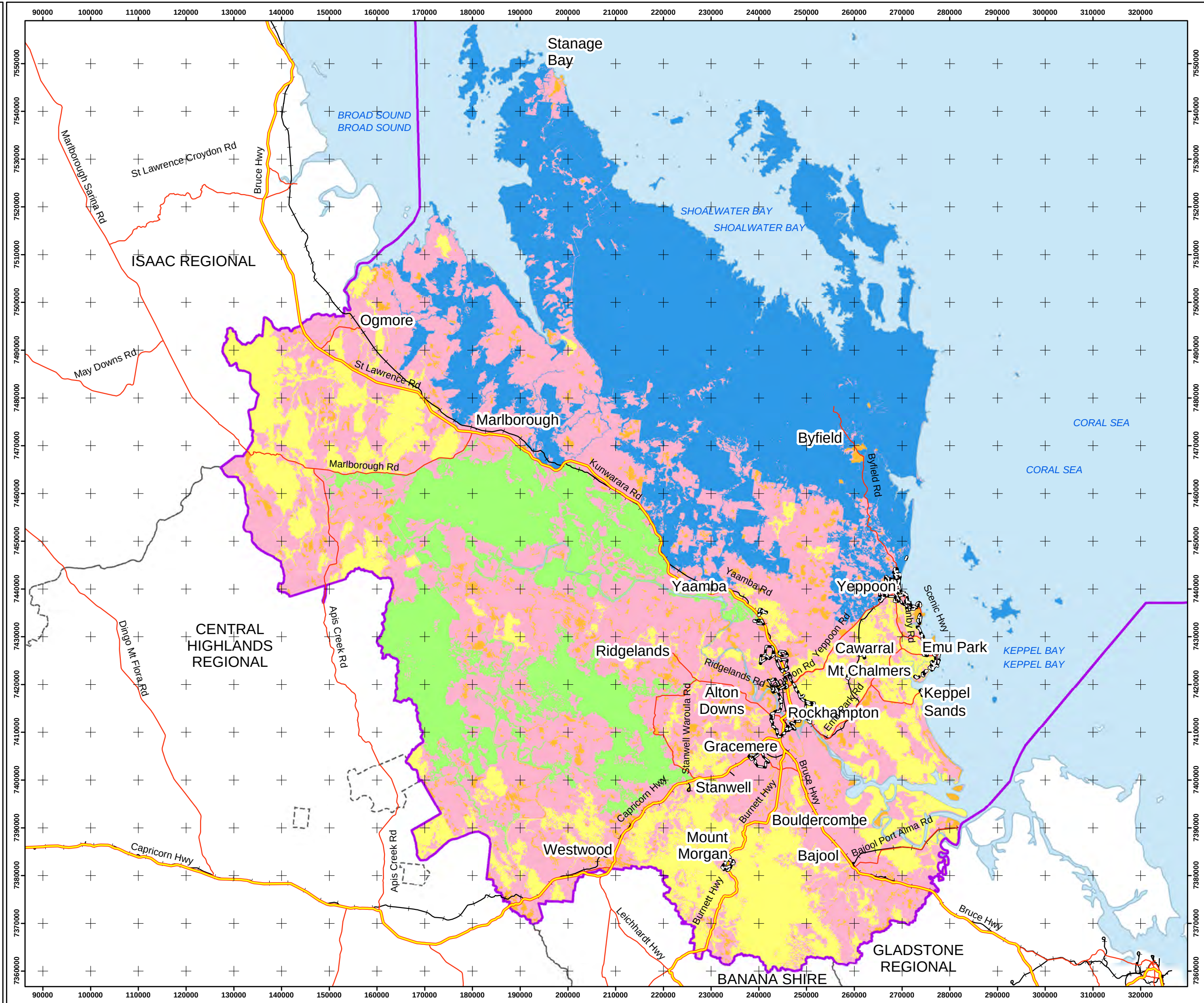


- Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Tract Size**
- Very High
 - High
 - Moderate
 - Low
 - Very Low



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Scale 1 : 730,000 when printed at A3
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Grid Projection: Map Grid of Australia Zone 56

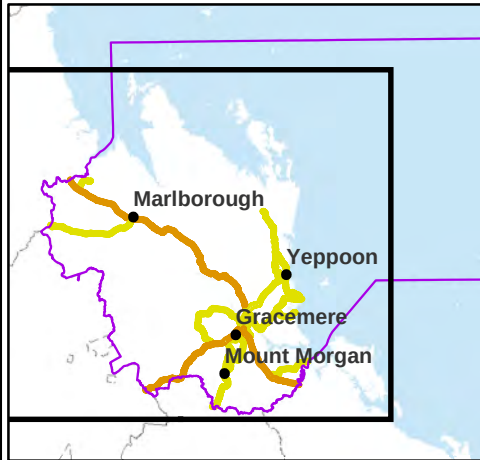


Appendix B

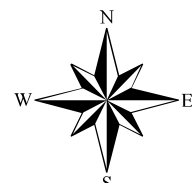
Biophysical Connectivity

Connectivity Rating

Rockhampton Regional Council Area

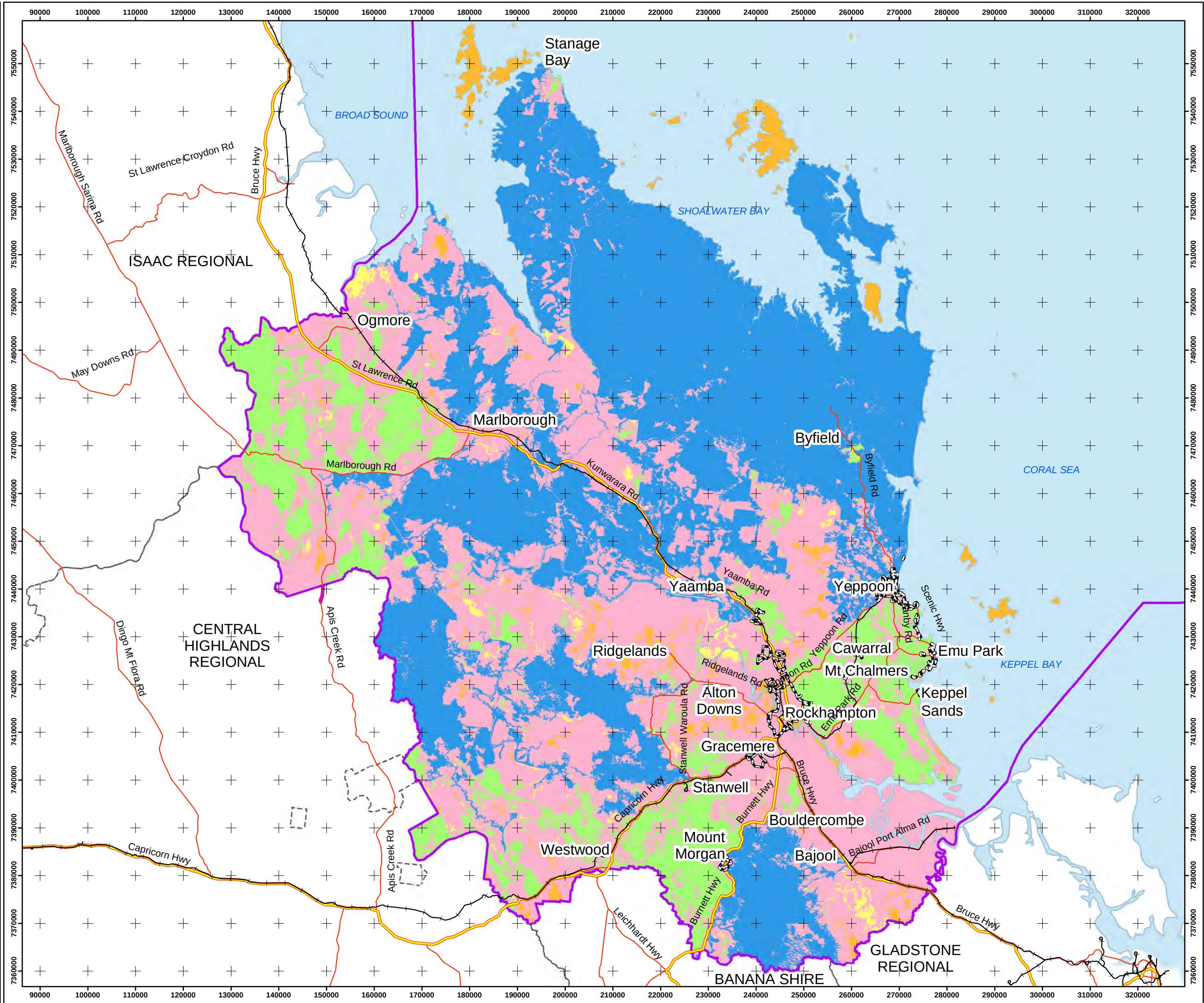


- Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Connectivity Rating**
- Very High
 - High
 - Moderate
 - Low
 - Very Low



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Appendix C

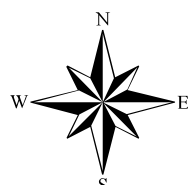
Biophysical Condition

Remnant Status Rating

Rockhampton Regional Council Area

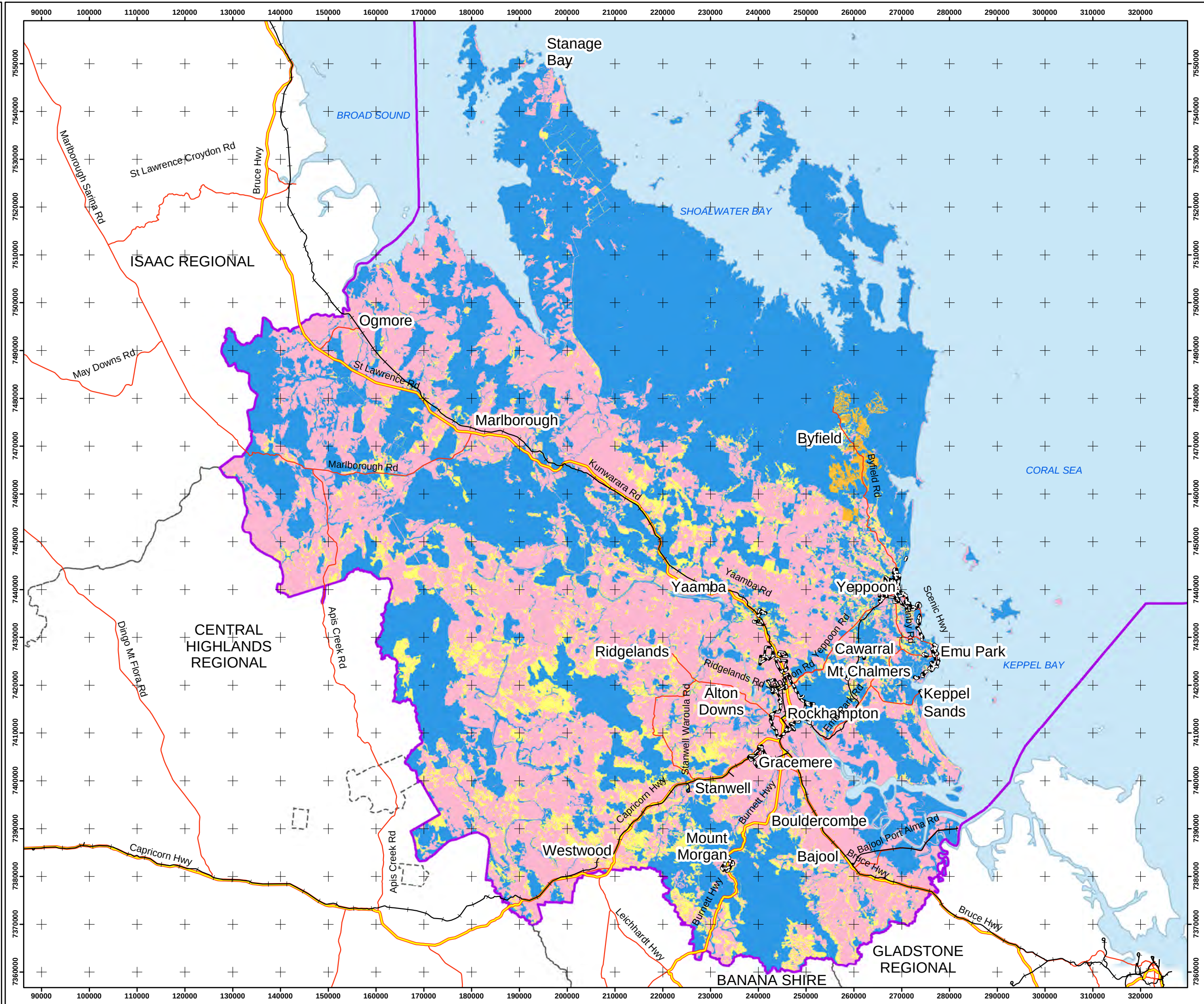


- Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Remnant Status Rating**
- Very High
 - High
 - Moderate
 - Low
 - Very Low



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Scale 1 : 730,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Appendix D

