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DIANNE COPPER MINE



Aquatic Ecology Report

Report prepared for:
Mineral Projects Pty Ltd

Date:
November 2024

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Client:

Mineral Projects Pty Ltd

Project Number:

23070

Project Name:

Dianne Copper Mine – EA amendment supporting studies

Report Title:

Dianne Copper Mine – Aquatic ecology report

Document Control

Revision	Revision date	Details	Author	Authorised by
0	12 August 2024	First draft for client review	MK, JS, JK	JJ
1	23 August 2024	Second draft for client review	MK	MK
2	21 November 2024	Final version		MK

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1. INTRODUCTION

Dianne Copper Mine (DCM) is located within the Cook Shire on the Cape York Peninsula in north Queensland, about 130 km northwest of Cairns and 100 km southwest of Cooktown (Figure 1). The region has historically been extensively fossicked for gold.

DCM was developed in the 1970s, targeting a high-grade (~30%) copper deposit. The mine operated until 1982, when it was placed into 'care and maintenance', which is still the status to date. However, following recent successful exploration activities at DCM, Mineral Projects Pty Ltd (Mineral Projects) aims to recommence operations. The current environmental authority (EA; EPML00881213, dated 31 July 2023), covering six separate mining leases (Figure 2), has not undergone a significant amendment in several years. Furthermore, the locations of approved historical works are not well defined under the EA.

C&R Consulting Pty Ltd (C&R) were commissioned by Mineral Projects to complete an aquatic ecology assessment as part of the supporting studies for a major EA amendment application to allow further development of the DCM site, with the aim to re-commence extractive activities on site.

1.1 SCOPE

The scope of the aquatic ecology study includes the following:

- Description of proposed and historical activities;
- Review of relevant legislative requirements associated with the project;
- Review of relevant literature of previous aquatic ecology studies conducted in the region to determine the background setting;
- Field surveys to assess current conditions in the project site in relation to aquatic habitat, water quality relevant to aquatic ecology, aquatic flora communities, aquatic macroinvertebrate communities, turtle communities, fish communities, benthic substrate type and river condition;
- Identification of the potential for listed species of aquatic flora and fauna to occur within the project site; and
- Assessment of the potential for the project to impact on the aquatic flora and fauna confirmed – or identified to have the potential to occur – within the project site.

The report structure is as follows:

- Section 2 – summarises historical and proposed project activities;
- Section 3 – describes the regional setting, including the environmental values (EVs) of note to the Palmer River catchment;
- Section 4 – presents relevant legislation, policies and regulations;
- Section 5 – provides an overview of the methods used to determine the aquatic values of the project site, including the desktop assessment and detailed field survey methods;
- Sections 6 and 7 – details the results of the aquatic ecology study based on the results of the desktop assessment and field survey. It includes the following:
 - Literature review summary and database search results;
 - A description of watercourses and habitats present, and their condition;
 - Sediment quality of the local watercourses;
 - Macroinvertebrate communities within the project site and neighbouring watercourses;



- Aquatic flora species noted;
 - Fish communities present and/or known to occur throughout the greater catchment;
 - Turtle communities and other vertebrate species present and/or known to occur within the project site; and
 - Wetland types relevant to the project site.
- Section 8 – discusses the potential impacts to aquatic ecology values identified within the project site and details the best-practice mitigation measures to ensure the risk of these impacts is reduced to within an acceptable range.

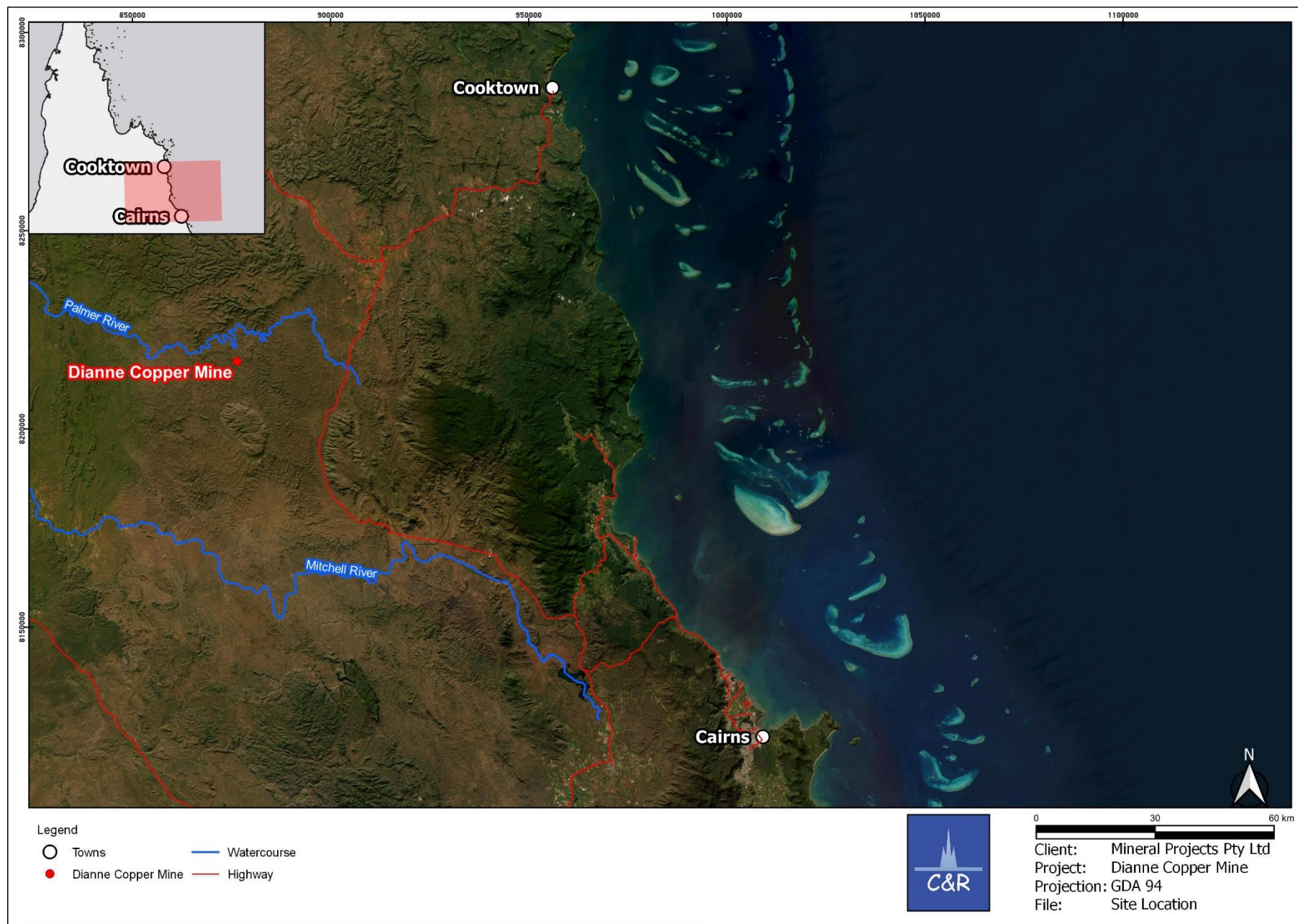


Figure 1: Dianne Copper Mine location.

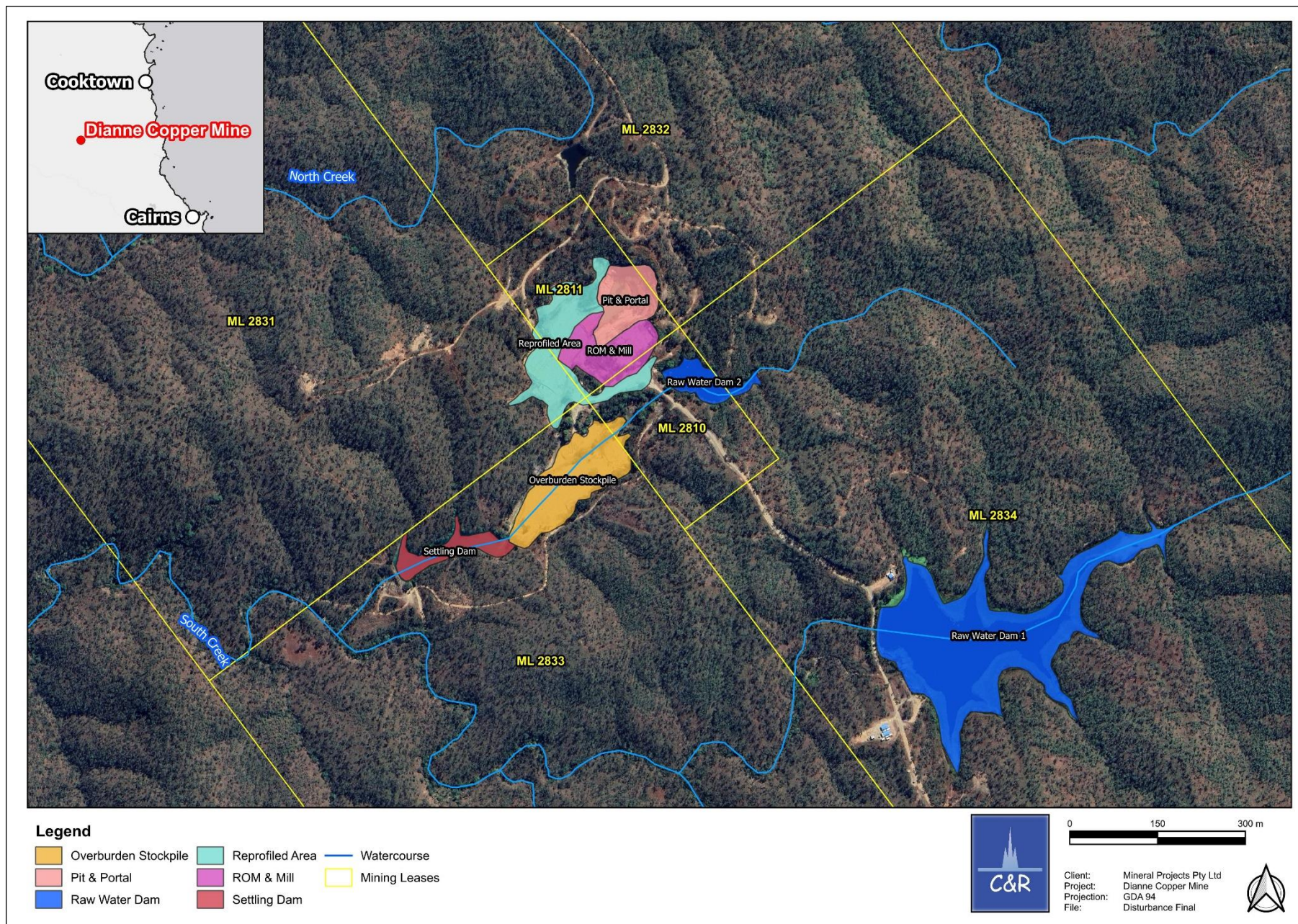


Figure 2: Existing disturbance footprint across DCM.

2. PROJECT DESCRIPTION

2.1 HISTORICAL ACTIVITIES

Historical DCM operations are encompassed by six mining leases that cover an area of 518 ha (Table 1 and Figure 3). DCM started as an open-cut pit in 1979 before progressing underground via bord-and-pillar mining techniques. The current disturbance footprint includes an open-cut void and portal, mine-water management dams (including raw water dams and a settling dam containing mine-affected water [MAW]), access roads/tracks and a overburden stockpile (Figure 2).

Table 1: Mining leases associated with the DCM operations.

Mining lease	Date granted	Expiry date	Area (ha)
ML 2810	24/04/1974	30/04/2028	5.67
ML 2811*	24/04/1974	30/04/2028	5.67
ML 2831	02/08/1973	30/04/2028	129.50
ML 2832	15/11/1973	30/04/2028	123.83
ML 2833	15/11/1973	30/04/2028	129.50
ML 2834	15/11/1973	30/04/2028	123.83
<u>Total</u>			<u>518.00</u>

*The access road that connects the site to Whites Creek Road is associated with this mining lease.

The mine has been in a state of 'care and maintenance' since the early 1980s. Although no extraction activities are currently being undertaken on site, existing disturbance from historical activities still influences the surrounding environment. The main source of potential contaminants to the receiving environment is from leached waters associated with the overburden stockpile. The stockpile is located within a small valley (Figure 2) and was reconfigured in 2020 to reinstate a drainage line around the dump instead of flowing through it.

The settling dam is located downstream of almost all disturbance areas associated with the mine, including the overburden stockpile (Figure 2). The only authorised release point to the receiving environment (RP1) is situated within the spillway of the settling dam. The spillway is recently gauged and likely releases passively throughout the wet season once the dam is full.

Historically, the settling dam was found to be seeping underneath the dam wall and into the receiving environment. However, remediation works completed in 2020–2021 reduced the head pressure of water held within the dam (by pumping MAW from the settling dam to the pit) and installing a sump at the foot of the dam wall. The sump has an automated pump installed to return seepage back to the settling dam as required.

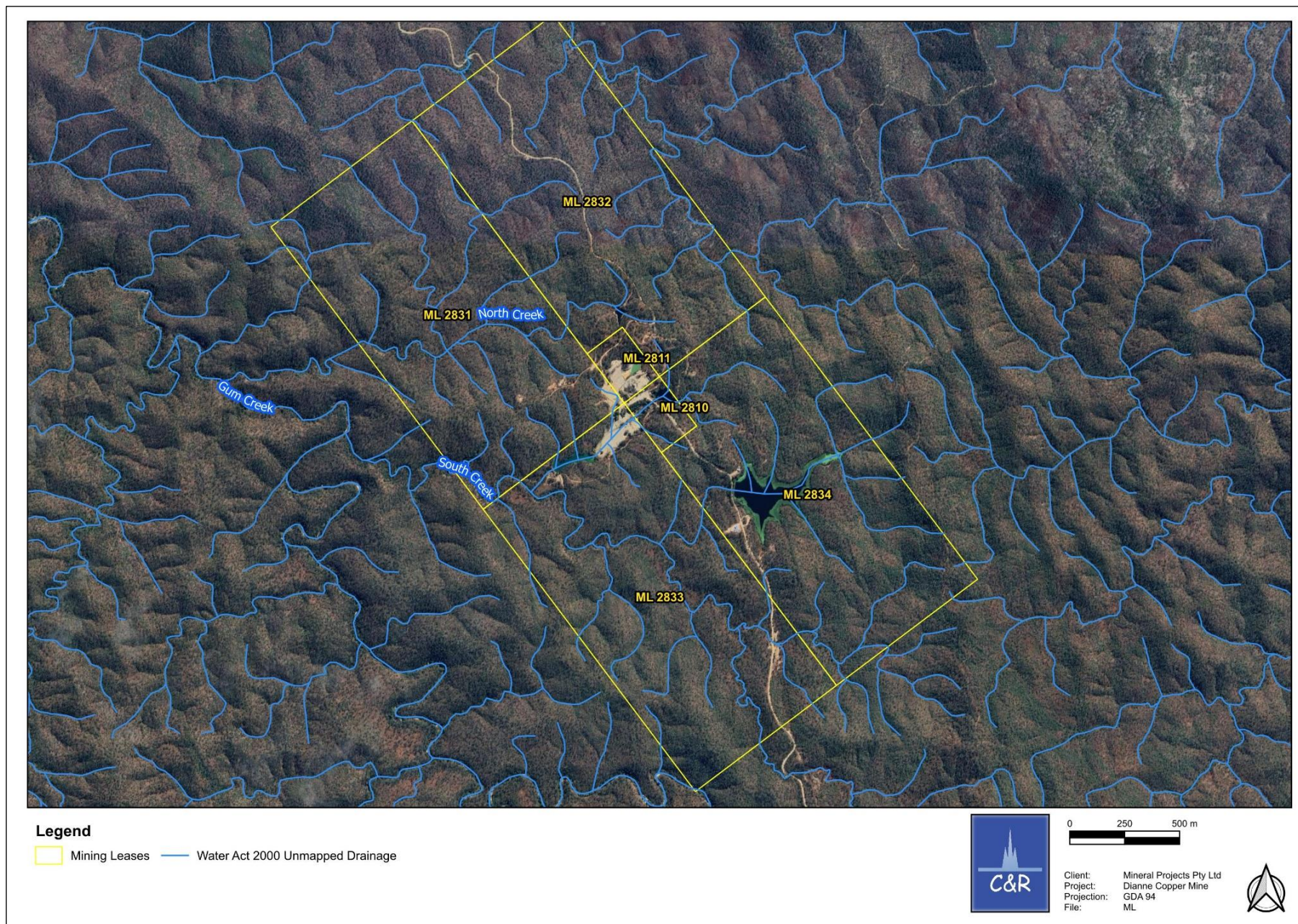


Figure 3: Mining leases associated with DCM operations.

2.2 PROPOSED ACTIVITIES

The recommencement activities at DCM will involve the following:

- The extraction – and processing – of up to 900,000 tonnes per annum (tpa) of copper ore from a single open-cut pit via a truck and shovel operation (i.e. excavator and haul methods). Additional minerals – including zinc and silver – will also be targeted, although copper will be the main target.
- The pit will be situated over the old/existing open-cut and portal void, reaching a total depth of about 110 m (Figure 4).
- Initial processing of the extracted ore will be undertaken via a two-phase crushing, screening and agglomeration circuit prior to stacking on heap leach pads for copper extraction (Figure 5).
- The heap leach pads, with an overall area of approximately 3 ha, will be lined with high-density polyethylene (HDPE) sheeting to prevent any seepage to underlying soils and groundwater systems. The heap leach and electrowinning processing stage is a closed circuit, with the heap leach pads irrigated with an acidic solution and the copper-rich runoff (pregnant liquor) being captured and treated using electrowinning that extracts the copper onto sheets charged as cathodes in an electrical circuit (Figure 5). Once the extraction process is completed, the remaining liquor is treated through a solvent extraction process so that the acid can be recycled to the heap leach process again (Figure 5).
- The heap leach area includes overflow dams (Figure 4) to ensure no solutions are released to the receiving environments.
- The copper cathode product will be transported to the Port of Townsville (PoT) via road (in 20 t trucks) for export to international markets. Up to 16 truck movements are required per week (on average).
- The construction and/or upgrade of various mine infrastructure (Figure 4), including:
 - Run-of-mine (ROM) area;
 - Access roads and tracks;
 - Temporary accommodation camp and associated sewage treatment plant (STP), with up to 40 staff working on site during the operational phase;
 - Water management infrastructure, including the development of diversion bunds/drains around the entire new operational footprint (including the heap leach area) and the remediation of the existing settling dam to develop the new release dam.
 - Workshop and administration buildings;
 - Power infrastructure (solar and diesel combination), including the development of bunded fuel storage areas; and
 - A small landfill pit for general (non-mining) waste.

The project has a mine life of approximately four years, commencing in late 2024, with an additional six months required for closure and rehabilitation. During this time, further exploration activities within the area will also be conducted.

The proposed total disturbance area is approximately 50 ha, which includes utilising 14.1 ha of existing disturbance areas (Figure 4).

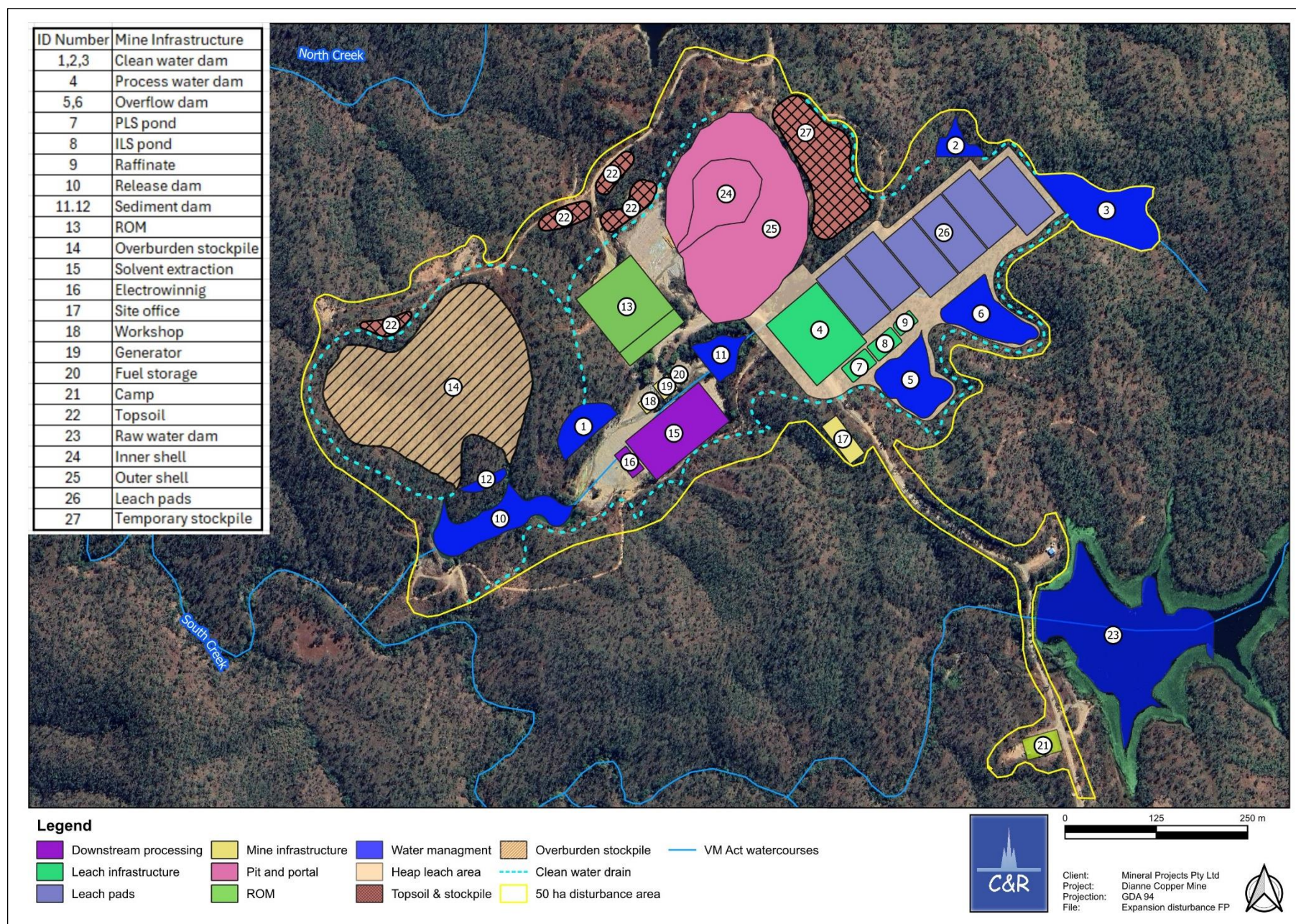


Figure 4: Proposed disturbance areas associated with the project.

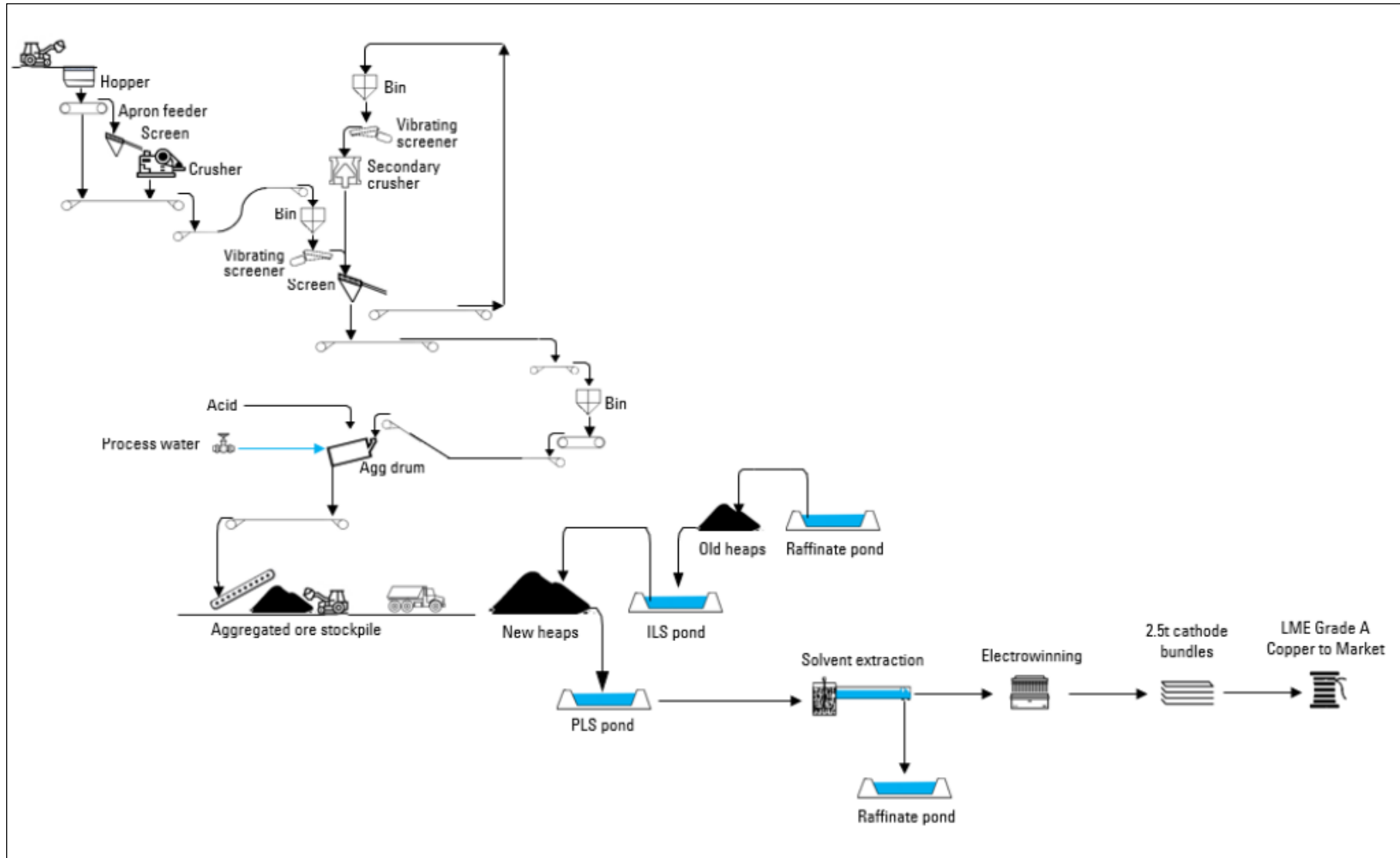


Figure 5: Indicative flowchart detailing the proposed mineral processing activities.