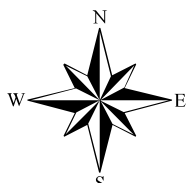
Threatened Species Habitat

Threatened Species Rating

Rockhampton Regional Council Area

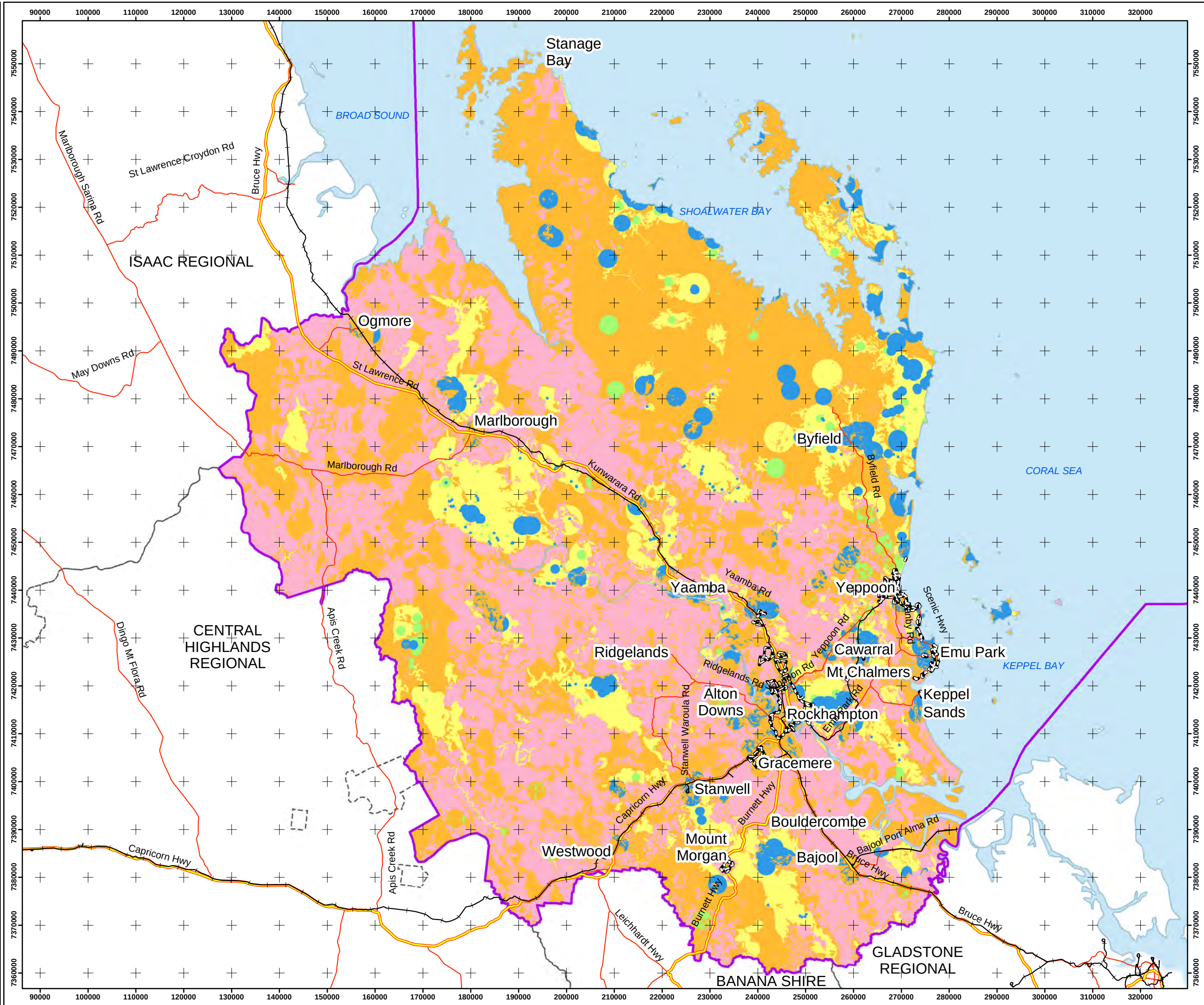


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 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Threatened Species Rating**
- Very High
 - High
 - Moderate
 - Low
 - Very Low



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Grid Projection: Map Grid of Australia Zone 56



Appendix E

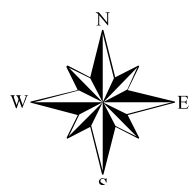
Ecosystem Diversity

Ecosystem Diversity Rating

Rockhampton Regional Council Area

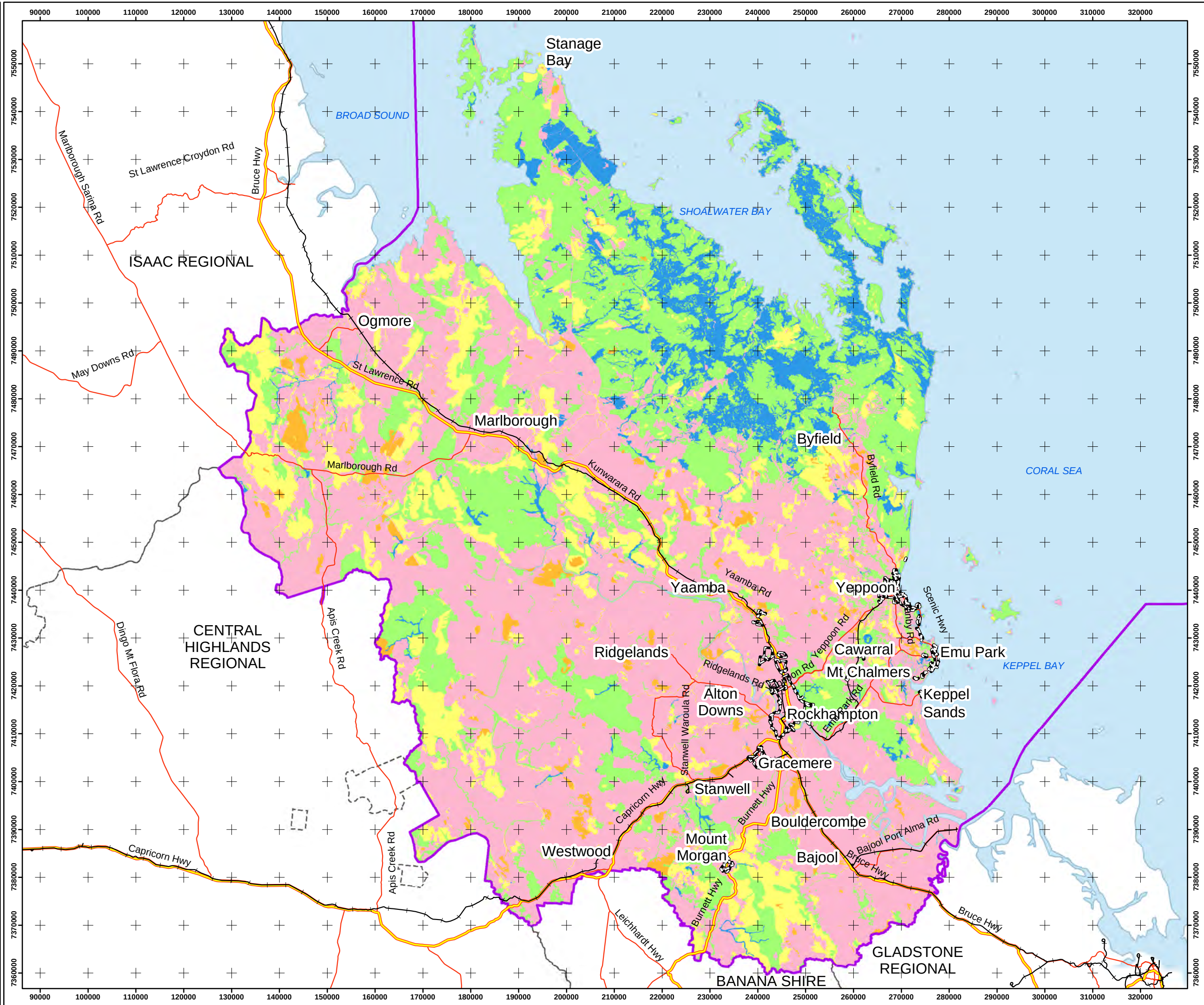


- Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Ecosystem Diversity**
- Very High
 - High
 - Moderate
 - Low
 - Very Low



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Grid Projection: Map Grid of Australia Zone 56



Appendix F

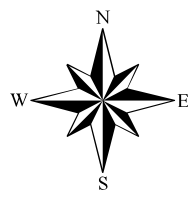
Overall Biophysical Values

Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Fitzroy - Gracemere



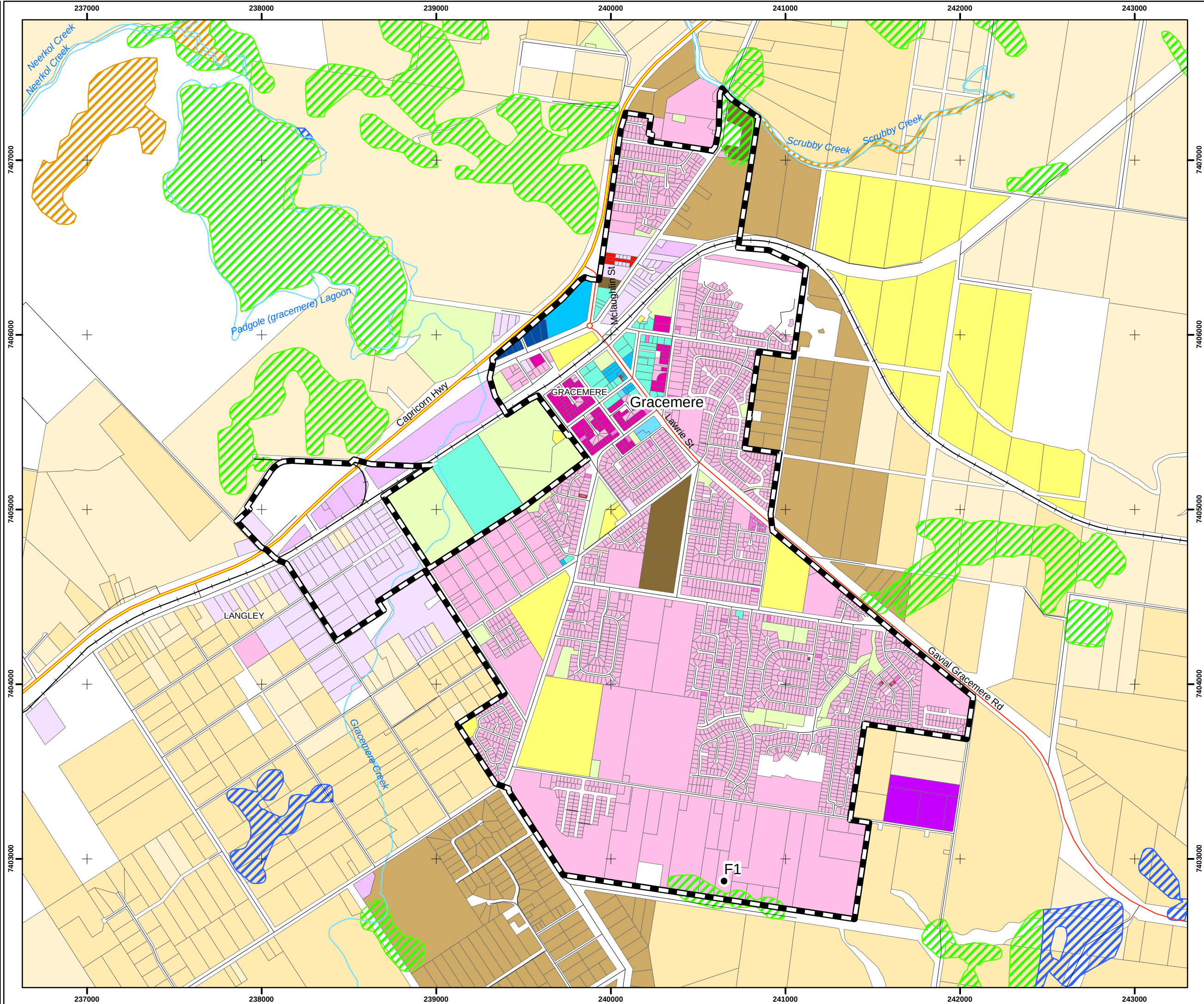
- Land Use Constraint
 - Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Rockhampton PAR Future Landuse**
- Detached Dwelling
 - Attached Dwelling
 - Multi-Unit Dwelling
 - Residential Special
 - Commercial Office
 - Commercial Other; Mixed Commercial
 - Commercial Retail
 - Commercial Retail Showroom
 - Mixed Res Com
 - GTP
 - Heavy Industry; Extractive Industry
 - Industry
 - Light Industry
 - Master Planned Community
 - Mixed Use
 - Openspace
 - Rural
 - Rural Dwelling
 - Rural Res Dwelling
 - Special Purpose
 - Special Residential
- Total Biophysical Rating**
- Very High
 - High
 - Moderate
 - Low
 - Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

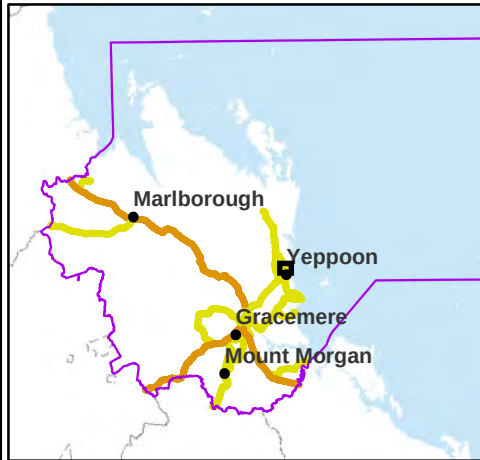


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Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Bangalee



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

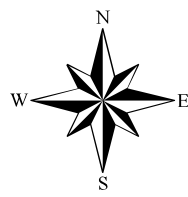
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other; Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry; Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

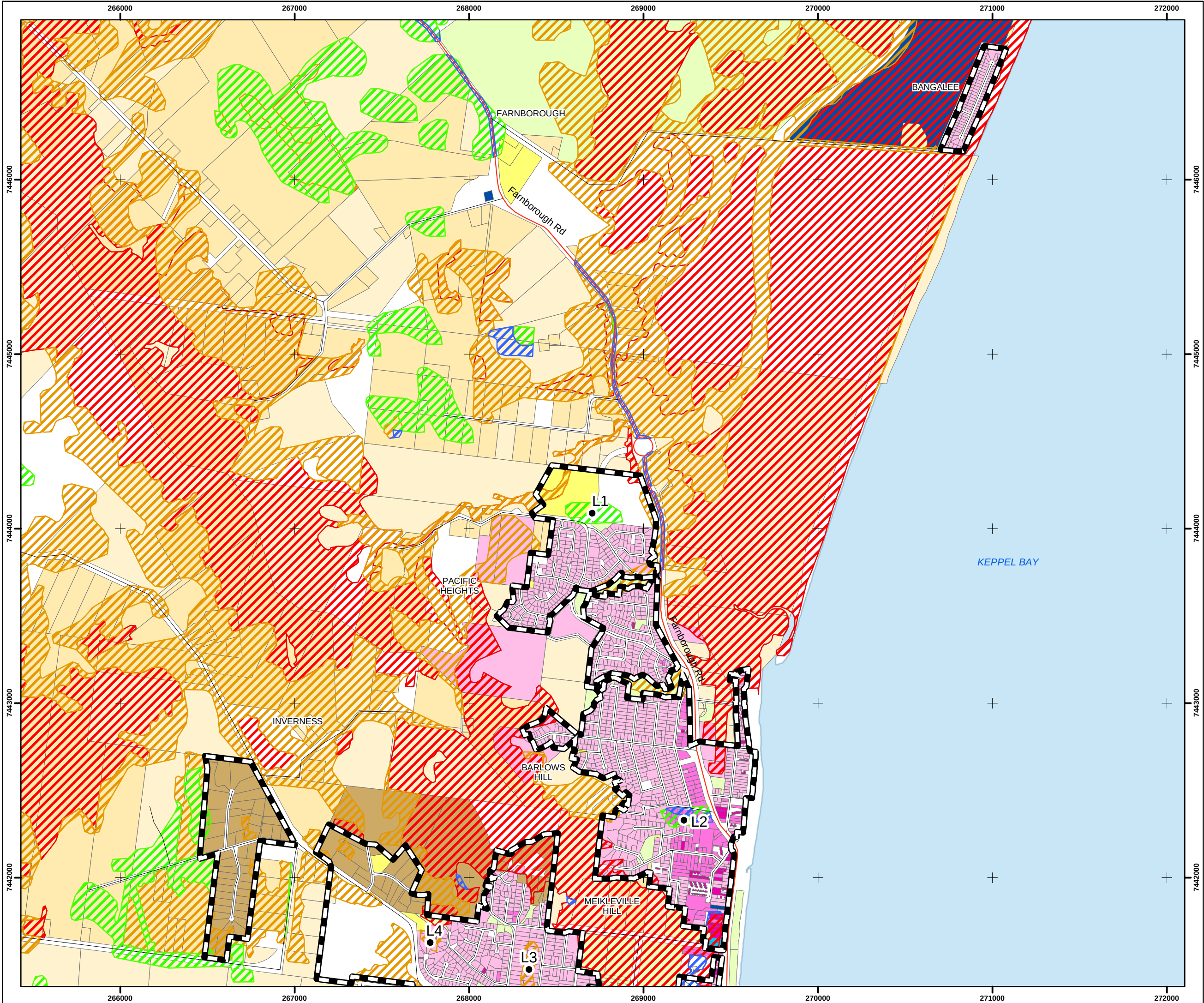
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