3. REGIONAL SETTING

3.1 CLIMATE

Rainfall in Queensland's seasonally dry tropics is notoriously inconsistent in its intensity, duration and location. The climate of the area is dominated by intense rainfall events during the wet season (November to April). These rainfall events are often highly variable in their spatial and temporal distribution, with much of the rain falling in distinct, spatially separated cells across the landscape.

The nearest Bureau of Meteorology (BoM) rainfall gauge (28013, Maitland Downs Station; BoM, 2024a) is located about 24 km southeast of the project site. At gauge 28013, the median annual rainfall total over the 1965–2023 period was 922.1 mm. However, annual rainfall displays very high variability, ranging from 333.2 mm (1966) to 1,879.0 mm (1981). Most precipitation tends to fall in January and February (Figure 6), with moderate to high falls also common in March and December. Typically, little rain falls throughout the dry season, with an occasional shower in May, June or October.

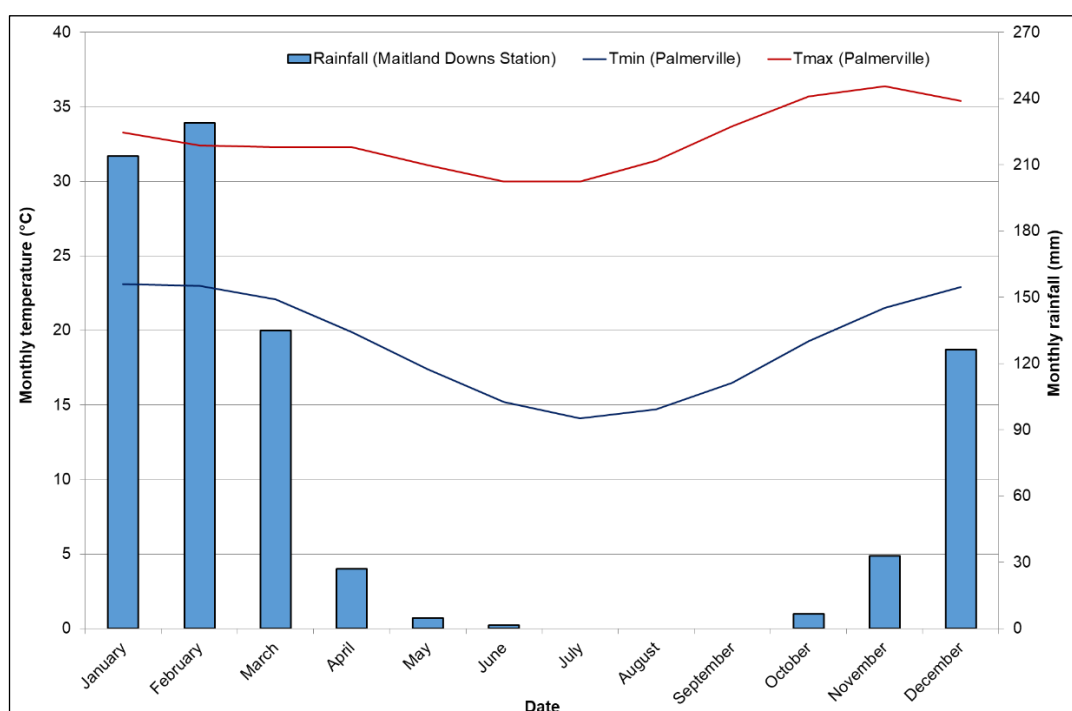


Figure 6: Long-term historical median monthly rainfall (BoM station 28013) and temperature (BoM station 28004).

The region is characterised by hot weather throughout the year. At Palmerville (BoM weather station 28004; BoM, 2024a), median monthly maximum temperatures (T_{max}) are generally above 30°C (Figure 6). The hottest day-time temperatures are typically during the monsoonal build-up before the beginning of the wet season (October–December; Figure 6). Conversely, median monthly minimum temperatures (T_{min}) more closely mirror the rainfall patterns, with the highest values (22°C – 23°C) observed between December and March, coinciding with the wettest months (Figure 6).

Evaporation tends to exceed rainfall for almost all days of the year except during intense rainfall events. The extended dry season causes baking and crusting of surface soils. These

processes will reduce the infiltration capacity of surface soils unless suitable pre-wetting is provided by gentle rain prior to the wet season. During the onset of the wet season, in the absence of gentle, pre-wetting rains, more than 90% of rainfall can eventuate as runoff throughout catchments.

Rainfall over the twelve months prior to the development of this report (i.e. June 2023 to May 2024, the reporting period) was higher in comparison to the long-term annual median (907.2 mm) over the equivalent interval (June to May), with a recorded total of 1,404.5 mm for the year. Figure 7 presents monthly rainfall over the reporting period, compared to the historical monthly median recorded at the Maitland Downs station (BoM station 28013). Rainfall during the 2023–2024 wet season was nearly double the long-term median rainfall as a result of severe tropical cyclone (TC) Jasper. TC Jasper formed in the Coral Sea and made landfall near Wujal Wujal on 13 December 2023, before stalling over the Cape York Peninsula for several days, bringing large amounts of rain to the region (BoM, 2024b). December 2023 was the wettest month (582.5 mm), with January and February 2024 also recording rainfall totals above the long-term median (Figure 7).

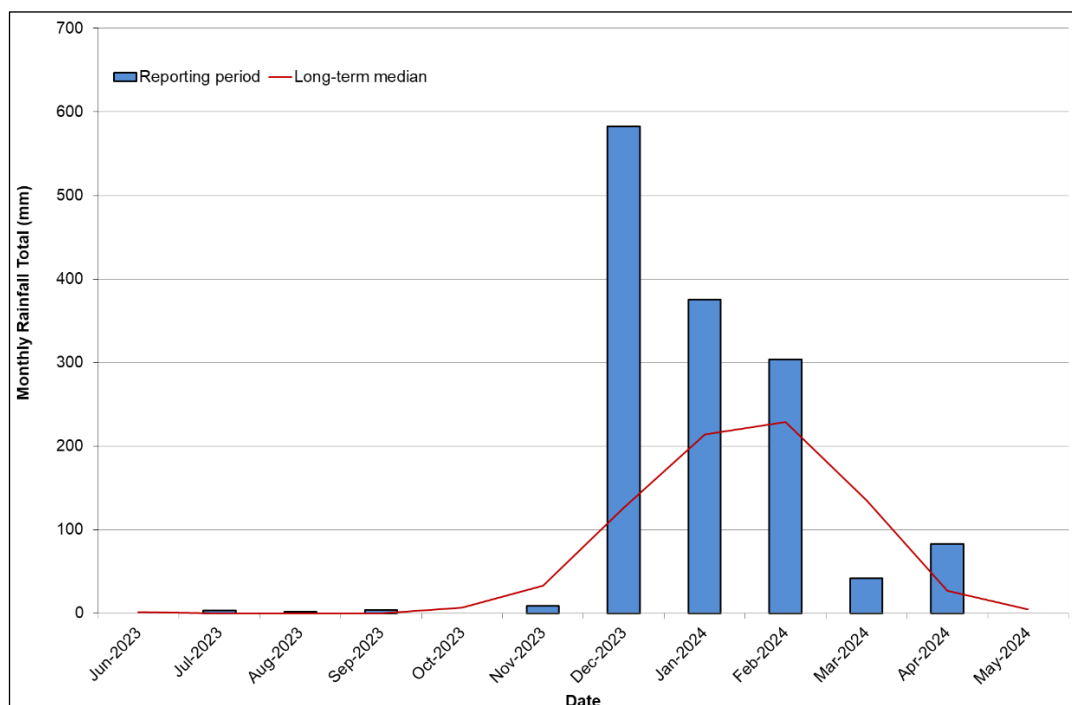


Figure 7: Rainfall over the reporting period and the long-term historical monthly median (BoM station 28013).

3.2 HYDROLOGY

The project site lies within the Palmer River sub-basin, which is part of the Mitchell River basin, draining west into the Gulf of Carpentaria (Figure 1). The Palmer River sub-basin covers approximately 8,424 km², and the Mitchell River basin about 71,622 km². The main watercourse associated with the project site is an unnamed tributary of Gum Creek, herein referred to as 'South Creek' (Figure 2). A second unnamed tributary of Gum Creek traverses the northern sections of the project site and will be herein referred to as 'North Creek' (Figure 2). Both these tributaries flow into Gum Creek, which joins Granite Creek before entering the Palmer River.

Watercourses within the region record peak flows within the wet season. Many smaller systems only flow while rains persist (ephemeral streams). Conversely, others like Gum Creek flow for extended periods, fed by groundwater outputs, following the cessation of the

wet season (intermittent streams). Similar to Gum Creek, South Creek is an intermittent system, with minor flows sustained for an extended period after the wet season via groundwater seepage from the highly fractured rock within the upper reaches. Conversely, North Creek is considered ephemeral. It is likely that all three systems dry out entirely over the dry season, although pools are expected to persist year-round in some areas.

South Creek receives flows from the existing disturbance areas associated with the historical mining operations via the settling dam. The settling dam has the potential to passively release during flood events. Additionally, seepage has been documented below the settling dam wall. A sump and return pump system has been set up at the base of the wall to capture seepage and return it to the settling dam. However, the effectiveness of the system to capture all seepage is unknown. Further, the connectivity of the shallow subsurface seepage to the downstream receiving environment is undetermined.

The Gum Creek catchment area is a relatively small catchment in the Palmer River sub-basin, situated within the hills to the south of the main channel of the Palmer River. The hills restrict the drainage lines in terms of width. Most drainage lines of Gum Creek are deeply incised and steep, creating fast-flowing waters during the wet season.

3.3 GEOLOGY AND GEOMORPHOLOGY

The area is characterised by rocky hills and steep valleys, controlling the morphology of the local watercourses. The primary geological formation in the region is the Hodgkinson Formation, which is several kilometres thick – and forms the bulk of Queensland's Hodgkinson Province, the northern part of the Tasman Fold Belt (Horn et al., 1995). The province is bounded to the west by the Palmerville Fault.

The Hodgkinson Province consists of Paleozoic, turbiditic siliciclastics with subordinate limestone, chert, and mafic volcanics. These rocks are mostly unfossiliferous, except for the limestone and chert. The oldest rocks are Ordovician, siliciclastic rocks that are located along the western margin of the province, adjacent to the Palmerville Fault (Horn et al., 1995).

The Hodgkinson Province is overlain by restricted Carboniferous to Triassic, non-marine successions, comprising conglomerate, coal measures, volcanic rocks and sandstone, including rocks of the Ngarrabullgan and Lakefield basins (Horn et al., 1995). The Hodgkinson Province has been folded and faulted by several deformation events.

The primary soil type found around the DCM is a tenosol, specifically Fu25. This type of soil is generally found in low, hilly to hilly lands closely dissected by numerous, small streams. Undulating areas occur marginally and there are some areas of high hills with very steep slopes and common rock outcrops. The dominant soils are very shallow, gravelly, bleached loams (Um2.12), with lesser areas of similar loams (Um2.21, Um4.1, and Um4.21). Smaller areas of similar, sandy loams (such as Uc2 and Uc4) occur locally. Associated throughout the unit are areas of shallow, gravelly duplex soils (namely Dy3.41, Dr2.41 and Dr3.41), particularly on lesser slopes. In some valley floors, there are small areas of Dy3.43 soils. Small areas of basic volcanic rocks in the unit have deeper, red, friable clays (i.e. Uf6.31). At the northern margin of the project site, the unit may be capped by small sandstone mesas of unit Ca35.

This surface geology and soils lead to the stream beds of the targeted watercourses being dominated by coarse sands, gravel and cobble, interspersed with bedrock throughout the reaches. The systems often present steep gradients, generating fast-flowing water in the wet season.

3.4 RIPARIAN COMMUNITIES

There are two main types of riparian vegetation communities associated with watercourses within the region. The type is dependent on the size of the watercourse:

1. Within small drainage channels that have limited alluvium present, in the upper reaches of the catchment, the riparian communities are characterised as a heterogeneous mix of regional ecosystem (RE) 9.11.3a (85%) and RE 9.3.14a (15%). As the creek extends downstream, there is more alluvial development and riparian vegetation becomes more pronounced (transitioning to the second type of riparian community discussed in point 2). Along these minor drainage lines, most of the fringing vegetation in this habitat type is analogous with the adjacent woodland which is dominated by Cullen's ironbark (*Eucalyptus cullenii*), Clarkson's bloodwood (*Corymbia clarksoniana*), Cooktown ironwood (*Erythrophleum chlorostachys*) and Dallachy's gum (*Corymbia dallachiana*). There is an infrequent occurrence of vegetation synonymous with riparian zones, including northern swamp mahogany (*Lophostemon grandiflorus*), bluegum (*Eucalyptus tereticornis*), river sheoak (*Casuarina cunninghamiana*) and sedges (*Cyperus* spp.).
2. Large creek lines (such as Gum Creek) present a more established riparian zone consisting of similar species as described in riparian communities in point 1 – but with additional riparian species such as Auri (*Acacia auriculiformis*), Leichhardt tree (*Nauclea orientalis*) and Cape fig (*Ficus nodosa*). These riparian communities are consistent with a heterogeneous mix of RE 9.3.14a (90%) and RE 9.11.3a (10%).

Further discussion on the riparian communities present across the site is provided within the terrestrial ecology report (C&R, 2024b).

3.5 LAND USE

Large portions of the Palmer River catchment area have historically been targeted for gold mining, including the Gum Creek catchment. Although alluvial gold mining still occurs within Gum Creek, it is no longer the dominant land use within the region, superseded by cattle grazing. Despite this, small-scale gold hunters are still irregularly observed in the area, with evidence of their recent activities (small diggings) often observed. Although some station homesteads occur in the Gum Creek catchment, there are no major settlements.

DCM is the only known hard rock mining operation within the Gum Creek catchment area.

3.6 ENVIRONMENTAL VALUES

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water) provides a framework for the protection of EVs associated with Queensland rivers, streams, wetlands, lakes, aquifers, estuaries and coastal areas. Under this framework, EVs for specific catchments and drainage basins have been formalised through a process of statutory declaration. EVs formalised in this way are listed in Schedule 1 of the EPP Water. For other waters, a site-specific assessment of the potential EVs is required. To date, no EVs have been declared for the Palmer River catchment (or its tributary catchments, i.e. Gum Creek).

Due to the anthropogenic disturbances that have occurred throughout the region (i.e. mining, grazing, etc.), the local catchments are considered slightly to moderately disturbed. Despite this, the local surface water resources currently support a range of EVs, including aquatic ecosystems, industry, stock watering and human uses. The existing EVs have been identified from a review of known land and water uses within the catchment, stakeholder consultation and through reference to published information.

In summary, the surface water EVs relevant to the project are:

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- Aquatic ecology;
- Stock drinking water;
- Drinking water supply (potentially/unknown);
- Cultural values; and
- Industrial use (downstream alluvial mine operations).

4. RELEVANT LEGISLATION, GUIDELINES AND REGULATORY REQUIREMENTS

The legislation, policies and regulations relevant to the management of aquatic ecology in relation to the project are discussed in sections 4.1 to 4.8 and include:

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- The Queensland *Nature Conservation Act 1992* (NC Act);
- The Queensland *Water Act 2000* (Water Act);
- The Queensland *Fisheries Act 1994* (Fisheries Act);
- The Queensland *Environmental Protection Act 1994* (EP Act);
- Directory of important wetlands of Australia (DIWA; DCCEEW, 2024a), Ramsar wetlands (DCCEEW, 2024a) and the Department of Environment, Science and Innovation (DESI, 2024b) *Map of Queensland wetland environmental values*;
- The Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC, 2012) environmental offsets policy; and
- The Queensland environmental offsets framework.

4.1 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) administers the EPBC Act. Any action that is likely to have a significant impact on a matter of national environmental significance (MNES) is subject to assessment under the EPBC Act approval process.

Threatened species – listed under the EPBC Act – with the potential to inhabit the project site were considered in this assessment. The Protected Matters Search Tool (PMST; DCCEEW, 2024b) report indicates the following:

- Freshwater sawfish (*Pristis pristis*), listed as vulnerable and a migratory marine species under the EPBC Act, has the potential to occur within 20 km of the project site. This species is considered unlikely to inhabit the project site, as discussed in Section 7.8.3.
- Freshwater crocodile (*Crocodylus johnstoni*), listed as a marine species under the EPBC Act but not threatened, has the potential to occur within the project area. However, the project site is not within mapped commonwealth marine waters. Therefore, this listing is not triggered by the proposed project and not directly assessed any further in this report.
- Mertens' water monitor (*Varanus mertensi*), listed as endangered under the EPBC Act, has the potential to inhabit the project site. Although this species can inhabit freshwater systems, it is considered a terrestrial species and is assessed within the terrestrial ecology report for this project. Therefore, it is not discussed any further within this report.

4.2 QUEENSLAND NATURE CONSERVATION ACT 1992

The Queensland NC Act provides the framework to regulate against any actions with the potential to impact protected areas (e.g. national parks) and protected flora and fauna listed under the *Nature Conservation (Animals) Regulation 2020* and *Nature Conservation (Plants) Regulation 2020*. The NC Act allocates protected fauna and flora into several categories

dependent on the level of management required to ensure their conservation. These categories include:

- *Extinct in the wild*;
- *Critically endangered*;
- *Endangered*;
- *Vulnerable*;
- *Near-threatened*; and
- *Least concern*.

The database searches did not identify any critically endangered, endangered, vulnerable or *near-threatened* (CEEVNT) species listed under the NC Act with the potential to occur within 20 km of the project site.

The NC Act also lists *special least concern* species. These species are allocated *special least concern* status based on either their special cultural significance or the existing population needing to be conserved. The only aquatic *special least concern* fauna species identified in database searches potentially occurring within the Palmer River catchment was the platypus (*Ornithorhynchus anatinus*). Several aquatic *special least concern* flora species are recognised as potentially occurring within the Palmer River catchment. These species are considered unlikely to occur within the project site, as discussed in section 7.10.

4.3 QUEENSLAND WATER ACT 2000

The Water Act provides for the sustainable management of water resources – as well as any other resources with the potential to impact water resources. This is achieved through a range of processes, including the establishment and operation of water authorities. Under the Water Act, any potential works that will destroy vegetation, excavate – or place fill within – a watercourse, lake or spring will require a riverine protection permit application. Mining operations may be exempt from obtaining a riverine protection permit under the guideline *Activities in a watercourse, lake or spring associated with mining operations* (Department of Environment and Resource Management [DERM], 2010), provided works are consistent with the guideline. The Water Act provides for the identification of watercourses on the watercourse identification map – or declaration of a watercourse by the administering authority.

A review of the Water Act watercourse identification map was undertaken for the area, with the results discussed in Section 6.2.3.

4.4 QUEENSLAND FISHERIES ACT 1994

The Fisheries Act is administered by the Queensland Department of Agriculture and Fisheries (DAF). Under section 125 of the Fisheries Act, all Queensland waters are protected against any potential impact that may directly or indirectly result in the degradation to the water body in question.

Development permits under the Queensland *Planning Act 2014* (Planning Act) are required prior to constructing any waterway barrier works (i.e. structures such as culverts, road crossings, dams, etc.) that may inhibit fish passage. DAF (2024) has prepared mapping which classifies all waterways in Queensland in relation to the level of risk that waterway barrier works could pose to fish movement and fish communities. This mapping is used for projects that require approvals under the Planning Act to assist proponents in determining the level of assessment that is required.

The activities being assessed for the project are restricted to those undertaken within the proposed mining lease boundary. These activities will be undertaken in accordance with the

EA that will be obtained for the project. The Planning Act does not apply to activities undertaken within a mining lease. There is consequently no need to obtain separate approvals for waterway barrier works. The DAF (2024) waterway mapping is, therefore, not directly relevant to the project given that approval under the Planning Act is not required. Despite this, Section 6.2.3.1 reviews the outcomes of this mapping and its relevance to the project site.

Section 7.8 discusses potential fish communities inhabiting the watercourses associated with the project site. The access requirements of these fish communities to upstream areas is documented in Appendix D.

4.5 QUEENSLAND ENVIRONMENTAL PROTECTION ACT 1994

The Queensland EP Act aims to protect the designated EVs of Queensland watercourses, wetlands and groundwaters. This is achieved through the adoption of the associated EPP Water and the *Environmental Protection Regulation 2019*.

The EP Act and its subordinate legislation provide a range of tools to ensure its objectives are met. These range from approvals (called EAs) for environmentally relevant activities (ERAs) through to statutory and enforcement tools such as environmental protection orders.

The EPP Water outlines the EVs identified for each basin and/or sub-basin within Queensland – as well as defining the catchment-specific water quality objectives required to ensure the protection of each unique EV. Section 3.6 discusses the EVs of the area, in accordance with the framework defined in the EPP Water.

The *Map of Queensland wetland environmental values* (DESI, 2024b) is a state-wide statutory map under the EPP Water. DESI (2024b) identifies wetlands of high ecological significance (HES) and general ecological significance (GES) across the state. Wetlands in wetland protection areas (WPAs) and HES wetlands are identified as matters of state environmental significance (MSES) under planning and environmental offsets legislation.

Section 6.2.3 details the potential for HES and WPAs to occur within the project site and/or the immediate downstream areas.

4.6 RAMSAR WETLANDS AND NATIONALLY IMPORTANT WETLANDS

The directory of important wetlands (DCCEEW, 2024a) is an online database that lists internationally and nationally important wetlands. The directory provides data and information about important wetlands on which to base management decisions. Although managed via the same database as MNES, nationally important wetlands are not protected under the EPBC Act.

The directory includes wetlands identified under the Ramsar convention which is an international cooperative designed to conserve wetlands. Ramsar wetlands are those that are representative, rare or unique wetlands, or are important for conserving biological diversity. Ramsar wetlands are considered MNES under the EPBC Act.

As discussed in Section 6.2.3, these databases list no wetlands on the project site, or within close proximity to the site.

4.7 COMMONWEALTH ENVIRONMENTAL OFFSET POLICY

The Commonwealth (DSEWPaC, 2012) environmental offsets policy relates to the potential for significant, residual impacts to MNES. DSEWPaC (2012) discusses the role of offsets in impact assessments. Further, it outlines the consideration process undertaken by DCCEEW

to determine the suitability of a proposed offset package. The policy defines an offset package as a “*suite of actions that a proponent undertakes in order to compensate for the residual significant impact of a project*” (DSEWPaC, 2012). An offset can be in the form of a direct offset or other compensatory measure.

Suitable offset packages must include direct offsets, with at least 90% of the offset requirements met by direct offsets. Direct offsets are actions that result in a measurable conservation gain for the impacted, protected matter. The remaining (less than 10% of) offset requirements within an offsets package can be provided as compensatory measures. Compensatory measures are actions that will benefit the impacted, protected matter without directly offsetting the impact (e.g. funding for research).

The potential for MNES to occur on the project site is discussed in Section 6.2.

4.8 QUEENSLAND ENVIRONMENTAL OFFSET FRAMEWORK

State environmental offset requirements are legislated within the *Environmental Offsets Act 2014* (EO Act), the *Environmental Offsets Regulation 2014* (EO Regulation) and the *Queensland environmental offsets policy* (Department of Environment and Science [DES], 2023), providing guidance on legislative requirements. These three documents comprise the Queensland environmental offsets framework. This framework is triggered when significant, residual impacts are predicted to occur to an MSES.

MSES are described within the EO Regulation and encompass several aquatic habitats that have the potential to occur within the project site, including:

- Habitat for aquatic flora and fauna species listed as *special least concern*, *vulnerable* or *endangered* under the NC Act; and/or
- Waterways providing fish passage under the Fisheries Act.

The *Significant residual impact guideline – Queensland environmental offsets policy* (Department of Environment and Heritage Protection [DEHP], 2014) discusses the process to determine if a significant, residual impact will occur from a proposed action and details the requirements of resultant offsets (if necessary).

Sections 6.2 and 8.2.6 discusses the potential for MSES to occur across the project site.

5. METHODS

5.1 DESKTOP ASSESSMENT

5.1.1 LITERATURE REVIEW

A literature review was conducted of all available studies that have previously assessed aquatic ecology – as well as surface and groundwater ecosystems – within the region. Each component targeted in the field surveys (e.g. aquatic habitat, water quality, aquatic flora and aquatic fauna) was reviewed. These background data provided valuable insight when preparing to undertake the field surveys and assisted in the ability to target specific areas/habitats within each watercourse.

Information collected during the literature review on each component of the study is discussed in a regional and ecological context (sections 6.1 and 7). This assists in determining the background (existing) aquatic, ecological processes occurring across the project site – as well as in upstream and downstream areas. These processes – and the potential connectivity of the project site to other areas – must be determined to appropriately assess the implications the development may have on the regional aquatic environments.