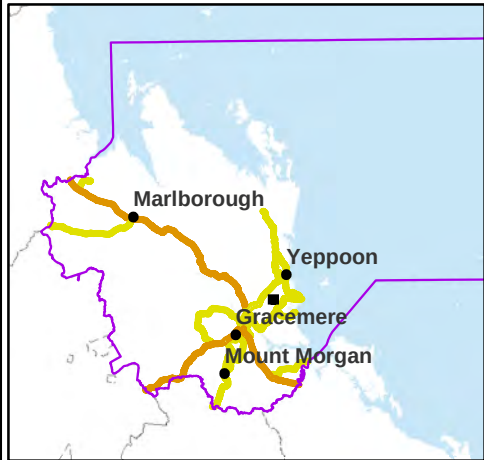


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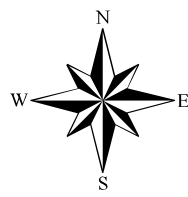


Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Cawarral



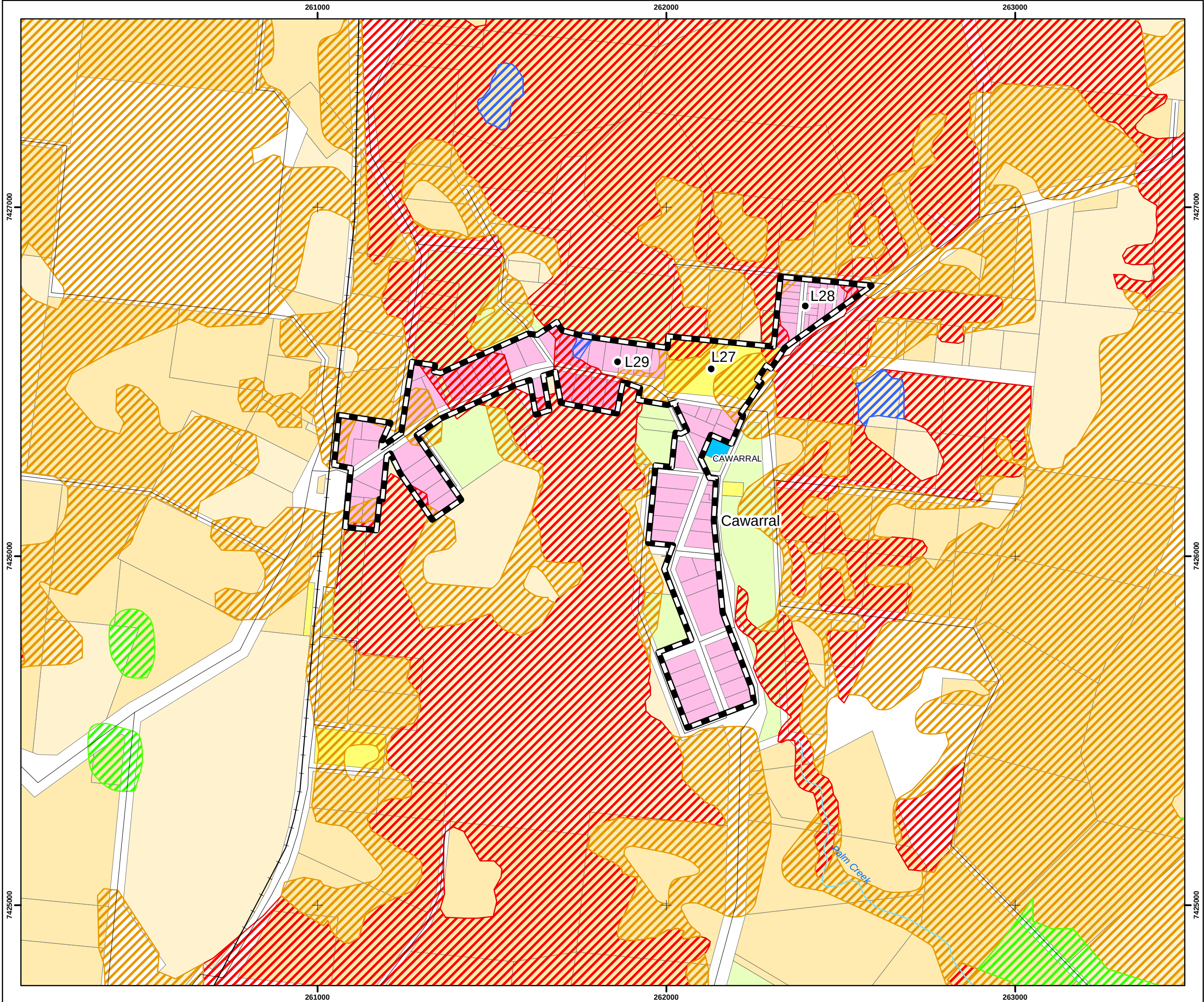
- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary
- Rockhampton PAR Future Landuse**
- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential
- Total Biophysical Rating**
- ▨ Very High
- ▨ High
- ▨ Moderate
- ▨ Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

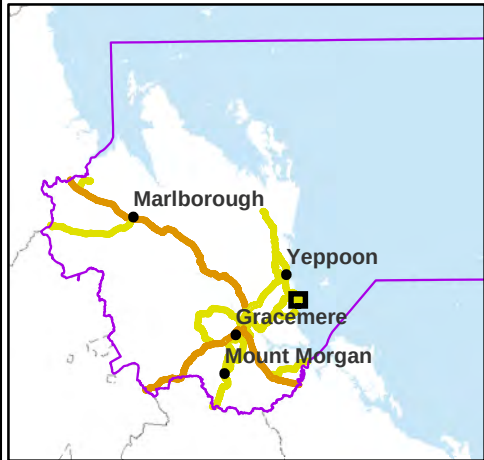


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Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Emu Park



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

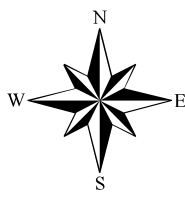
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other; Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry; Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

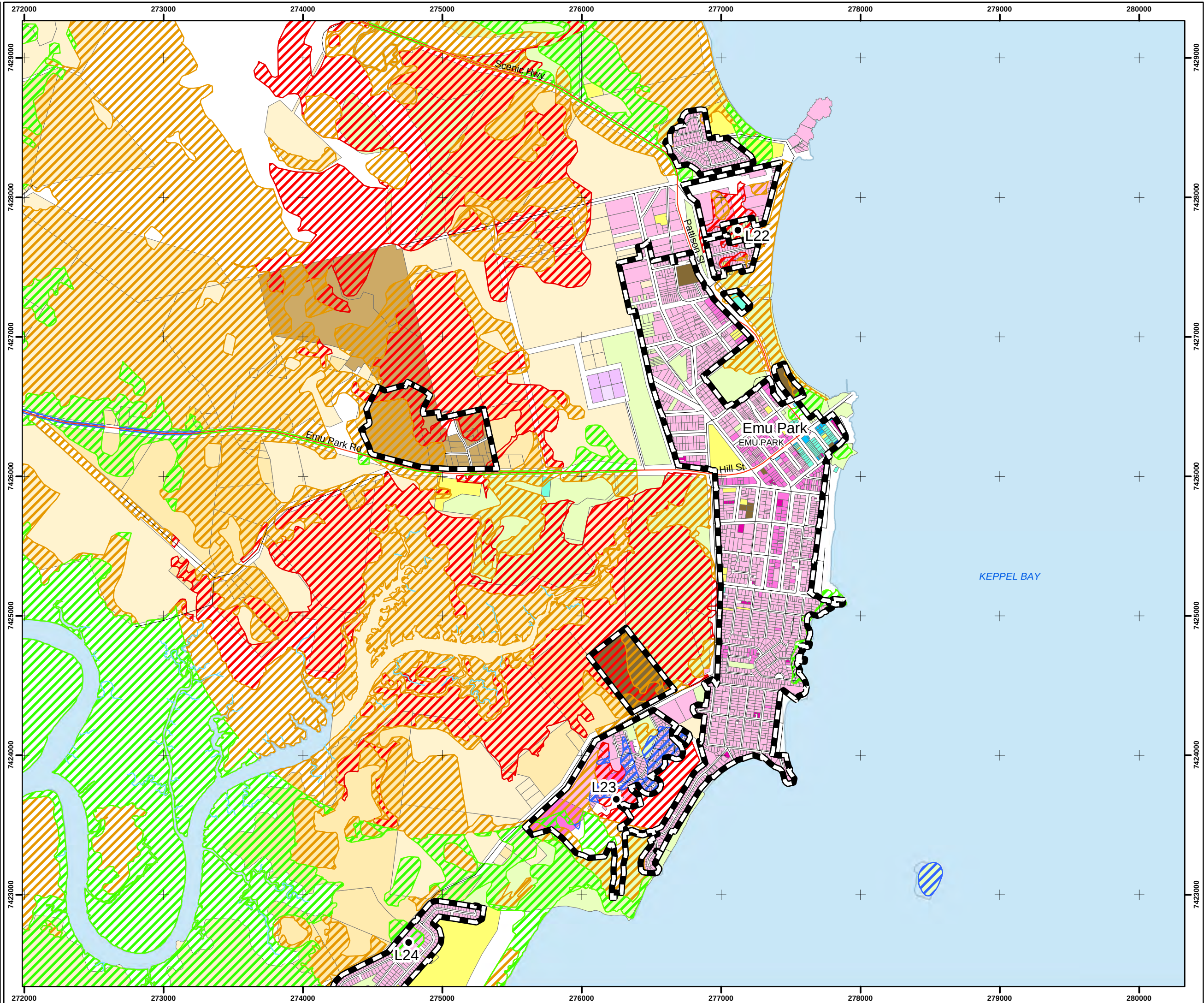
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.



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Scale 1 : 25,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Glendale



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

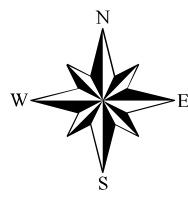
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

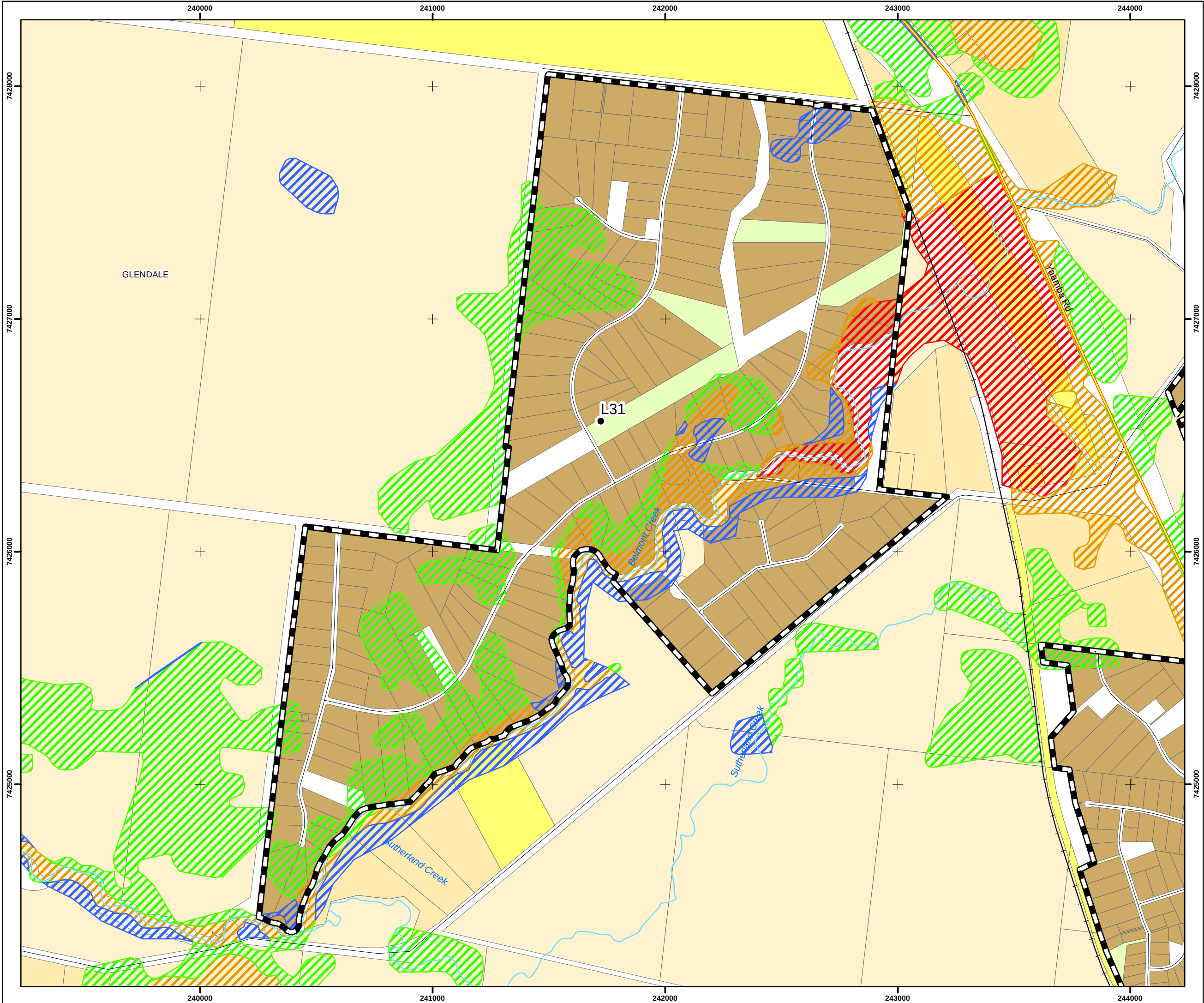
- ▨ Very High
- ▨ High
- ▨ Moderate
- ▨ Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

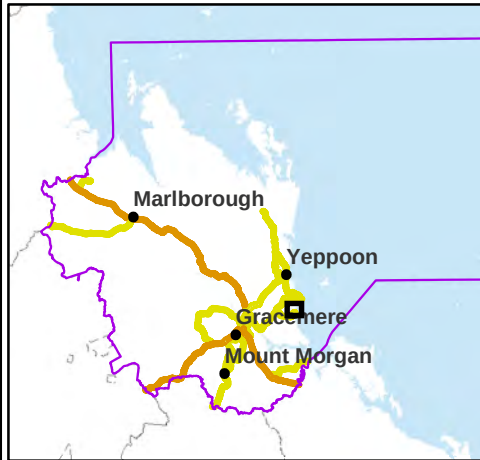


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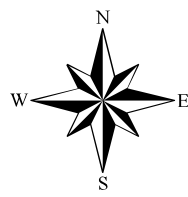


Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Keppel Sands



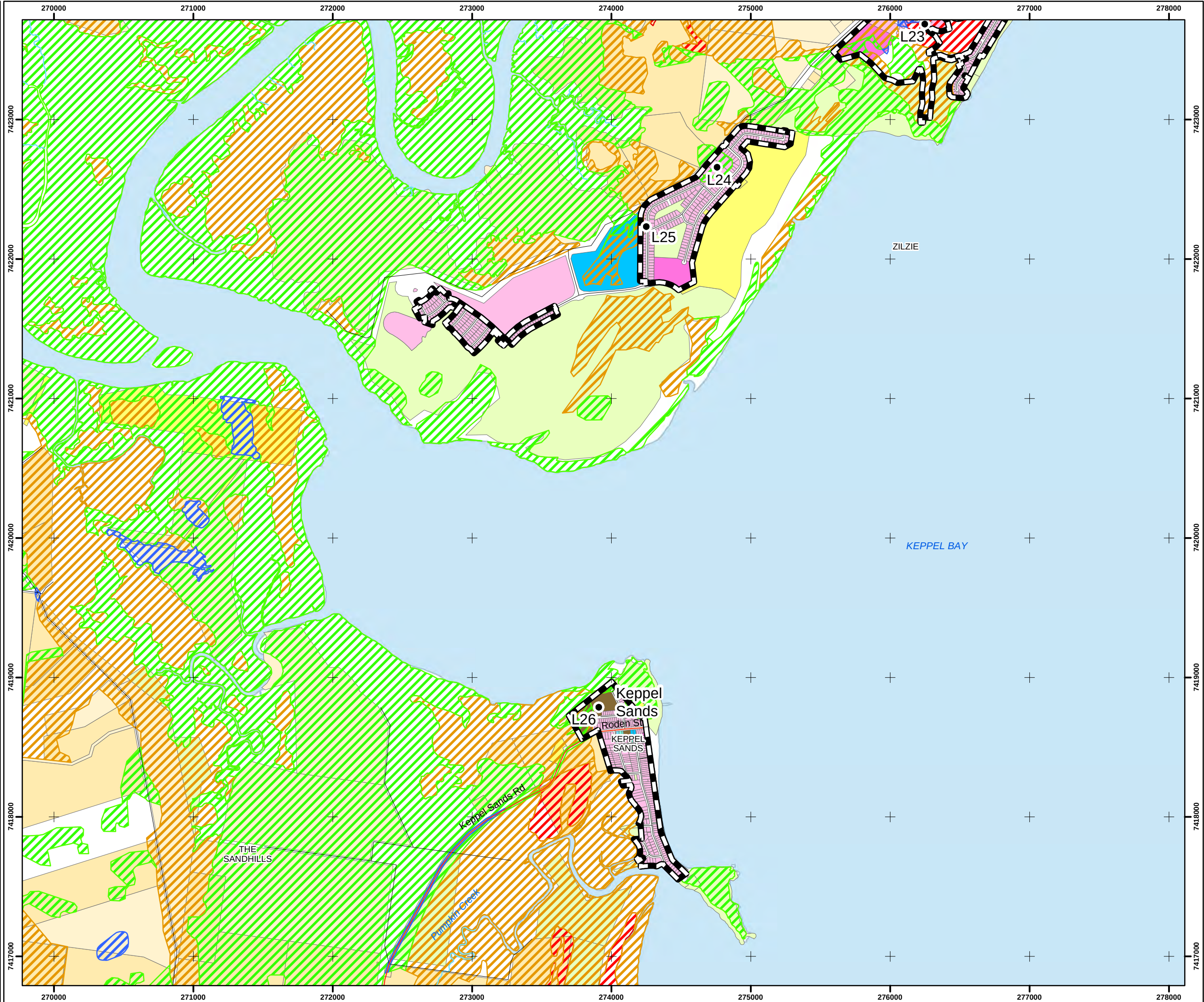
- Land Use Constraint
 - Railway
 - Highway
 - Main Road
 - Local Road
 - Watercourse
 - Waterbody / Ocean
 - Study Area
 - PIA
 - Local Government Boundary
- Rockhampton PAR Future Landuse**
- Detached Dwelling
 - Attached Dwelling
 - Multi-Unit Dwelling
 - Residential Special
 - Commercial Office
 - Commercial Other; Mixed Commercial
 - Commercial Retail
 - Commercial Retail Showroom
 - Mixed Res Com
 - GTP
 - Heavy Industry; Extractive Industry
 - Industry
 - Light Industry
 - Master Planned Community
 - Mixed Use
 - Openspace
 - Rural
 - Rural Dwelling
 - Rural Res Dwelling
 - Special Purpose
 - Special Residential
- Total Biophysical Rating**
- Very High
 - High
 - Moderate
 - Low
 - Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

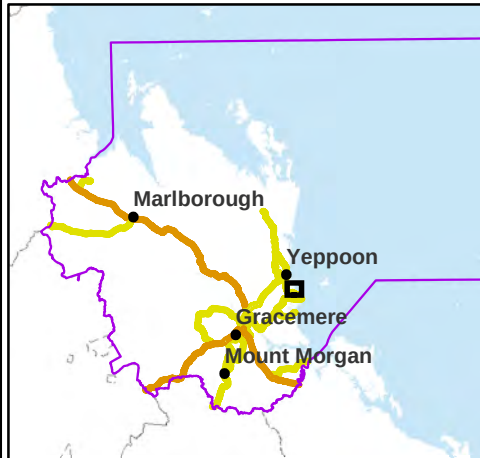


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Scale 1 : 25,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Kinka



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

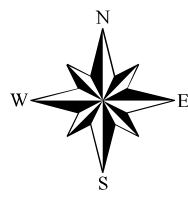
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

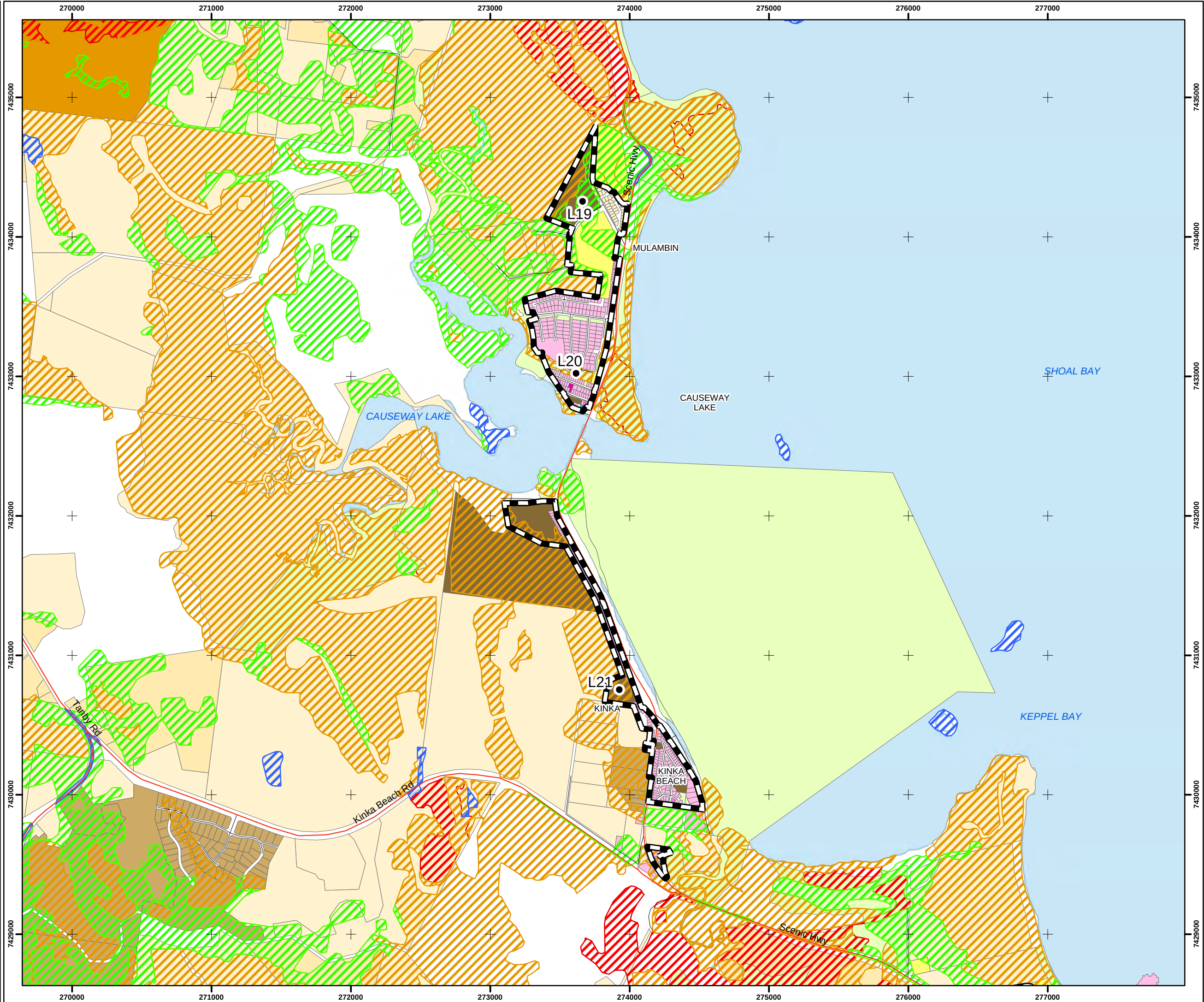
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

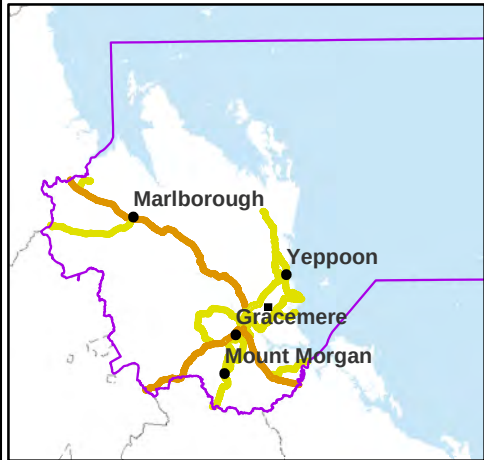


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Scale 1 : 25,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Mount Chalmers



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

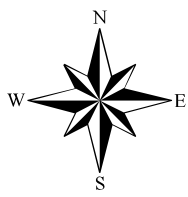
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

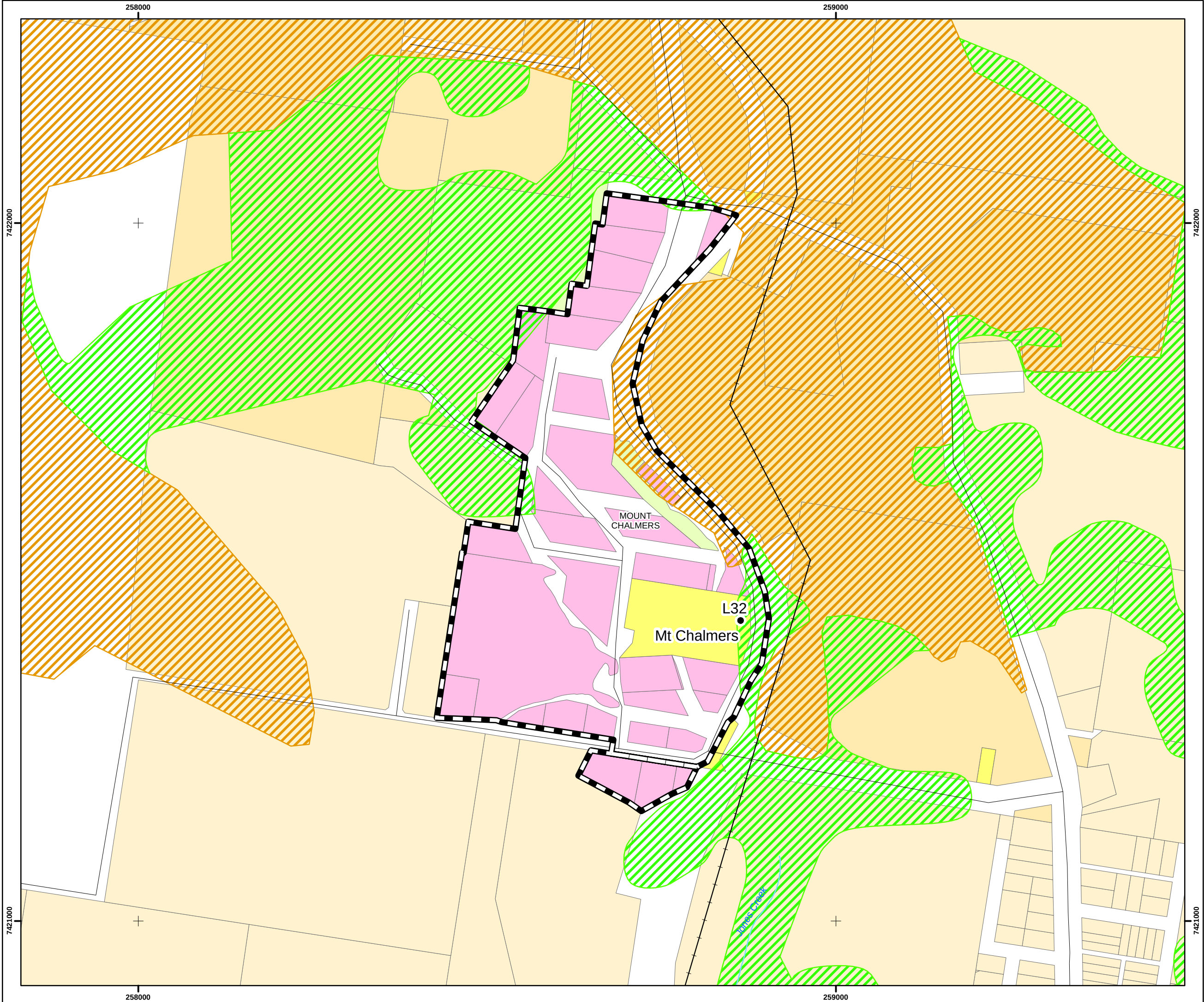
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.