5.1.2 DATABASE SEARCHES

Database searches for this study targeted listed aquatic flora, fauna and communities previously documented in the area, as well as known wetlands. The results of the database searches are provided in Appendix A. Database searches included reviews of the following publicly available resources:

- **DCCEEW (2024b) Protected Matters Search Tool (PMST):** This database applies species distribution modelling to predict the presence of species listed in the EPBC Act, within a given radius of the site. Search parameters utilised a 20 km buffer on the project footprint.
- **WildNet database (DESI, 2024c):** This database holds records of flora and fauna that have been sighted or collected within a given radius of the site. It also identifies the species listing status under the NC Act and EPBC Act. Search parameters utilised a centroid point placed within the project site, with a 20 km buffer.
- **WetlandInfo (DESI, 2024d):** This online database utilises the WildNet database to identify species known within the catchment area and sub-basins – and identifies wetland indicator species which are relevant to aquatic ecology.
- **WetlandMaps (DESI, 2024e):** This interactive mapping portal was utilised to view the most up-to-date and fine-scale Queensland wetland mapping (Queensland Government, 2024; 1:100,000 wetland data – version 6). This mapping was reviewed for the purposes of determining and characterising potential aquatic habitats.
- **Australian wetlands database (DCCEEW, 2024a):** This online database provides information about Australia's Ramsar wetlands (internationally important wetlands) and wetlands identified in the directory of important wetlands of Australia (nationally important wetlands).
- **Map of Queensland wetland environmental values (DESI, 2024b) and the Map of Great Barrier Reef wetland protection areas (DESI, 2024a):** These mapping layers identify the occurrence and location of wetland management areas, including HES wetlands and WPAs. The mapping layers were viewed using the Department of Resources (DoR, 2024) Queensland Globe interactive mapping portal.

- **Atlas of Living Australia (ALA, 2024):** This database details all known records for species of interest, including verified records and unverified citizen science records.

5.1.3 AERIAL PHOTOGRAPHY REVIEW

Aerial photographs of the Palmer River region from the past ten years – as well as the most up-to-date and finest-scale Queensland wetland mapping (Queensland Government, 2024; 1:100,000 wetland data – version 6) were reviewed for the purposes of determining and characterising potential aquatic habitats across the project site.

5.2 AQUATIC ECOLOGY FIELD SURVEYS

5.2.1 SURVEY TIMING

The aquatic ecology field surveys targeted the two main seasons within the region – the wet and dry seasons – to determine seasonal changes in aquatic environments on site. The dry season survey was conducted in November 2023, whereas the wet season survey was undertaken in April 2024, at least four weeks after significant rain had fallen within the region.

5.2.2 SITE SELECTION

Aquatic ecology sampling sites were located based on:

- The different habitat types present within each targeted watercourse (e.g. pool, riffle and/or run);
- The proposed project layout; and
- Accessibility for sampling.

Potential sampling sites were determined through an assessment of aerial photographs, available site infrastructure information, historical sampling locations and proposed site boundaries. A detailed review of aerial photographs resulted in the identification of key habitat types within each watercourse that were then assessed (ground-truthed) during the field assessment.

The sampling sites are mostly located along North Creek and South Creek, although Gum Creek and some farm dams were also targeted, where possible. The site coordinates and the parameters sampled at each site are presented in Table 2, with the locations shown on Figure 8.

A total of 12 sampling sites were assessed for aquatic ecology across (and/or immediately adjacent to) the project site, including:

- Eleven watercourse sites:
 - four located along Gum Creek (AQ06, AQ04, AQ03a and AQ03b);
 - two along North Creek (AQ01 and AQ02); and
 - five along South Creek (AQ05, S13, S7, S11 and S12); and
- One raw water dam.

Table 2: Sites targeted and methods utilised.

Site	System	Latitude [#]	Longitude [#]	Parameters sampled						
				Habitat condition	Macrophytes	Macroinvertebrates	Fish surveys	Turtle surveys	Water quality	Sediment quality
S1	Raw water dam	-16.1026	144.5232	✓	✓	✓	✓	✓	✓	✗
AQ01	North Creek	-16.0948	144.5168	✓	✓	✓	✗	✗	✓	✓
AQ02	North Creek	-16.0978	144.5046	✓	✓	✓	✓	✓	✓	✓
AQ06	Gum Creek	-16.1234	144.5258	✓	✓	✓	✓	✓	✓	✓
AQ04	Gum Creek	-16.1007	144.5042	✗	✗	✗	✗	✗	✗	✓
AQ03a	Gum Creek	-16.0990	144.5051	✓	✓	✓	✓	✓	✓	✓
AQ03b	Gum Creek	-16.0984	144.5003	✓	✓	✓	✓	✓	✓	✓
AQ05	South Creek	-16.1139	144.5242	✗	✗	✗	✗	✗	✗	✓
S13	South Creek	-16.1046	144.5160	✓	✓	✓	✓	✓	✓	✓
S7	South Creek	-16.1030	144.5148	✓	✓	✓	✓	✓	✓	✓
S11	South Creek	-16.1020	144.5127	✓	✓	✓	✓	✓	✓	✓
S12	South Creek	-16.1016	144.5106	✓	✓	✓	✓	✓	✓	✓
S14	South Creek	-16.1012	144.5060	✓	✓	✓	✓	✓	✓	✓

[#]Latitude and longitude are based on the Geocentric Datum of Australia 1994 (GDA94), Map Grid of Australia (MGA) zone 55.

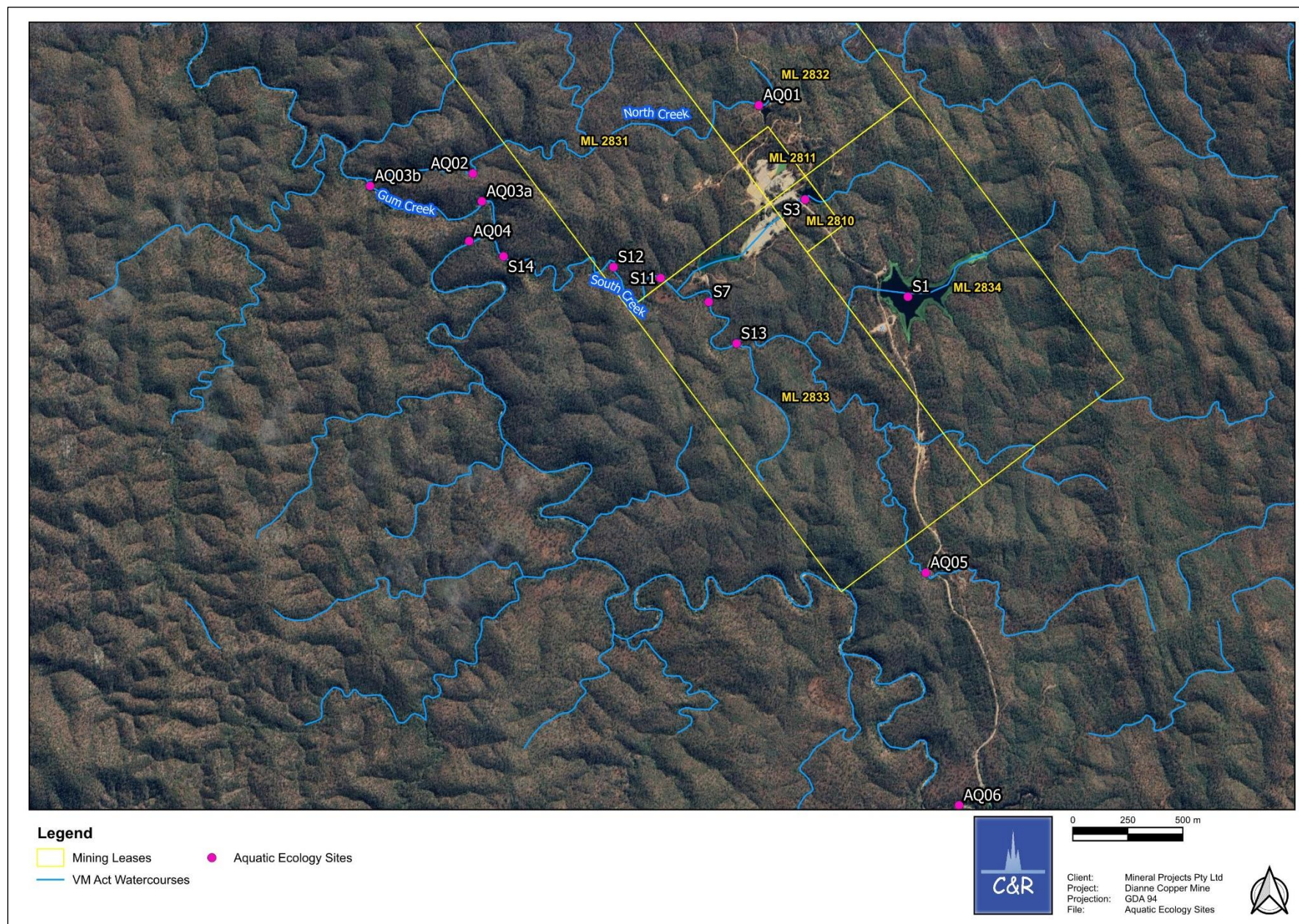


Figure 8: Monitoring site locations.

5.2.3 AQUATIC HABITAT

Habitat condition was assessed at each sampling site in accordance with the methods outlined within the *Queensland Australian River Assessment System (AUSRIVAS) sampling and processing manual* (Department of Natural Resources and Mines [DNRM], 2001). The AusRivAS habitat condition bioassessment is intended for use at sites holding water when macroinvertebrate communities are sampled. The collected data provide an indication of the health of the habitat being used by the aquatic fauna communities and potentially assist in explaining community structure.

Habitat condition is a descriptive account of several physical factors known to influence macroinvertebrate communities, including:

- Bottom substrate / available cover;
- Embeddedness;
- Velocity/depth category;
- Channel alteration;
- Bottom scouring and deposition;
- Pool/riffle, run/bend ratio;
- Bank stability;
- Bank vegetative stability; and
- Streamside cover.

Because this assessment is descriptive, the results are allocated into bands based on an overall total score to limit any sampler preference biasing the result. Each physical habitat characteristic is given a rating based on its condition, with the overall habitat bioassessment score for a site (the sum of all the possible ratings) then allocated to one of four categories signifying habitat condition present at the site (Table 3). The four allocated categories are:

- *Excellent* (>110);
- *Good* (75 – 110);
- *Fair/moderate* (39 – 74); and
- *Poor* (≤38).

Table 3: Rating system used to determine habitat bioassessment scores (DNRM, 2001).

Number	Habitat variable	Habitat condition rating ranges			
		<i>Poor</i>	<i>Fair</i>	<i>Good</i>	<i>Excellent</i>
1.	Bottom substrate / available cover	0–5	6–10	11–15	16–20
2.	Embeddedness	0–5	6–10	11–15	16–20
3.	Velocity/depth category	0–5	6–10	11–15	16–20
4.	Channel alteration	0–3	4–7	8–11	12–15
5.	Bottom scouring and deposition	0–3	4–7	8–11	12–15
6.	Pool/riffle, run/bend ratio	0–3	4–7	8–11	12–15
7.	Bank stability	0–2	3–5	6–8	9–10
8.	Bank vegetative stability	0–2	3–5	6–8	9–10
9.	Streamside cover	0–2	3–5	6–8	9–10
–	<u>Total habitat bioassessment score</u>	<u>0–38</u>	<u>39–74</u>	<u>75–110</u>	<u>111–135</u>

Photos were taken to document habitat variability at each site. This habitat assessment provides a detailed overview of existing habitat condition at each sampling site. It also provides a baseline for each site against which future change can be monitored.

5.2.4 WATER QUALITY

In-situ physico-chemical water quality characteristics were recorded at each site using a multiparameter water quality meter to guide fish sampling techniques utilised within the field. Targeted quality characteristics included:

- Water temperature (°C);
- Electrical conductivity (µS/cm);
- pH;
- Dissolved oxygen (mg/L and %sat);
- Oxidation reduction potential (mV); and
- Turbidity (NTU).

All water quality sampling was conducted by a suitably qualified person, in accordance with the Australian standard (AS) AS5667 (water quality sampling) and the DES (2018) *Monitoring and sampling manual*.

5.2.4.1 Data Analysis

Water quality data are tabulated and discussed in terms of suitability for the various fishing techniques employed in Section 7.4.

5.2.5 SEDIMENT QUALITY

Sediment quality provides an assessment of the accumulation of quality characteristics within aquatic systems over an extended period of time (e.g. years) – specifically, the accumulation of metals and metalloids. Sediment quality analysis also offers an indication of the level of quality characteristics naturally available to organisms occurring within the substrate and/or ingesting fine sediments (fines).

Sediment samples were collected at all sites and transported to a National Association of Testing Authorities (NATA) accredited laboratory for basic sediment quality analysis and particle size distribution. Each sample was fractionated, with the “<63 µm” fraction analysed for the following quality characteristics:

- | | |
|--------------|-----------------|
| • Aluminium; | • Lead; |
| • Antimony; | • Manganese; |
| • Arsenic; | • Mercury; |
| • Boron; | • Nickel; |
| • Cadmium; | • Selenium; |
| • Chromium; | • Silver; |
| • Copper; | • Sulphate; and |
| • Fluoride; | • Zinc. |

All sediment samples were collected in accordance with the best-practice methods outlined in the AS5667.12 (guidance on sampling of bottom sediments) and the CSIRO-published *Sediment quality assessment: a practical guide* (Simpson and Batley, 2016).