0 25 50 100 150 200 m

Scale 1 : 5,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Rockyview



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

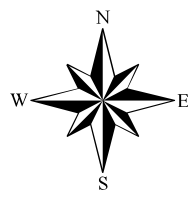
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

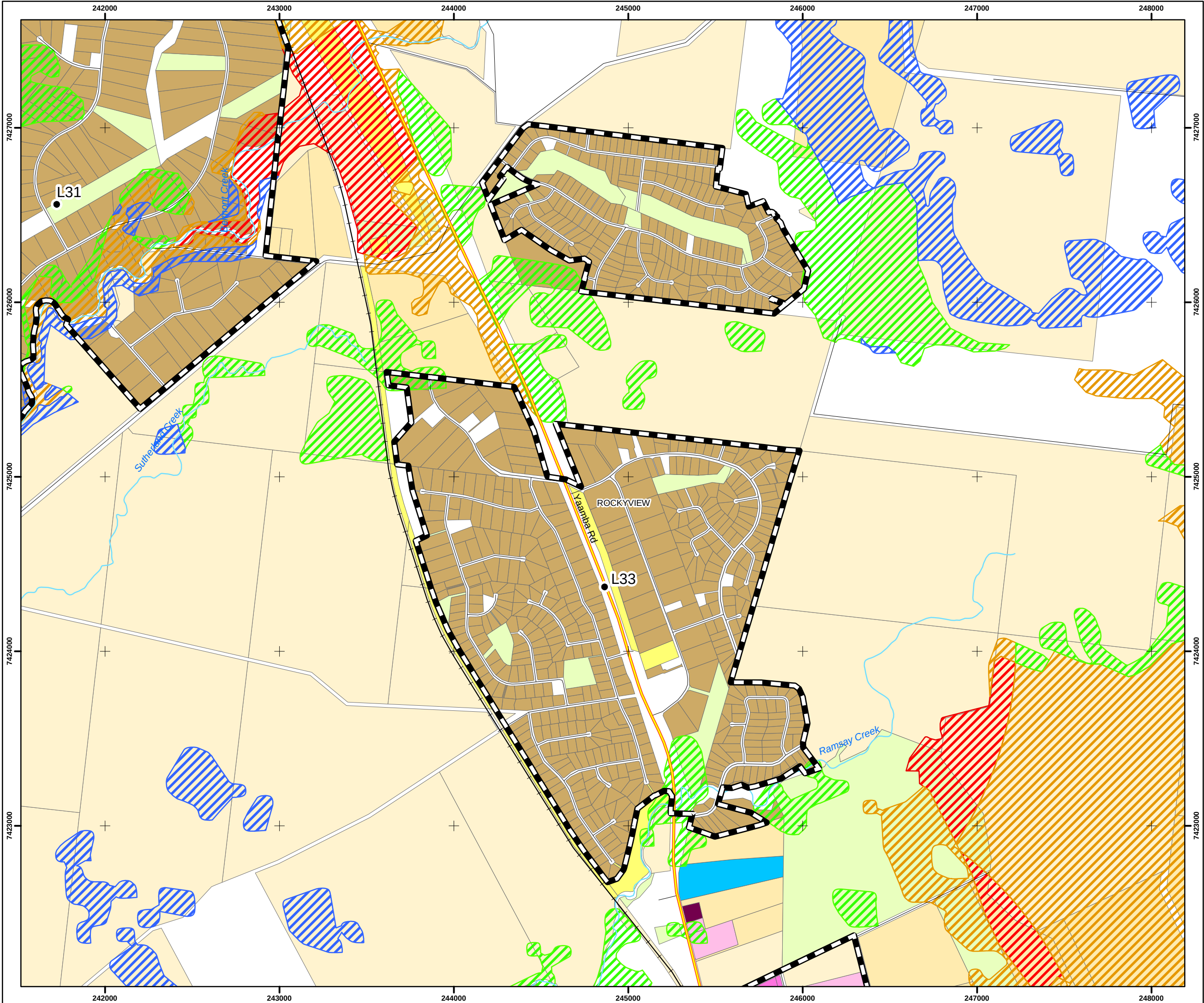
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

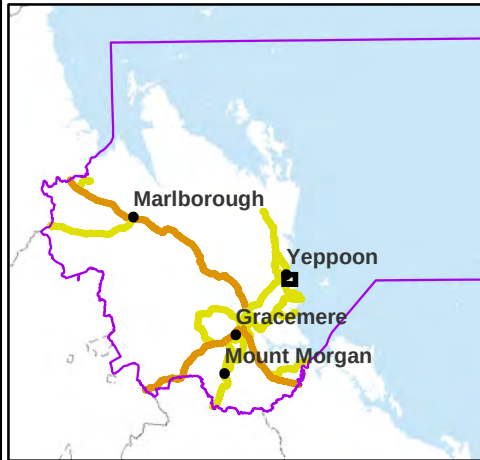


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Scale 1 : 20,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Taranganba



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

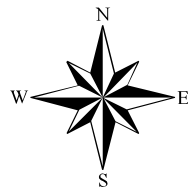
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

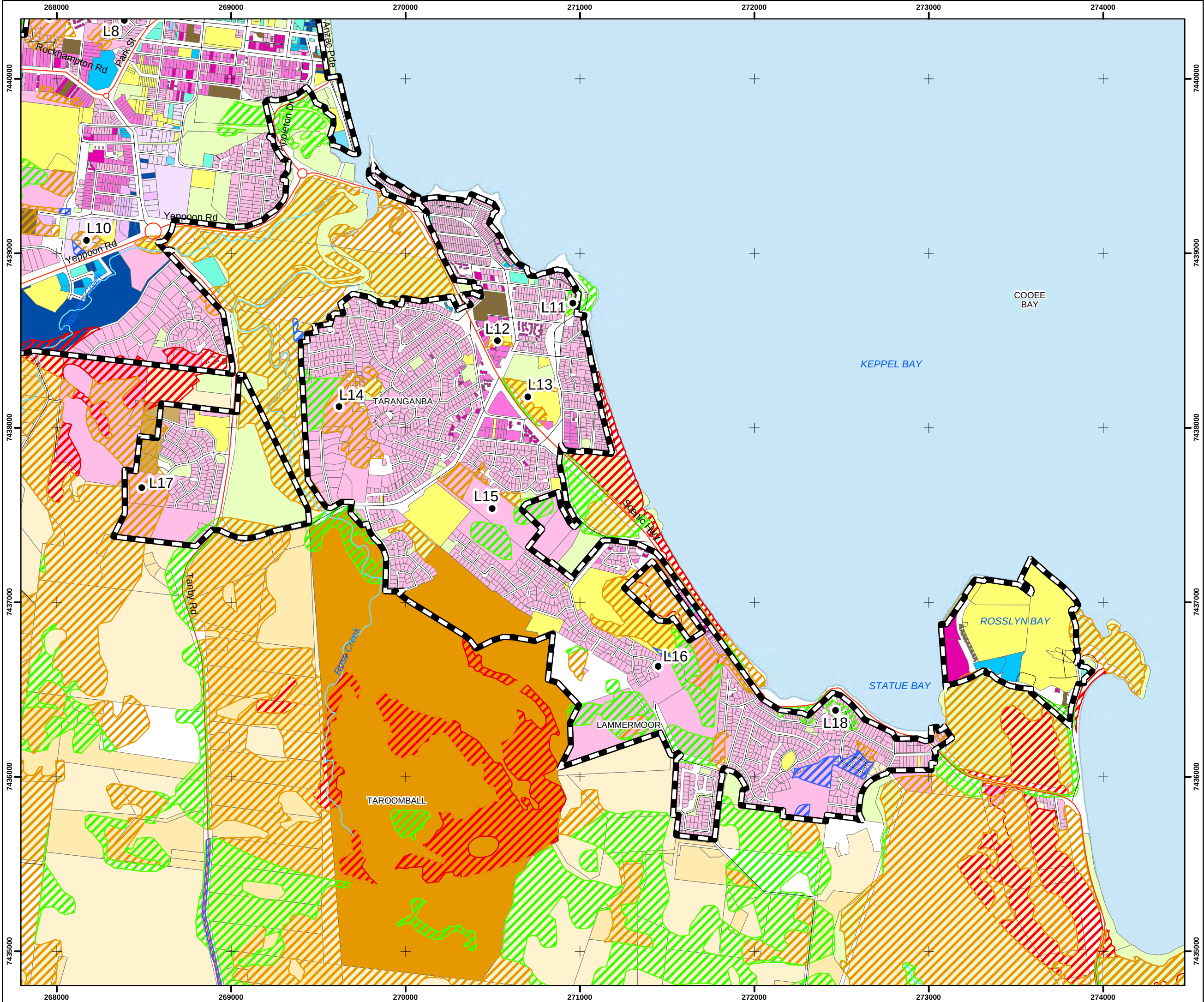
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.



0 100 200 400 600 800 m

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Grid Projection: Map Grid of Australia Zone 56

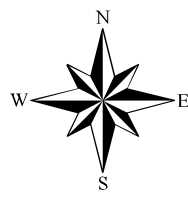


Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - The Caves



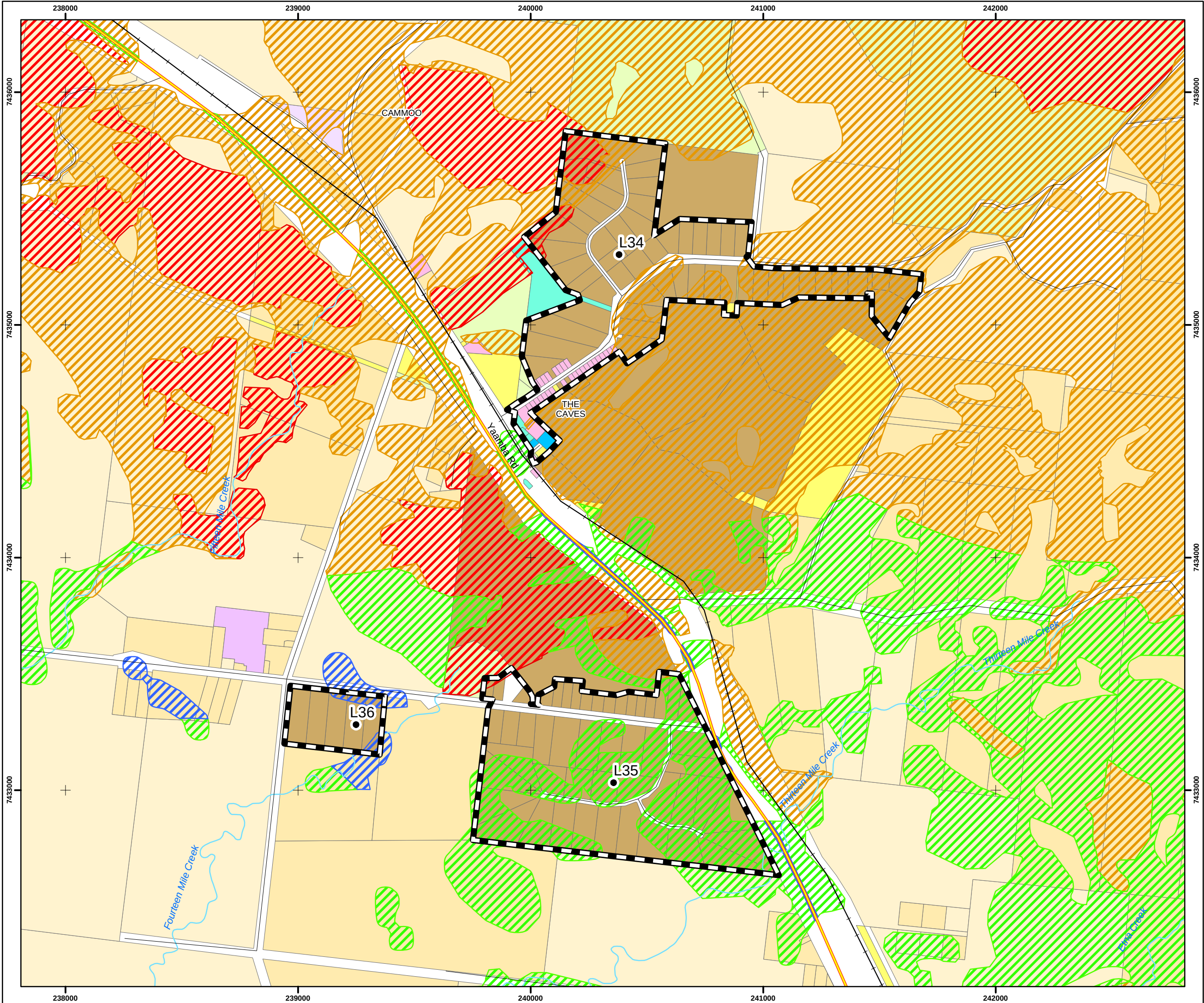
- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary
- Rockhampton PAR Future Landuse**
 - Detached Dwelling
 - Attached Dwelling
 - Multi-Unit Dwelling
 - Residential Special
 - Commercial Office
 - Commercial Other, Mixed Commercial
 - Commercial Retail
 - Commercial Retail Showroom
 - Mixed Res Com
 - GTP
 - Heavy Industry, Extractive Industry
 - Industry
 - Light Industry
 - Master Planned Community
 - Mixed Use
 - Openspace
 - Rural
 - Rural Dwelling
 - Rural Res Dwelling
 - Special Purpose
 - Special Residential
- Total Biophysical Rating**
 - Very High
 - High
 - Moderate
 - Low
 - Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

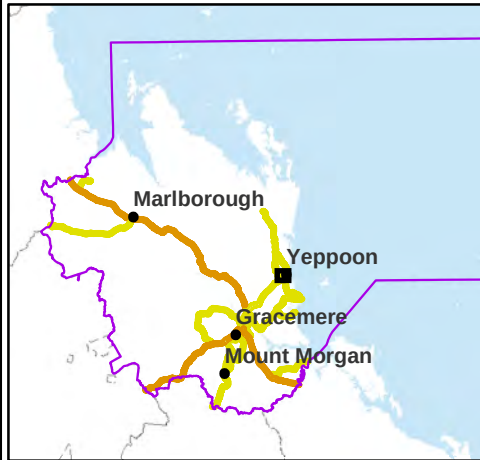


0 75 150 300 450 600 m

Scale 1 : 15,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Livingston - Yeppoon



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

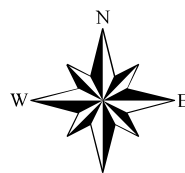
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