5.2.5.1 *Data Analysis*

Results of the sediment testing were compared against the sediment quality objectives (SQOs) outlined in the ANZG (2024) *Toxicant default guidelines values for sediment quality* and the DCM receiving environment monitoring program (REMP) design document (C&R, 2021a).

5.2.6 MACROINVERTEBRATE COMMUNITIES

Aquatic ecology field sites were selected primarily on the number of different habitats (pool, run or riffle) present within each waterway (e.g. different habitats were targeted in the same watercourse).

Sampling methods followed the procedures set out in the Queensland AusRivAS sampling manual (DNRM, 2001). This involves the use of a standard, triangular-mouthed frame fitted with a 250 µm mesh size net to collect all samples. Edge samples were taken by selecting the appropriate section (e.g. backwater with leaf litter, exposed tree roots and some trailing vegetation, if available) and vigorously sweeping the net in short, upward movements perpendicular to the bank. Bed habitats were sampled by holding the macroinvertebrate net down-current of the sampler's position, with the open end facing the sampler. The sampler then disturbed the substrate by kicking the feet and slowly walking backwards while dragging the net through the disturbed plume. This ensured that organisms inhabiting the benthos are collected. A maximum distance of 10 m (and ~0.5 m wide) was sampled.

The taken samples were live-picked in the field for a minimum of 30 minutes using tweezers and pipettes. The first 5 minutes of picking targeted the common and most abundant taxa. After the first 5 minutes, the majority of the picking effort focused on the less common, conspicuous taxa. If – at the end of the 30 minutes – less than 200 animals had been found, the samples were picked for a further 10 minutes. Picked specimens from each sample were stored in a vial of 70% alcohol and sent to a third-party taxonomist for detailed family identification. Organisms were counted and identified to the lowest practical taxonomic level (in most instances, family) to comply with AusRivAS standards. Macroinvertebrate samples for this project were initially identified by a suitably qualified aquatic ecologist, with 10% (or greater) of samples randomly chosen for verification by C&R's principal aquatic ecologist to ensure QA/QC (quality assurance / quality control).

5.2.6.1 *Data Analysis*

Several indices were employed to appropriately assess the current condition of macroinvertebrate communities inhabiting the watercourses of the local area. These indices were adapted from both the *Queensland water quality guidelines* (QWQG; DEHP, 2009) and Chessman (2003) – and included:

- **Taxonomic richness** – The total number of different macroinvertebrate taxa collected at each site. This is to determine the diversity of the macroinvertebrate community present at each site. Healthier sites will have a greater diversity.
- **Plecoptera, Ephemeroptera and Trichoptera (PET) taxa richness** – Indicates the number of families collected from three specific orders: Plecoptera (stoneflies), Ephemeroptera (mayflies) and Trichoptera (caddisflies). These macroinvertebrate orders are considered sensitive to changes within their environment. Therefore, a low number of families collected from these orders (compared to the guidelines values) may suggest habitat degradation.

- **SIGNAL index** – The SIGNAL index (Stream Invertebrate Grade Number – Average Level) was developed by Chessman (1995) to assist in the bioassessment of water quality in Australia. Chessman (1995) determined sensitivity grade numbers (between 1 and 10) for most freshwater macroinvertebrate families in Australia based on how sensitive each was to various pollutants and other physical and chemical factors. The SIGNAL value outlined within the QWQG (DEHP, 2009) is an average (mean) of all the sensitivity grades for each family identified inhabiting a site. SIGNAL index values provide an indication of overall macroinvertebrate assemblage tolerance in a site. This index thereby indicates potentially impacted assemblages by comparison with 20th and 80th percentile values from representative sites.
- **Shannon-Wiener diversity index** – This index provides an assessment of biodiversity of a community assemblage sampled at a site based on the diversity of the assemblage and the abundance of each family present. The index, H' , is calculated using the equation:

$$H' = -\sum p_i \ln p_i$$

Where p_i is the proportion of individuals found in family i , or $p_i = n_i/N$; where n_i is the number of individuals in species i and N is the total number of individuals within the sample. Evenness of the sample is then calculated by the equation:

$$\text{Evenness} = H'/\ln(N)$$

The Shannon-Weiner diversity index increases as both the richness and evenness of a community increase, although values greater than 4 are rarely recorded. The higher the number the greater the biodiversity value of a site. Evenness is a measure of dominance of families within a community. The lower the evenness value, the greater the propensity for a monoculture.

5.2.7 AQUATIC FLORA COMMUNITIES

Aquatic flora can have many different forms, including:

- **Submerged macrophytes:** Growth is predominantly beneath the water surface although flowers and/or leaves of some species protrude the surface of the water;
- **Floating macrophytes:** Can be either attached or free-floating (Sainty and Jacobs, 2003). For example, the introduced water hyacinth floats freely around waterways, being moved across the surface by wind or currents. Conversely, waterlilies are rooted to the substrate but the mature leaves float on the surface;
- **Emergent macrophytes:** Generally grow in shallower waters and are rooted to the substrate, with most of the plant (stems, flowers and leaves) protruding above the surface of the water (Sainty and Jacobs, 2003); and
- **Algae:** Generally need to be fully submerged to survive.

Aquatic flora surveys were conducted at each site along a 50 m reach. This assessment detailed the presence/absence of all native and exotic aquatic flora and their form (from the four categories listed above) – as well as the percent cover of every species at each site. Transects could not be effectively surveyed in highly turbid and/or deep habitats. Transects therefore generally targeted shallower waters.

Photographs were taken of different macrophyte species present at each site. Specimens of any species that could not be identified in the field were collected for identification purposes within the C&R laboratory – or sent to a taxonomic specialist at James Cook University for further assessment.

The collected data provide the administering authority with an understanding of the existing condition of aquatic macrophyte communities present within each of the water bodies across the proposed development site.

5.2.8 FISH COMMUNITIES

Fish communities were surveyed using a combination of backpack electrofishing, baited traps and dip nets. Backpack electrofishing (using a Smith-Root LR-24) was the preferred sampling technique and was primarily used across all sampling sites (where water was present). Baited traps were employed at each site to target both fish and crustaceans. This included replicate samples of collapsible box traps (2 mm mesh), opera house traps (1.5" mesh) and baited remote underwater video stations (BRUVS) where suitable habitat and water quality (i.e. visibility) allowed. Table 4 details the fishing effort applied per site for each apparatus.

Collected fish were counted, identified, measured (to determine life history stage) and photographed. A general assessment of fish health was also noted for each surveyed site. Species richness, total abundance, abundance of listed aquatic species and abundance of exotic species were determined.

Freshwater fish surveys were conducted in accordance with the methods outlined in DES (2018) *Monitoring and sampling manual* and in accordance with the Australian Code of Electrofishing Practice 1997, under the animal ethics approval CA2023/02/1689 and general fisheries permit 253191.

5.2.9 TURTLE COMMUNITIES

A turtle survey was conducted to identify any turtle species that may be present within the project site. Turtle communities at each site containing water were assessed via baited cathedral traps, visual surveys and BRUVS (where appropriate). Table 4 details the fishing effort applied per site for each apparatus.

Turtles are also regularly seen during electrofishing surveys for fish communities. If noticed, the electrofisher is shut down to prevent injury to the animal. The turtle is then caught for identification purposes, and subsequently released.

All captured turtles are measured, identified to species level and photographed. Species richness, total abundance, abundance of listed aquatic species and abundance of exotic species can then be determined.

All turtle surveys were conducted under animal ethics approval CA2023/02/1689.

5.2.10 OTHER AQUATIC VERTEBRATES

The potential presence of other aquatic vertebrates in the region was assessed through the completion of a literature review and database searches, specifically the PMST (DCCEEW, 2024b) and WildNet (DESI, 2024c).

Table 4: Fishing effort employed at each site over the both sampling events.

Site	Date	Habitat sampled	Average depth	Method	Fishing settings			Total effort
Dry season								
S1	8/11/2023	Large (~6.5 ha), artificial raw water dam, with heavily vegetated edges and large, woody debris.	>2 m	Backpack electrofisher	500 V	60 Hz	25% duty	126 s
				Baited box traps	2 deployed		2 mm mesh	14 hrs
				Baited opera traps	2 deployed		1" mesh	14 hrs
				Cathedral traps	2 deployed		¾" mesh	14 hrs
				BRUVS	2 deployed			4 hrs
				Fyke net	1 deployed		¾" mesh	14 hrs
AQ03	7/11/2023	Series of small, sandy remnant pools (~1.5 m wide x 3 m long) over bedrock.	0.3 m	Visual observations	Two personnel walking along the edge of the pools.			20 mins
AQ06	8/11/2023	Artificial farm dam (~0.8 ha) with steep banks and limited woody debris, directly adjacent to Gum Creek.	>1 m	Backpack electrofisher	400 V	60 Hz	25% duty	357 s
				Baited box traps	2 deployed		2 mm mesh	14 hrs
				Baited opera traps	2 deployed		1" mesh	14 hrs
				Cathedral traps	2 deployed		¾" mesh	14 hrs
				Fyke net	1 deployed		¾" mesh	14 hrs
Wet season								
S1	24/04/2024	Large (~6.5 ha), artificial raw water dam, with heavily vegetated edges and large, woody debris.	> 2m	Backpack electrofisher	900 V	60 Hz	25% duty	276 s
				Baited box traps	2 deployed		2 mm mesh	13.5 hrs
				Baited opera traps	2 deployed		1" mesh	13.5 hrs
				BRUVS	2 deployed			4 hrs
S13	22/04/2024	Small upper tributary creek section with rocky cobble substrate and woody debris.	0.2 m	Backpack electrofisher	350 V	60 Hz	25% duty	125 s
				Baited box traps	1 deployed		2 mm mesh	15 hrs
				Baited opera traps	1 deployed		1" mesh	15 hrs

Site	Date	Habitat sampled	Average depth	Method	Fishing settings			Total effort
S7	22/04/2024	Steep-sided pool with overhanging vegetation and sandy substrate, with cobbles and woody debris.	0.4 m	Backpack electrofisher	350 V	60 Hz	25% duty	129 s
				Baited box traps	2 deployed		2 mm mesh	16.5 hrs
				Baited opera traps	2 deployed		1" mesh	16.5 hrs
S11	22/04/2024	Long, shallow pool with incised banks – and rocky substrate with woody debris.	0.5 m	Backpack electrofisher	350 V	60 Hz	25% duty	251 s
				Baited box traps	1 deployed		2 mm mesh	22 hrs
				Baited opera traps	1 deployed		1" mesh	22 hrs
S12	22/04/2024	Deep, rocky pool with gravel/cobble substrate over bed rock.	0.75 m	Backpack electrofisher	400 V	60 Hz	25% duty	148 s
				Baited box traps	1 deployed		2 mm mesh	20 hrs
				Baited opera traps	1 deployed		1" mesh	20 hrs
S14	23/04/2024	Narrow, rocky riffle section with steep banks opening up into deep pool with trailing vegetation and woody debris.	0.75 m	Backpack electrofisher	400 V	60 Hz	25% duty	129 s
				BRUVS	1 deployed			2 hrs
AQ02	23/04/2024	Narrow series of shallow pools with heavily vegetated banks over gravel and slate cobble/boulder substrate.	0.4 m	Backpack electrofisher	300 V	60 Hz	25% duty	211 s
				Baited box traps	1 deployed		2 mm mesh	1.5 hrs
				Baited opera traps	1 deployed		1" mesh	1.5 hrs
AQ03b	23/04/2024	Large, deep, sandy pool running into a riffle/run section with moderate flow over cobbles, sand and woody debris.	0.35 m	Backpack electrofisher	400 V	60 Hz	25% duty	321 s
				BRUVS	1 deployed			2 hrs
AQ06	24/04/2024	Large, moderately-flowing pool with extensively incised, undercut banks and trailing vegetation – over a slate cobble substrate with some sand.	0.5 m	Backpack electrofisher	425 V	60 Hz	25% duty	306 s
				Baited box traps	2 deployed		2 mm mesh	13 hrs
				Baited opera traps	2 deployed		1" mesh	13 hrs
				BRUVS	1 deployed			2 hrs

6. DESKTOP ASSESSMENT RESULTS

6.1 LITERATURE REVIEW

Limited aquatic ecology studies are publicly available that have been carried out in the Palmer River catchment. Consequently, several other reports from the greater Mitchell River basin were also reviewed. The most informative studies relevant to the project include the following:

- *Freshwater fish and aquatic habitat survey of Cape York Peninsula* (Herbert et al., 1995);
- *State of the Rivers – Mitchell River and major tributaries* (Moller et al., 2002).
- *Impact of landuse on ecological water quality in the Mitchell River catchment, north Queensland* (Thomson et al., 2002).
- *Freshwater fishes of north-eastern Australia* (Pusey et al., 2004).
- *Report 7: freshwater fish* (Burrows, 2008).
- *Freshwater fishes of northern Australia* (Pusey et al., 2017).
- *Threats and condition of Queensland's Gulf rivers: Q-catchments* (Negus et al., 2023).
- Dianne Copper Mine REMP assessment reports (C&R, 2021b, 2022, 2023, 2024).

A summary of the relevant findings from each aquatic study is provided in sections 6.1.1 to 6.1.7. Findings from these reports are then also compared to the field results in Section 7.

6.1.1 FRESHWATER FISH AND AQUATIC HABITAT SURVEY OF CAPE YORK PENINSULA (1995)

In the study by Herbert et al. (1995), data were collected from most major watercourse catchment areas on Cape York Peninsula over a period of two years in the early 1990s. This included detailed surveys within the freshwater reaches of the Palmer River catchment area. Four upper tributary sites, three river holes, one dam and one lagoon were targeted, although none of the survey sites were within the Gum Creek catchment area.

The survey identified a total of 24 fish species within the Palmer River catchment. However, most of these were recorded in the downstream extents, with the intermittent upstream reaches only registering up to eight species. The freshwater crocodile (*Crocodylus johnstoni*) was commonly observed within the river holes. The study found that aquatic habitat in the Palmer River had been severely impacted by mining, with large sections scoured down to bedrock. Additionally, riparian vegetation and gallery forests had been cleared along most of the Palmer River.

6.1.2 STATE OF THE RIVERS – MITCHELL RIVER AND MAJOR TRIBUTARIES (2002)

The Moller et al. (2002) report details the findings of the *State of the Rivers* assessment of the major sub-catchments within the Mitchell basin. Eleven sites along the Palmer River and its tributaries were assessed using the *State of the Rivers* methodology. Findings concluded that most of the Palmer River had an overall condition of *good to very good*. However, the channel habitat diversity was limited, and most sites scored very low in this criterion. Aquatic vegetation cover was also low, with most sites completely bare of aquatic vegetation.

6.1.3 IMPACTS OF LANDUSE ON ECOLOGICAL WATER QUALITY IN THE MITCHELL RIVER CATCHMENT, NORTH QUEENSLAND (2002)

The Thomson et al. (2002) study was commissioned as part of a National Heritage Trust funded project entitled '*Sustainable management of the Mitchell River catchment utilising environmental data*'. The report provides information on the impact of land use on the ecological condition of 29 riverine sites in the Mitchell River catchment. The information was based on water quality data, habitat assessments and aquatic macroinvertebrate community data.

Most sites were assessed as being in reference condition and this was supported by the AusRivAS taxa scores. The report also determined that macroinvertebrate communities differed significantly between habitats (e.g. edge, riffles) in the Mitchell River catchment. Overall, the study concluded that human land use had minimal impact on river health in the Mitchell River catchment. However, macroinvertebrate data at some specific sites indicated a possible impact but further investigation was required for confirmation.

6.1.4 FRESHWATER FISHES OF NORTH – EASTERN AUSTRALIA (2004)

The book by Pusey et al. (2004) provides information on all species of freshwater fish that are known from waterways of north-eastern Australia. Preparation of the book entailed a major review of existing literature and collation of the results of unpublished field research undertaken by the authors in freshwater systems throughout Queensland. The book identifies 46 species of freshwater fish that occur within the Mitchell Basin, including one invasive species – the guppy (*Poecilia reticulata*).

6.1.5 REPORT 7: FRESHWATER FISH (2008)

Burrows (2008) carried out a review of the literature and available records for freshwater fish in rivers of northern Australia to determine where fish survey efforts had been located historically and where it needed to be applied in the future. The research found records for 57 species of freshwater fish from 53 locations in the Mitchell River catchment, with one fish species of conservation significance known to occur in the Mitchell River – the freshwater sawfish (*Pristis pristis*). The only confirmed records for exotic fish at the time of this study was the guppy (*Poecilia reticulata*), recorded in the upper Walsh River.

6.1.6 FRESHWATER FISHES OF NORTHERN AUSTRALIA (2017)

This research by Pusey et al. (2017) used a diverse set of information sources and datasets to update the distribution mapping of freshwater fishes in northern Australian catchments. It also described the macroecological relationships of fish species and their habitats. Data sources included museum records, online databases, a variety of publications and unpublished field sampling. The study identified records for 26 fish species within the Palmer River.

6.1.7 THREATS AND CONDITION OF QUEENSLAND'S GULF RIVERS: Q-CATCHMENTS (2023)

The Negus et al. (2023) report documents the findings of the Q-catchments program that was undertaken within Queensland's Gulf of Carpentaria catchments, including the Leichardt, Morning, Flinders, Norman, Gilbert, Staaten and Mitchell river catchments. The program assessed the impact that human-induced threats to riverine health have on ecological responses.

Thirty-three (33) sites were sampled during the program, though only one was located in the Palmer River at Maytown. The surveys found the Gulf region to be moderately disturbed, with cattle damage being the dominant disturbance across all catchments. Aquatic weeds were not identified at any sites, although the Mitchell catchment was considered at high risk from several aquatic weeds. It was also at moderate risk of introduced aquatic fauna due to the presence of tilapia in the upper Walsh River sub-catchment. However, no pest fish were detected during the surveys. A total of 13 native fish species were identified across the Gulf of Carpentaria catchments, with seven recorded at the Palmer River site.

6.1.8 DIANNE COPPER MINE REMP ASSESSMENT REPORT (2021–2024)

The REMP assessment reports are completed as a requirement under the Dianne Copper Mine EA. In accordance with the EA and the REMP design document developed by C&R (2021a), the annual REMPs (C&R, 2021b, 2022, 2023, 2024) assess site conditions, habitat, water quality, sediment quality and macroinvertebrate communities. The REMP includes assessment of all these characteristics at four sites along the upstream Gum Creek tributary and assesses water quality at five additional on-site locations. The REMP reports have found evidence of historical and potentially ongoing impacts in the downstream receiving environment for various parameters, including water quality, sediment quality and macroinvertebrate communities. It has been suggested that the impacts are a result of releases (via overtopping and seepage) from the MAW dam into South Creek.

6.2 DATABASE SEARCHES

6.2.1 LISTED AQUATIC SPECIES

WetlandInfo (DESI, 2024d) identified 117 wetland indicator species (excluding terrestrial fauna such as birds and amphibians) known from the waterways of the Palmer River sub-basin. None are listed as CEEVNT species under the EPBC Act or the NC Act. However, the platypus (*Ornithorhynchus anatinus*) is listed as *special least concern* under the NC Act and the freshwater crocodile (*Crocodylus johnstoni*) is a listed marine species under the EPBC Act.

The PMST report (DCCEEW, 2024b) also identified the freshwater sawfish (*Pristis pristis*) as potentially occurring within 20 km of the project site (Appendix A). This species is listed as *vulnerable* under the EPBC Act.

The WildNet (DESI, 2024c) and ALA (2024) database searches did not identify any records of aquatic flora and fauna species listed under the NC Act or the EPBC Act within 20 km of the project site (Appendix A).

There are 19 aquatic flora species known from waterways of the Palmer River sub-basin that are listed as *special least concern* under the NC Act (DESI, 2024a, 2024c; Appendix A).

6.2.2 INTRODUCED AQUATIC SPECIES

The desktop assessment did not identify any introduced aquatic fauna species with the potential to occur at DCM. WildNet (DESI, 2024c) and WetlandInfo (DESI, 2024d) databases determined the following introduced aquatic flora species with potential to inhabit the project site:

- *Eclipta prostrata*;
- *Eleocharis minuta*;
- *Ludwigia hyssopifolia*;
- *Echinochloa colona*;

- *Urochloa mutica*; and
- *Salvinia molesta* – Category 3 restricted, invasive plant under the Biosecurity Act 2014.

6.2.3 WATERWAYS AND WETLANDS

6.2.3.1 Waterways

No watercourses are defined under the Water Act within the project site, with the closest downstream mapped watercourse the main channel of Granite Creek. However, there are several unmapped tributaries that flow east to west across the project site before entering Gum Creek (Figure 3). These watercourses are considered relatively minor, with the VM Act watercourse mapping allocating stream orders for Gum Creek, South Creek and North Creek as four, two and two, respectively (DoR, 2024).

The DAF (2024) *Queensland waterways for waterway barrier works* mapping indicates the level of 'risk' associated with undertaking waterway barrier works within Queensland waterways with regards to fish passage. The mapping indicates that waterway barrier works in both North and South creeks have a low (green) to moderate (amber) risk of impacting fish passage (Figure 9). However, the proposed project disturbance footprint only intersects waterways at low risk (Figure 9). Waterways providing passage for fish are considered MSES. The potential impacts to MSES are discussed further in Section 8.2.6.

6.2.3.2 Wetlands

A database search of DIWA and Ramsar wetlands (DCCEEW, 2024a) found no internationally or nationally significant wetlands within a 20 km radius of the project site. Similarly, assessment of the *Map of Queensland wetland environmental values* (DESI, 2024b) using Queensland Globe did not identify any WPAs or HES wetlands within or immediately (within 20 km) downstream of the project site. The nearest mapped HES wetland is located approximately 9 km northeast of the project site in a direct line, which is greater than 100 km upstream of the project site, via the watercourses, on the banks of the Palmer River.

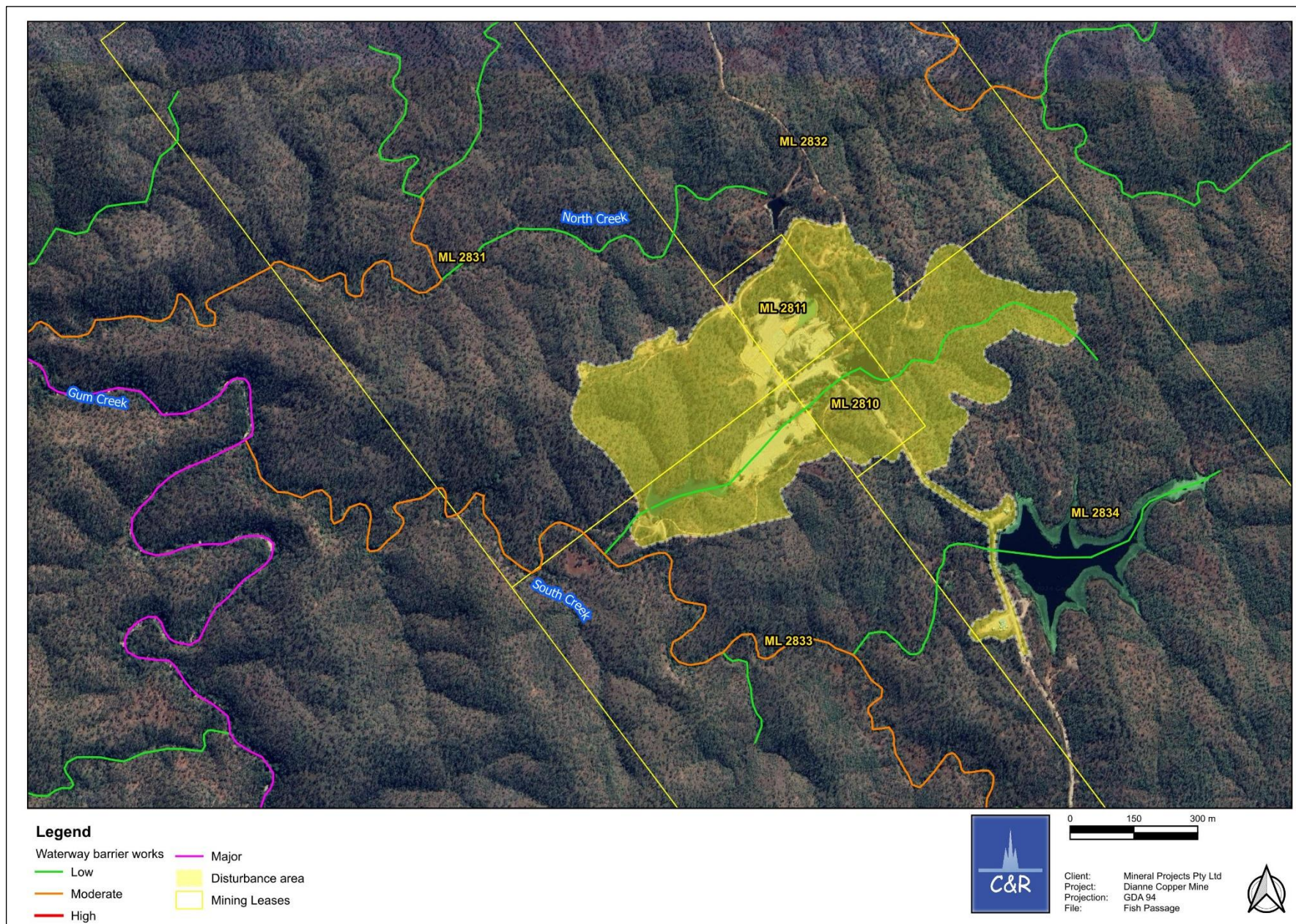


Figure 9: Waterway barrier works mapping across the proposed disturbance footprint.