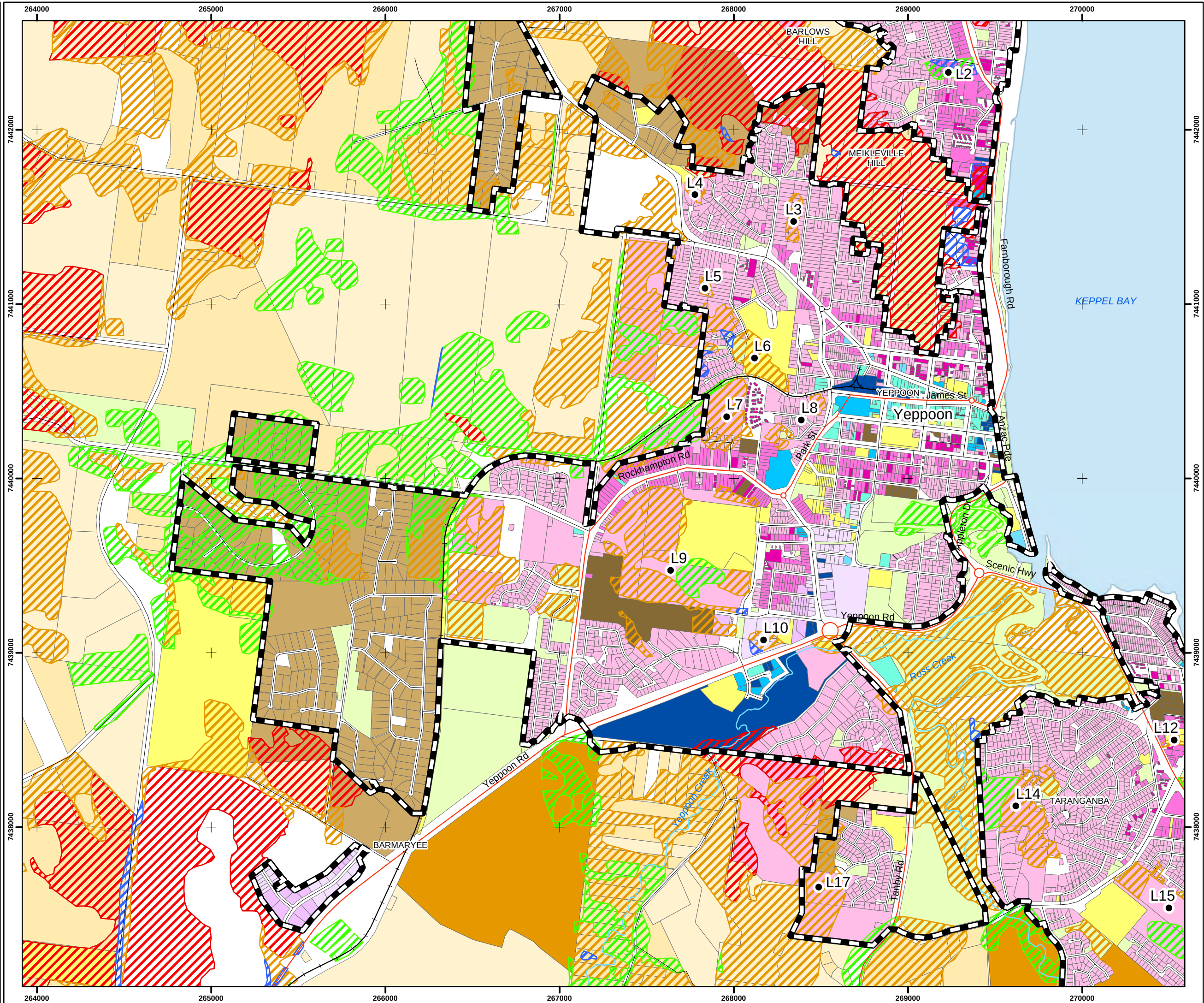
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

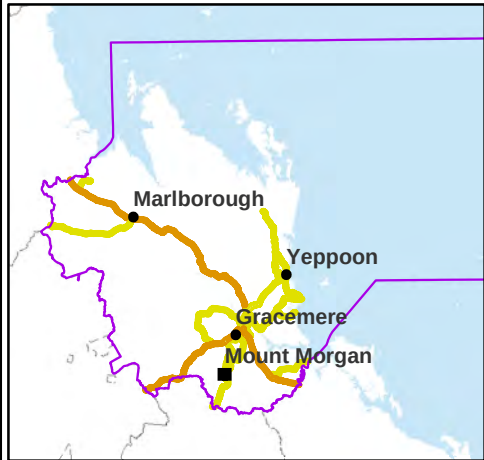


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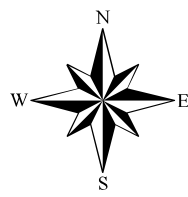


Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Mount Morgan



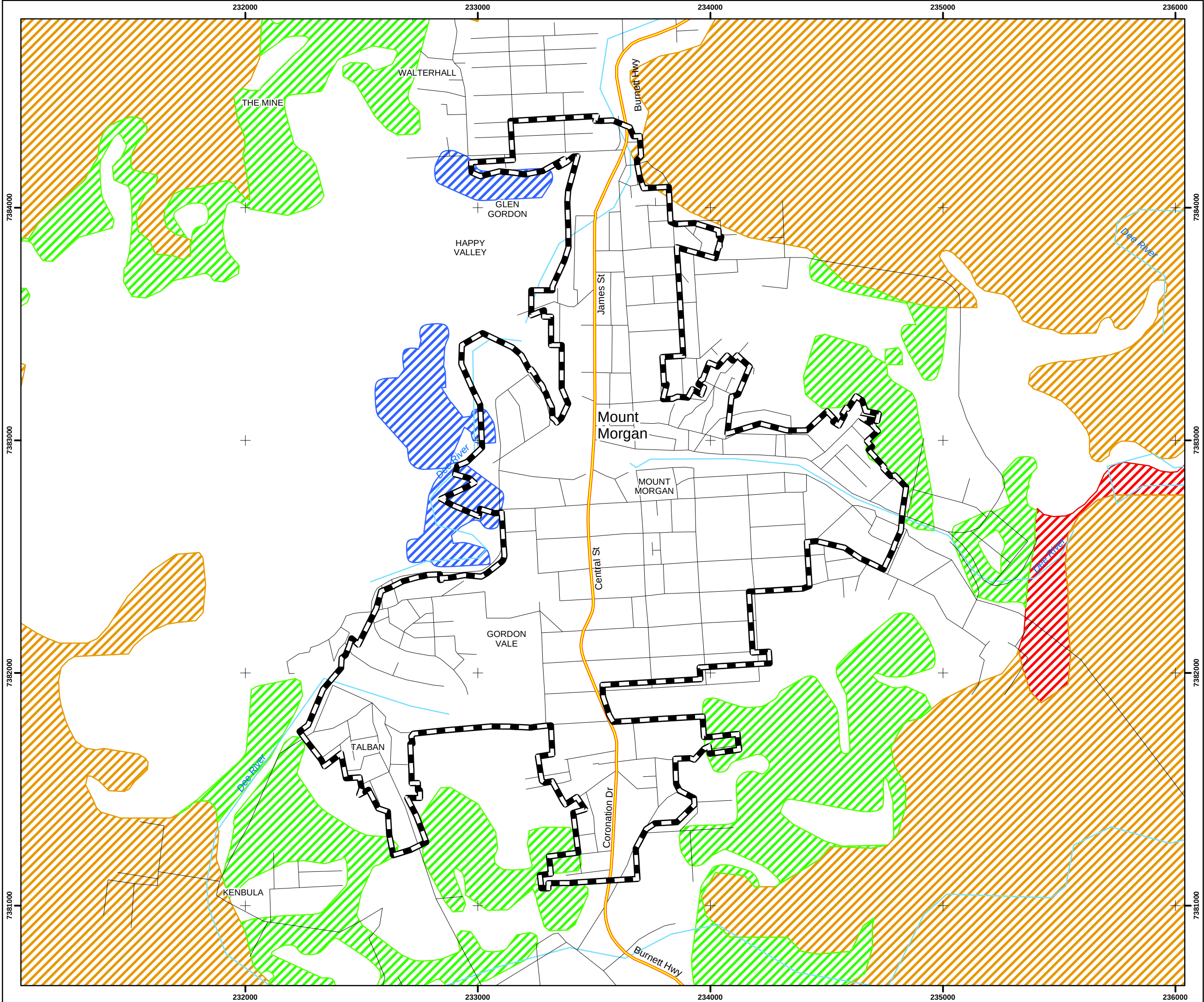
- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary
- Rockhampton PAR Future Landuse**
 - Detached Dwelling
 - Attached Dwelling
 - Multi-Unit Dwelling
 - Residential Special
 - Commercial Office
 - Commercial Other, Mixed Commercial
 - Commercial Retail
 - Commercial Retail Showroom
 - Mixed Res Com
 - GTP
 - Heavy Industry, Extractive Industry
 - Industry
 - Light Industry
 - Master Planned Community
 - Mixed Use
 - Openspace
 - Rural
 - Rural Dwelling
 - Rural Res Dwelling
 - Special Purpose
 - Special Residential
- Total Biophysical Rating**
 - Very High
 - High
 - Moderate
 - Low
 - Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.

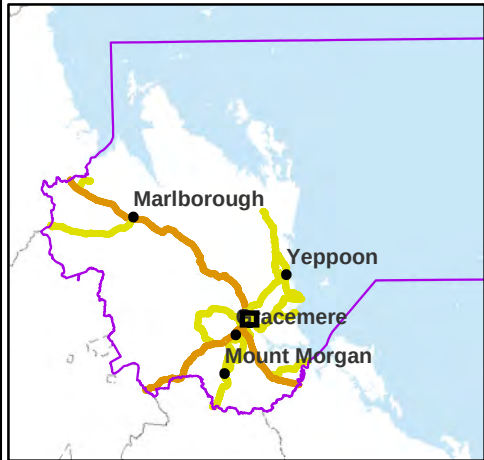


0 75 150 300 450 600 m

Scale 1 : 15,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Rockhampton City - Centre



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

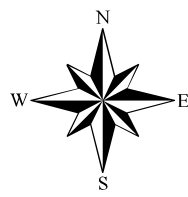
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

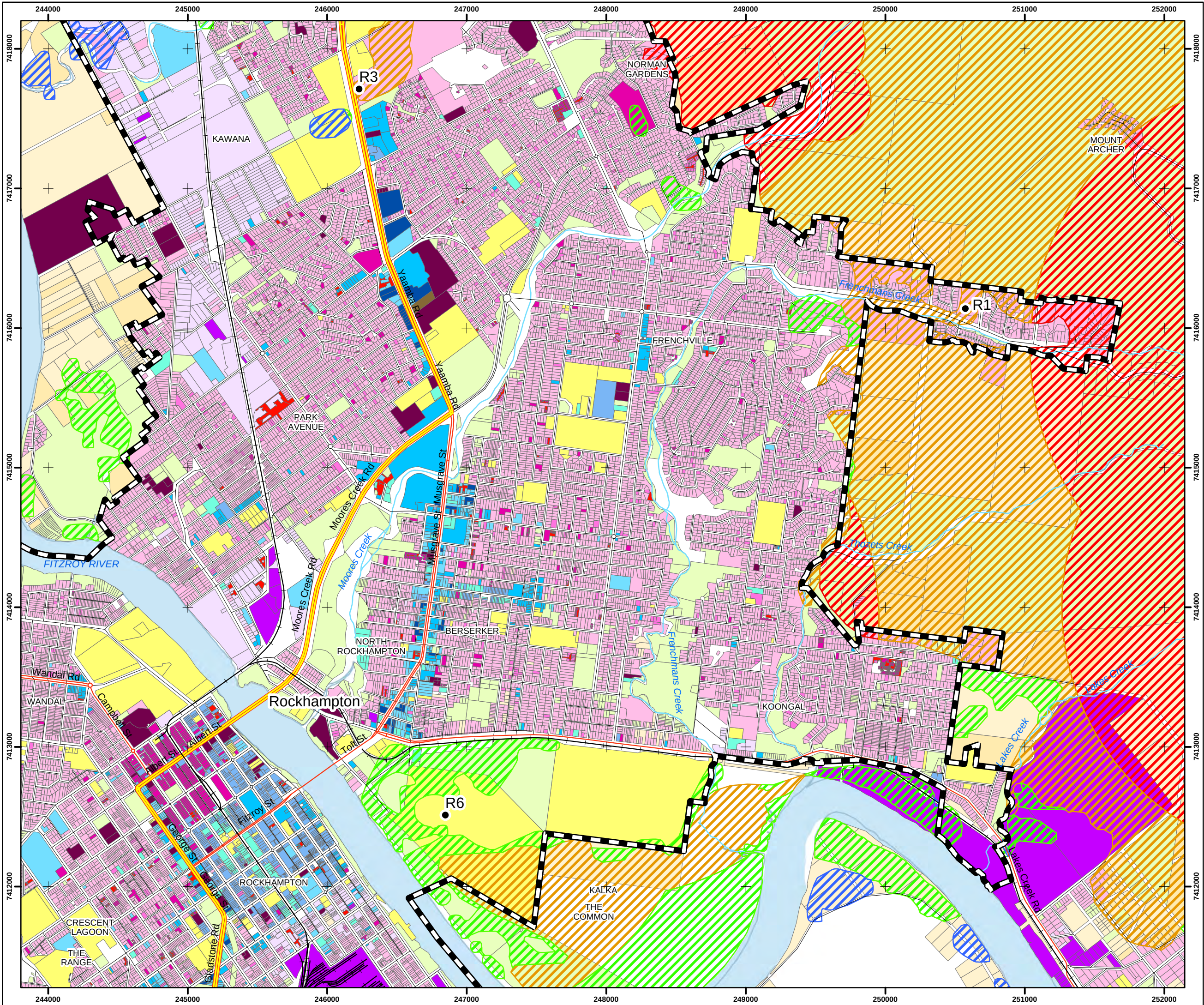
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.



0 125 250 500 750 1000 m

Scale 1 : 25,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Rockhampton City - North



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

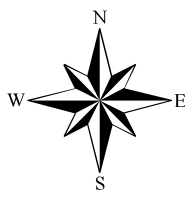
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

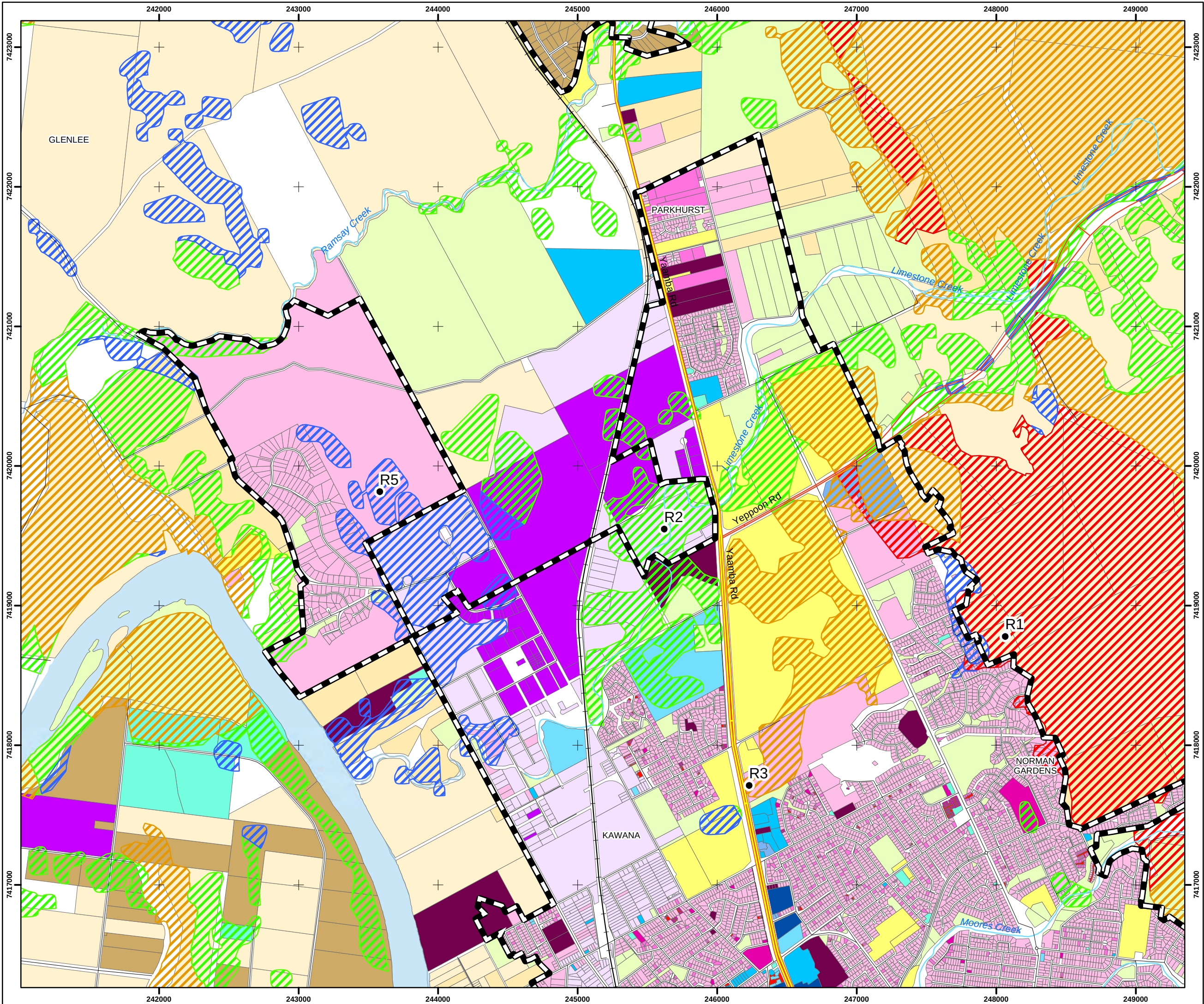
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.



0 125 250 500 750 1000 m

Scale 1 : 25,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Rockhampton Regional Council
Natural Environment Study
Total Biophysical Rating
Future Land Use
Rockhampton City - West



- Land Use Constraint
- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Study Area
- PIA
- Local Government Boundary

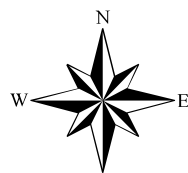
Rockhampton PAR Future Landuse

- Detached Dwelling
- Attached Dwelling
- Multi-Unit Dwelling
- Residential Special
- Commercial Office
- Commercial Other, Mixed Commercial
- Commercial Retail
- Commercial Retail Showroom
- Mixed Res Com
- GTP
- Heavy Industry, Extractive Industry
- Industry
- Light Industry
- Master Planned Community
- Mixed Use
- Openspace
- Rural
- Rural Dwelling
- Rural Res Dwelling
- Special Purpose
- Special Residential

Total Biophysical Rating

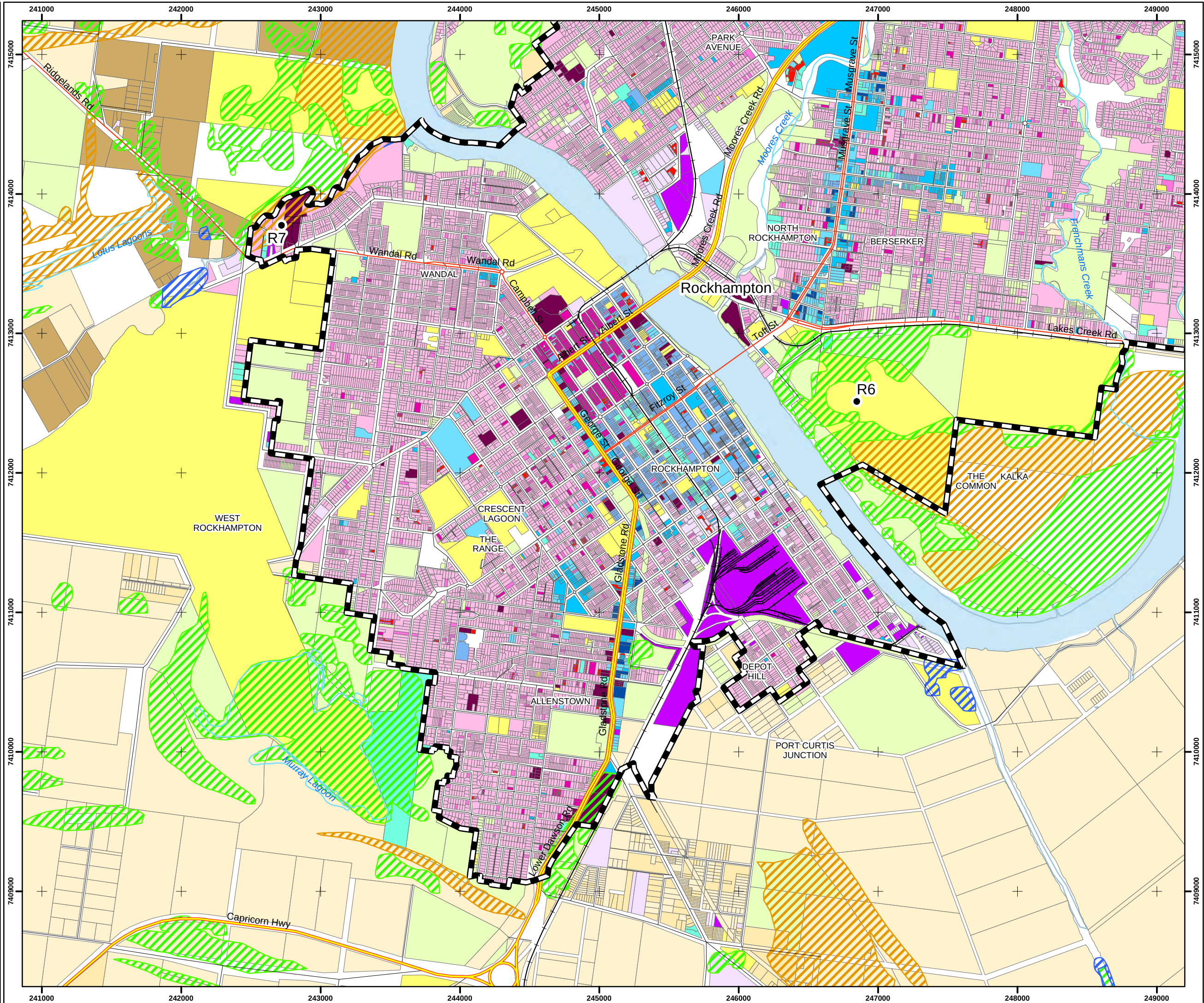
- Very High
- High
- Moderate
- Low
- Very Low

Note: "Very Low" ratings are not symbolised. Areas with no hatching receive "Very Low" rating.



0 125 250 500 750 1000 m

Scale 1 : 25,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Appendix G

PIP Analysis

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
F1	Gracemere Caravan Park The vegetation within the caravan park does not constitute a constraint to development.	Moderate	Special purposes	NA	NA
F2	East of the unconstructed Washpool Road. Though not completely intact does offer opportunities for urban environmental connectivity from the small tributary at Washpool Road east to Gavial Creek. This tract should be conserved. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m.	Moderate	Residential Precinct	1.2	39
L1	Area north of Pacific Heights Rd. Provides connectivity between two creeks. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m. It should be noted that the area to the west of this reference (outside of the PIA), though designated for future residential development is highly constrained with a very high Total Biophysical Rating. This rating could result in a significant reduction in yield. It is recommended that consideration be given to changing the proposed zone or placing a development constraint overlay over the land.	Moderate and High	Rural	300m x 50m = 1.5	49
L2	Creek between Heaslip and Meileville Streets has low tract size but provides urban nature connectivity. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m.	Moderate	R1	300m x 50m = 1.5	49
L3	Hughes and Melland Streets, a small isolated tract with low connectivity. It is considered that this tract has limited environmental value. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	High	R1	NA	NA

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
L4	Adelaide Park Rd. Consists of Small tract as well as the land surrounding St Brendan's College. Together forms a good tract of vegetation. This tract also links to L5. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m.	High	R1 and Special Purpose	120m x 50m = 0.6	20
L5	School Street – Caroline St. This is a small tract; however there is good connectivity to L6. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m. It should be noted that the area to the west of this reference (outside of the PIA), though designated for future residential development is highly constrained with a moderate high Total Biophysical Ratings. This rating could result in a reduction in yield Consideration should also be given to placing a development constraint overlay over the affected land. There may be some loss in yield but this will be a factor of development design, layout, building form and ownership methodologies utilised	High	R1	110m x 50m = 0.5	18
L6	Yeppoon Primary School, East of Explorer Dr. There is some connectivity to L7 and L8 to the south. However, overall connectivity is poor. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is a state school it is considered that there will be no loss in yield.	High	Special Purpose	NA	NA
L7	South of Explores Dr. Small Tract but a solid link to vegetated to the west over the cane tram tracks. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m. It should be noted that the area to the west of this reference (outside of the PIA), though designated for future residential development is highly constrained with a moderate high	High	R1	400m x 50m = 2.0	65

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	Total Biophysical Ratings. This rating could result in a reduction in yield Consideration should also be given to placing a development constraint overlay over the affected land. There may be some loss in yield but this will be a factor of development design, layout, building form and ownership methodologies utilised.				
L8	Figtree and Little Park St's. Small tract with low connectivity. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	High	R1	NA	NA
L9	South of Rockhampton Rd. A substantial tract of vegetation that is totally contained by urban streets therefore having low connectivity. However, measures should be implemented to conserve this tract of high biophysically rated land; in addition it is recommended that sufficient vegetation in the high biophysical rated land be retained as an urban nature corridor with a minimum width of 50m. It is recommended that consideration be given to placing a development constraint overlay over the affected land. There may be some loss in yield but this will be a factor of development design, layout, building form and ownership methodologies utilised.	Moderate and High	R1	Very High = 0.5 Plus Corridor 1200m x 50m = 6.0 Total 6.5	211
L10	North of Fred Lawn Drive. This is a small tract. However, it does connect to a small creek that flows to the south. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m.	High	Light Industry	200m x 50m = 1.0	NA
L11	Wreck Point. Despite the rating, inspection shows the site is cleared and has no natural environmental value.	Moderate	R1	NA	NA
L12	Poinciana Tourist Park. A small tract totally contained by urban streets therefore having low connectivity.	High		NA	NA

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is already fragmented, it is considered that there will be no loss in yield.				
L13	East of Scenic Hwy. A small tract totally contained by urban streets therefore low connectivity. Despite the rating, inspection shows the site is either cleared or severely modified. It therefore has minimal environmental value.	High	Special Purpose	NA	NA
L14	Taranganba, north and east of Carbean Dr. There is good connectivity to wetlands to the west. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 50m. It is further recommended that consideration be given to placing a development constraint overlay over the affected land. It should be noted that the area to the south of this reference identified as Taroomball (outside of the PIA), though designated for future residential development, and is constrained with moderate to high Total Biophysical Rating. This rating could result in a reduction in yield. It is recommended that consideration be given to changing the proposed zone or placing a development constraint overlay over the land. Any proposal to clear this land should be supported by a detailed biophysical impact assessment outlining conservation measures proposed, offset plantings and ongoing environmental support and management techniques proposed.	Moderate and High	R1	650m x 50m = 3.25	105
L15	Three tracts: (one partly outside of the PIA). East of Taranganba Dr. and north of Taranganba State School; North of Taranganba State School; and East and South of Taranganba State School.	Moderate and High	R1	Very High = 2.5 Plus Corridor 600m x 50m = 3.0	178

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	Small tracts of vegetation that is fragmented and isolated. Despite the rating, inspection shows the site is either cleared or severely modified. It therefore has minimal environmental value. it is recommended that sufficient vegetation in the high biophysical rated land be retained as an urban nature corridor with a minimum width of 50m. It should be noted that the area to the north east of this reference (outside of the PIA), though designated for future residential development is constrained with a very high Total Biophysical Rating. There may be some loss in yield but this will be a factor of development design, layout, building form and ownership methodologies utilised.			Total 5.5	
L16	Lammermoor. Although there has been considerable disturbance to parts of this tract, it should be treated as a consolidated whole. In order to achieve good sustainability and urban connectivity a nature corridor could be designed through the site. This will not sterilise development. However, there may be some loss in yield but this will be a factor of development design, layout, building form and ownership methodologies utilised. It is recommended the land with a very high Total Biophysical Rating measures should be conserved In addition, it is recommended that sufficient vegetation in the moderate biophysical rated land be retained as an urban nature corridor with a minimum width of 50m. It is recommended that consideration be given to changing the proposed zone or placing a development constraint overlay over the land.	Moderate and High	R1	2000m x 50m = 10.0	324

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	Any proposal to clear this land should be supported by a detailed biophysical impact assessment outlining conservation measures proposed, offset plantings and ongoing environmental support and management techniques proposed.				
L17	Land west of Plantation Dr. appears to be previously cleared. However, in the broader whole of Council view, there is good connectivity to the west into Hidden Valley. In order to achieve good sustainability the larger tract of land to the west of Plantation Dr. could be conserved and urban connectivity a nature corridor could be designed through the site. This will not sterilise development but may lead to some loss of yield. It should be noted that the area to the west within this reference, though designated for future residential development, is highly constrained with a very high Total Biophysical Rating. This rating could result in a significant reduction in yield. It is recommended that consideration be given to changing the proposed zone or placing a development constraint overlay over the land. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	Moderate and High	R1	Very High = 3.0 Plus Corridor 550m x 50m = 2.75 Total =5.75	186
L18	Prospect and Scenic Dr, plus Driftwood Dr. A small Tract of vegetation but it does provide good connectivity to the south into the Capricorn Coast national park. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	Moderate	R1	500m x 50m = 2.5	81
L19	Mulambin. Although predominately cleared this small Tract of vegetation does provide good connectivity to the west into the Capricorn Coast national park. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	High		300m x 50 =1.5	49

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
L20	Lakeview Crt. Although predominately cleared these small Tracts of vegetation do have moderate to very high Total Biophysical Ratings, they also provide good connectivity between the coastal ecotones fronting Causeway Lake and the west into the Capricorn Coast national park. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	High		300m and 350m corridors x 50m = 3.25	105
L21	Kinka Beach. This patch is small and fragmented by on site development. There is vegetation of greater value to the west of the site. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	High		150m x 50m = 0.75	24
L22	Emu Park North. Although highly fragmented there are opportunities to achieve good sustainability and urban connectivity through the introduction of a nature corridor designed through the site. This will not sterilise development but may lead to some loss of yield. The very high rated Biophysical Rated land is predominately located within road reserve. It is suggested that Council liaise with DERM to examine opportunities to conserve significant vegetation in road reserves. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	High and Very High	R1	300m x 50m = 1.5	49
L23	Great Barrier Reef International Marine Resort. The whole of the development site has been cleared in the recent past. There is no recommendation to retain this vegetation.	Moderate, Very High and High	Comprehensive Development	NA	NA
L24	Svendsen Rd and Monaco Dr. A small tract of vegetation that is fragmented and isolated. It is recommended and this vegetation be retained as an urban nature corridor with a minimum width of 50m.	Moderate	Rural	100m x 50m = 0.5	16

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
L25	Svendsen Rd and Amalfi Dr. The whole of the development site has been cleared in the recent past. There is no recommendation to retain this vegetation. It should be noted that the area to the south west of this reference (outside of the PIA), though designated for future residential development is constrained with a high Total Biophysical Rating. This rating could result in a reduction in yield. It is recommended that consideration be given to placing a development constraint overlay over the affected land.	Moderate	Comprehensive Development	NA	NA
L26	End of Meadow St, Keppel Sands. Vegetation fringing a Wetland. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is open space it is considered that there will be no loss in yield.	Moderate and High	Open Space	NA	NA
L27	Cawarral Primary School. The site has two tracts of vegetation that is fragmented; however both connect into larger tracts to the north, east or south. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is a school it is considered that there will be no loss in yield.	Very High and High	Special Purposes	NA	NA
L28	Felix and Davidson Cawarral. A small tract of vegetation that connects into larger tracts to the north, east and south. It is recommended that consideration be given to placing a development constraint overlay over the affected land. It is not envisaged that there will be any loss in yield.	Very High and High	Rural Residential	NA	NA

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
L29	Lands in proximity to Annie Dr Cawarral. Small tracts of vegetation that connects into larger tracts to the north, and south. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is already fragmented it is not envisaged that there will be any loss in yield.	Very High and High	R1	NA	NA
L30	Lands fronting Belmont Creek, Glendale It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 30m to each side. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	Very High and High	Rural Residential	NA	NA
L31	Klekx Dr and Glendale Road, Glendale. Small tracts of vegetation that is fragmented and isolated. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	Moderate	Rural Residential	NA	NA
L32	Mt Chalmers Rd, Mt Chalmers. Small tracts of vegetation that is fragmented and isolated. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	Moderate and High	Rural Residential	NA	NA
L33	Rockyview Small tracts of vegetation that is fragmented and isolated but conserved in local parks or situated on lots that are already fragmented. Lands fronting Belmont Creek and	Moderate	Rural Residential	NA	NA

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	Ramsay Creek. It is recommended that this vegetation be retained as an urban/rural nature corridor with a minimum width of 30m to each side. As the land is fragmented it is considered that there will be no loss in yield.				
L34	Barmoya Rd, The Caves. Small tracts of vegetation that is fragmented and isolated. There is an area of vegetation to the north western corner important that connects to nearby National Park It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	High and Very High	Rural Residential	NA	NA
L35	Keryn Dr and Rhys Ave, The Caves Small tracts of vegetation that is fragmented and isolated. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.	High and Very High	Rural Residential	NA	NA
L36	Auto And Johnsons Rd, The Caves Small tracts of vegetation that is fragmented and isolated.	Low	Rural Residential	NA	NA
M1	Mount Morgan Lands fronting Dee River. It is recommended that this vegetation be retained as an urban/rural nature corridor with a minimum width of 30m to each side. As the land is fragmented it is considered that there will be no loss in yield. Throughout the balance of the town there are a number of small tracts of vegetation that is fragmented and isolated. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in	Low, Moderate and High	Mix of Tourist, Business, Residential and Rural Residential	NA	NA

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	yield.				
R1	Frenchville Rd Frenchville, Berserker Foothills and the Norman Road Residential Area, Rockhampton. There are a number of tracts of vegetation which connect back into Mount Archer National Park. Unfortunately due to existing land use and reconfiguration pattern there is a significant fire risk between the National Park and dwelling stocks. Although resolution of natural hazards is outside the scope of this report. It is recommended that Council review current land use patterns of development and examine opportunities to improve the safety and security of existing development and ascertained whether future development can be used as a mechanism to reduce the current risk to fire, while minimising the negative impacts on the integrity of the interface between urban development and the National Park.	Moderate , High and Very High,	Residential Dwelling	TBD	TBD
R2	Limestone Creek, Parkhurst and Kawana. Most of Limestone Creek is situated in existing surveyed reserve or as part of adjoining reserve. There is a section between Slade street and the Bruce Hwy where the creek is not excises out of the freehold. This equates to approximately 1000metres of creek frontage. It is recommended that this vegetation be retained as an urban nature corridor with a minimum width of 30m to each side of Limestone Creek.	Moderate and High	Residential Dwelling	6.0	243
R3	Livingstone Creek Environmental Park, Central Queensland University, land east of Cathedral of Praise Christian College and South side of Carlton St and Cant St A contiguous tract that breaks up into smaller tracts of more dispersed vegetation going from north to south. It is recommended that consideration be given to placing a development constraint overlay over the affected land. It is considered that there will be no loss in yield over the Special Purpose land.	Low and High	Residential Dwelling and Special Purposes	15	486

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	There is approximately 15 Ha of land east of the Cathedral of Praise Christian College that could be severely affected by the Total Biophysical Rating. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is fragmented it is considered that there will be no loss in yield.				
R4	North side of Wade Street, Kawana. Although outside the PIA area the land is designated for urban development. The whole of the development site has been cleared in the recent past. There is no recommendation to retain this vegetation.	Low	Industrial Rural Open Space	NA	NA
R5	North of Birkbeck Dr. Small tracts of dispersed vegetation that is fragmented and isolated. It is recommended that consideration be given to placing a development constraint overlay over the affected land. The Parkhurst Industrial Area east of Alexandra Street, is designated for a range of industrial activities. However, the land is outside of the PIA. Accordingly there is no immediate loss in yield for the PIP. Due to the moderate status of the Total Biophysical Rating consideration should be given to placing the land in a development constraint overlay.	Low and Moderate	Residential Dwelling Industrial Zonings outside the PIA	NA	NA
R6	The Common Small tracts of dispersed vegetation that is fragmented and isolated. However, there is good connectivity to the south fronting onto the Fitzroy River, where the vegetation is denser. It is recommended that consideration be given to placing a development constraint overlay over the affected land. As the land is zoned for open space and Special purpose it is considered that there will be no loss in yield.	High and Moderate	Open Space and Special purpose	NA	NA
R7	Lion Creek Wandal Lands fronting Belmont Creek and Ramsay Creek. It is recommended that this vegetation	High	Residential Dwelling	NA	NA

Map Reference	Vegetation Cover Assessment	Total Biophysical Rating	Zone	Area (Ha)	Implications on Pop'n and Emp Growth.
	be retained as an urban/rural nature corridor with a minimum width of 30m to each side. The land is subject to inundation by the 1:100 flood event. It is therefore considered that there will be no loss in yield.				
Total				108.55	3517

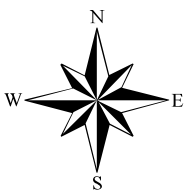
Appendix H

Native Title Claim

Rockhampton Regional Council
Natural Environment Study
Native Title Claim
(QC 97/21)

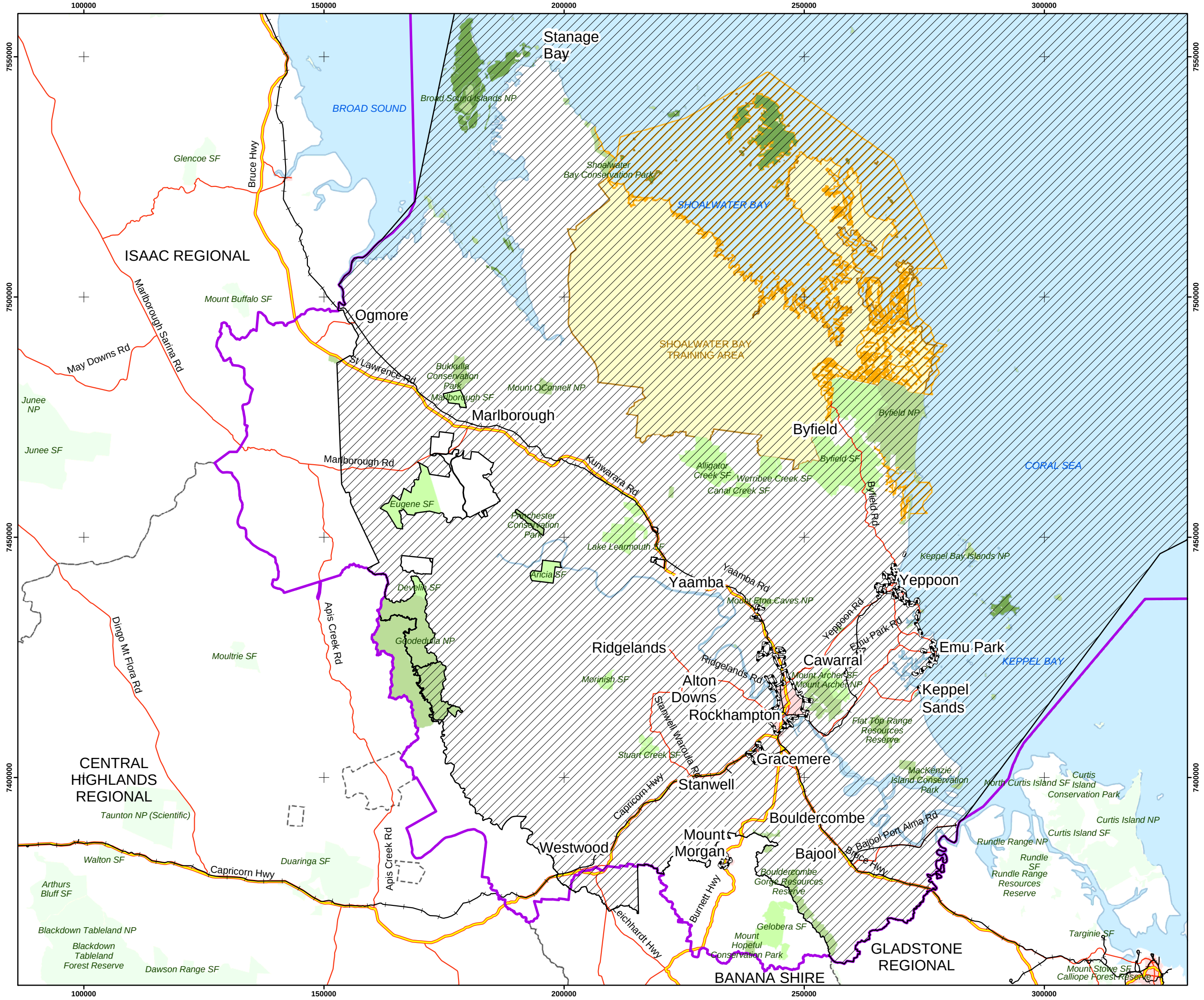


- Railway
- Highway
- Main Road
- Local Road
- Watercourse
- Waterbody / Ocean
- Shoalwater Bay Military Training Area
- Built Up Area
- Study Area
- Native Title Claim QC 97/21
- PIA
- Local Government Boundary
- QLD Estate Outside Study Area
- State Forest
- National Park
- World Heritage Area
- RAMSAR Wetland



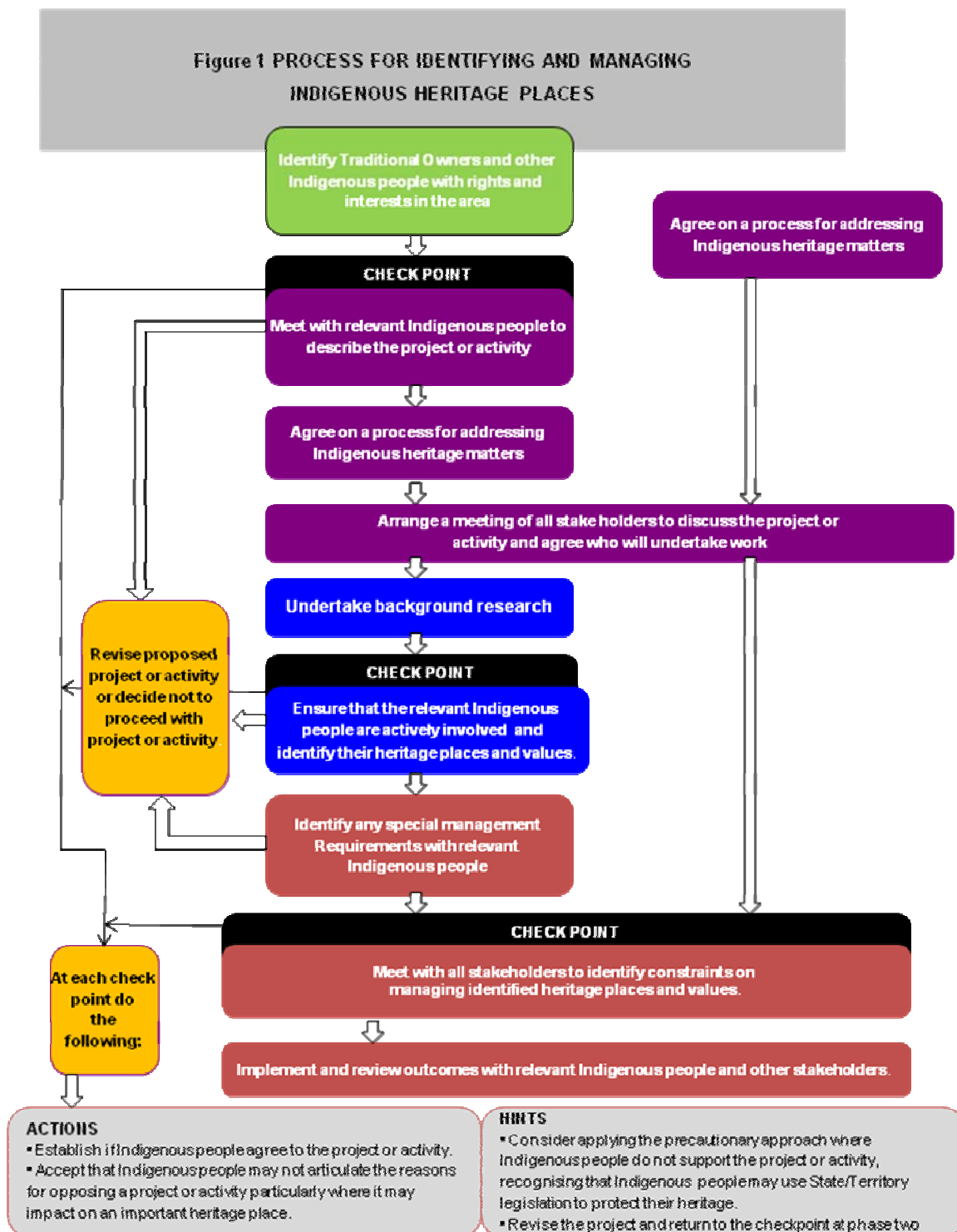
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Scale 1 : 730,000 when printed at A3
Datum: Geocentric Datum of Australia 1994
Grid Projection: Map Grid of Australia Zone 56



Appendix I

Processes for Identifying and Managing Indigenous Heritage Places



Source: Australian Heritage Commission's publication *Ask First: A guide to respecting Indigenous*