7. FIELD-VALIDATED RESULTS

7.1 INTRODUCTION

This section presents the results of the field survey. Within each major sub-section of these results, the background condition – as noted from the desktop study – is compared against the findings of the field survey to provide a detailed overview of the current aquatic ecology condition found within the project site. The major sub-sections include the following:

- Site descriptions (Section 7.2);
- Habitat condition (Section 0);
- Surface water quality (Section 7.4);
- Sediment quality (Section 7.5);
- Macroinvertebrate communities (Section 7.6);
- Aquatic flora communities (Section 7.7);
- Fish communities (Section 7.8);
- Turtle communities (Section 7.9);
- Other aquatic vertebrates (Section 7.10).

7.2 SITE DESCRIPTIONS

Table 5 discusses the habitats encountered at each monitoring location, providing photos of the upstream and downstream reaches associated with the site. Further discussion on the main surface water types associated with the project site are provided in subsequent sections 7.2.1 to 7.2.3.

7.2.1 WATERWAYS

Gum Creek is the main waterway downstream of the project area. There are two tributaries to Gum Creek that were assessed for aquatic values, including South Creek that is the receiving environment for DCM and North Creek that runs along the northern boundary of the proposed mining operational area.

Large portions of the upper catchment area of South Creek have been impacted by the historical operations associated with DCM. Conversely, little activities – limited to minor areas of cleared land and a small farm dam – have taken place in the North Creek catchment area. Alluvial gold mining continues in the upper reaches of Gum Creek, whereas cattle grazing has occurred across all three catchment areas.

Except for upper reaches of North Creek (ephemeral), the major waterways associated with the project site are intermittent in nature, flowing for an extended period of time after significant rainfall events. This characteristic suggests that various reaches of each of the major systems associated with the project (North Creek, Gum Creek and South Creek) are considered groundwater-dependent ecosystems (GDEs), classified as riverine wetland GDEs under the DESI terminology¹.

¹ <https://wetlandinfo.des.qld.gov.au/wetlands/ecology/aquatic-ecosystems-natural/groundwater-dependent/#:~:text=GDEs%20include%20aquifers%2C%20caves%2C%20lakes,lacustrine%20wetlands%2C%20rivers%20and%20vegetation>

7.2.2 STORAGE DAMS

A large raw water dam (S1) was assessed for aquatic values. The dam receives freshwater flows from the surrounding undeveloped catchment area during rainfall events. This dam permanently holds water, with well-established aquatic flora and fauna communities present. Despite the permanency of water, the dam is not thought to be a GDE. This artificial structure is the only waterbody that acts like a lacustrine wetland within the project site boundary.

7.2.3 WETLANDS

The desktop assessment determined that there are no wetlands of conservation significance within the vicinity of the project site. This was confirmed during the field surveys, with no natural, lacustrine or palustrine wetlands observed on – or adjacent to – the project site.

Table 5: Descriptions and photographs of each monitoring site targeted.

Site name	System	Site description	View upstream	View downstream
S1	Raw water Dam	This site is a ~6.5 ha raw water dam located south of the mine, along the main access road. It is directly opposite the mine camp. The wetted width was approximately 100 m, with an estimated average depth of >2 m. The substrate within the dam was dominated by fine sediments (silt). However, clarity was high during both surveys. Macrophyte coverage within the dam was high, and dominated by water snowflake (<i>Nymphoides indica</i>), spikerush (<i>Eleocharis</i> sp.), and sedges (<i>Cyperus</i> sp.). The riparian vegetation cover fluctuated from 50% during the November survey to >80% in April and was dominated by native grass species.		
			Nov 2023	
				
			Apr 2024	Apr 2024

Site name	System	Site description	View upstream	View downstream
AQ05	South Creek	Located in the upper reaches of South Creek ~1,500 m upstream of S13, the channel at AQ05 is up to 6 m wide, with low (<1 m high), incised, rocky banks along the outside edge of the bend at the base of the hill. The substrate largely consisted of cobbles, coarse gravel and sand. Riparian vegetation – sparse trees and grass – was consistent with the surrounding vegetation on the neighbouring hills. No macrophytes were observed at the site. This site was dry during both November 2023 and April 2024 survey events. Consequently, sampling at this site was limited to sediments only.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
S13	South Creek	The site is located along South Creek, >500 m upstream of S7. A small tributary enters the targeted drainage line at this site. The creek is ~5 m wide. The banks were heavily vegetated, with the riparian community dominated by terrestrial grasses. The water depth was generally <1 m at the time of sampling. The substrate comprised large cobbles, gravel, clay/silt and sand, with limited macrophytes or woody debris noted. The site was dry during the November 2023 survey. However, flows in the wet season resulted in clear, pooled water during the April 2024 monitoring round.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
S7	South Creek	The site is located along South Creek and is immediately (~50 m) upstream of the licenced release point. The site was characterised by a large pool (~6 m wide and 30 m long) upstream of an established and vegetated (with grasses and shrubs) bar that covered over 2/3 of the width of the main channel, creating a small (<1 m wide) low-flow channel. The riparian vegetation was similar to that of S13, with over 100% cover. Macrophyte communities were limited at the site. The substrate was comprised of cobble, gravel, silt and sand. The site was dry during the November 2023 survey event, with flows persisting during the April 2024 sampling round. Pools had an average depth of <1 m.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
S11	South Creek	Located ~100 m downstream of the release point, S11 is the closest established compliance site. The watercourse is over 8 m wide at this site, with a steep hill on the northern bank and a shallower-gradient bank on the southern side. The substrate was comprised of boulders, cobble, gravel and sand. The riparian vegetation was sparser at this location (compared to background sites) – and dominated by terrestrial tree species rather than true riparian species. A small, very shallow, remnant pool was present during the November 2023 survey event, allowing for sampling. Minor flows were present at the site during the April 2024 sampling round.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
S12	South Creek	Located ~400 m downstream of the release point, S12 displays similar characteristics to S11. The channel is up to 10 m wide at this site, with a steep, high rock face on one bank. The substrate comprised boulder, cobble, gravel and sand. The riparian vegetation was sparser than upstream sites and dominated by trees, with large areas of exposed bedrock along the banks. The site was entirely dry during the November 2023 survey event. Clear, low flows persisted at this site during the April 2024 survey, with an average depth of <1 m.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
S14	South Creek	The site is located along South Creek, ~1 km downstream of S12 with whom it shares similar characteristics. The overall site is a shallow riffle section about 30 m long, through a narrow, ~4 m wide, steep-sided canyon/gorge opening into a deeper (>1 m), 15 m long × 6 m wide pool. The substrate comprised boulder, cobble, slate, gravel and sand. The riparian vegetation was dense during the wet season and dominated by trees, although large areas of exposed bedrock were noted along the banks. The site was entirely dry during the November 2023 survey event. Minor flows of clear water were present during the April 2024 survey round, with an average depth through the riffle zone of <0.3 m.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
AQ01	North Creek	AQ01 is located immediately downstream of a minor farm dam at the head of North Creek, which runs along the northern border of the DCM project area. The site is ephemeral, with ill-defined banks. Vegetation was dominated by terrestrial trees and grasses, with the only riparian vegetation being small tufts of <i>Cyperus</i> sp. These grow within a small, inundated depression about 10 m long × 2 m wide, running along the valley floor. The site was entirely dry during the November 2023 survey event. Water was present within the depression during the April 2024 survey round, with an average depth of <0.2 m.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
AQ02	North Creek	AQ02 is located approximately 1,500 m downstream of AQ01 and about 400 m upstream of the confluence with Gum Creek. The site itself consisted of a winding, narrow series of pools <1 m deep, interspersed by steep-gradient riffle zones. However, no flows were present during either sampling event. The substrate was dominated by boulders, slate, cobble and gravel. Riparian vegetation consisted of terrestrial tree species and grasses. The waterway itself held sparse patches of macrophytes, consisting of <i>Nymphaea</i> sp. and <i>Cyperus</i> sp. The site was entirely dry during the November 2023 survey event. Clear water was present during the April 2024 survey round, allowing for effective sampling.	 Nov 2023	 Nov 2023
			 Apr 2024	 Apr 2024

Site name	System	Site description	View upstream	View downstream
AQ06	Gum Creek	AQ06 is located on Gum Creek, immediately adjacent to the main DCM access road approximately 2 km south of the main camp or about 7 km (along the watercourse) upstream of AQ03a. The site consisted of two large pools with undercut banks (~30 m long × 10 m wide, with an average depth of <1 m), connected by a 10 m long riffle/run section that had flows ~0.4 m deep during the April 2024 sampling round. An in-channel farm dam is located immediately (i.e. <50 m) upstream, on a tributary that enters Gum Creek at this site. The substrate consisted of sand with a substantial amount of cobble and woody debris. Riparian vegetation was dominated by large terrestrial trees and grasses. This site was completely dry during the late-dry season survey so sampling for fish and macroinvertebrates targeted the adjacent farm dam (see Figure 10). The April 2024 sampling was conducted in Gum Creek.	Nov 2023 Note: Sampling in November 2023 was undertaken at the adjacent farm dam (see Figure 10).	Nov 2023 Note: Sampling in November 2023 was undertaken at the adjacent farm dam (see Figure 10).
			 Mar 2024 Note: Flows were present in the system during the mid-March 2024 water sampling event. No upstream photo is available for the Apr 2024 sampling round.	 Apr 2024

Site name	System	Site description	View upstream	View downstream
AQ04	Gum Creek	AQ04 is located on Gum Creek approximately 100 m upstream of its confluence with South Creek. The site consists of a ~5 m wide channel, with low (i.e. <1 m high), incised banks and steep hills on either side. The substrate was composed of boulders, cobbles and gravel, with substantial sand bars and instream, woody vegetation present. Riparian vegetation was mostly composed of terrestrial tree and grass species. The site was inaccessible during the wet season because of the height of waters/flows within Gum Creek and the steep gradient of the surrounding hills. Therefore, only one sediment sample (from November 2023) could be collected from this site, with no other parameters able to be targeted.	 Nov 2023	 Nov 2023

Site name	System	Site description	View upstream	View downstream
AQ03	Gum Creek	During the November 2023 sampling round, AQ03 (presented as AQ03a in Figure 8) was located on Gum Creek approximately 150 downstream of the South Creek confluence and about 300 m downstream of S14. This site consisted of a series of small (~6 m × 2 m), shallow, remnant pools (~0.3 m deep) along the outside bend of the creek and running along the base of a sheer, rocky cliff face. The substrate was dominated by sand, gravel and slate boulders. Access to this site was restricted in the wet season. Therefore, the site was moved ~700 m downstream but still upstream of the North Creek confluence (referred to as AQ03b in Figure 8). This site consisted of a large (30 m long × 6 m wide), sandy pool (>1 m deep), flowing into a shallow (~0.4 m deep) riffle/run section (100 m long × 4m wide) – over cobbles and bedrock with some woody debris. Dense, riparian vegetation was dominated by terrestrial trees. The steepness of the terrain – when accessing AQ03a on foot – precluded the use of bulky sampling techniques (i.e. electrofishing, traps, etc.) in the dry season.	 Nov 2023	
			 Apr 2024	 Apr 2024



Figure 10: Farm dam adjacent to AQ06 – sampled for fish and macroinvertebrates in November 2024.

7.3 HABITAT CONDITION

The AusRivAS habitat condition bioassessment is intended for use at sites holding water when macroinvertebrate communities are sampled. The results from the field surveys – as well as the historical minimum and maximum scores from previous REMPs – are presented in Figure 11.

Good condition is a typical result for watercourses within the region because the waterways experience few physical, anthropogenic impacts. The results of the habitat condition assessment indicate that most sites fall within the *moderate* to *good* categories. A noticeable difference in habitat assessment score was observed between November 2023 and April 2024. This is explained by the lack of flowing water and the associated reduced habitat diversity present during the November sampling round, as dry-season processes (e.g. evaporation) take effect.

Other than sites sampled in November 2023, only S1 (the farm dam) and AQ01 – located in the headwaters of North Creek – in April 2024 were found in *moderate* health. Both sites displayed no or low flows in April 2024. AQ01 contained very low flows in a narrow channel, reducing the capacity for a variety of flow environments – such as deeper pools and backwaters – to be formed during flow events. Furthermore, constructed raw water dam S1 contained limited habitat complexity, consisting of one deep pool with minimal riparian habitat, and substrates dominated by fine sediments.

Gum Creek and South Creek are larger and have more developed channels, containing deep pools amongst other shallow riffle habitats. The habitats are more complex, with undercut banks, macrophytes and thicker riparian habitats. The substrate composition within these creeks is also more diverse, ranging from silty sand to boulders but with large portions of gravel and cobble at each site. This suggests that these systems present a structurally complex and stable habitat for aquatic species. S11 is located immediately downstream of the DCM mine and has been slightly modified to allow for a track to cross the creek.

All sites are accessible by feral cattle. Evidence of cattle impacts – such as pugging along the banks – was present at all sites.

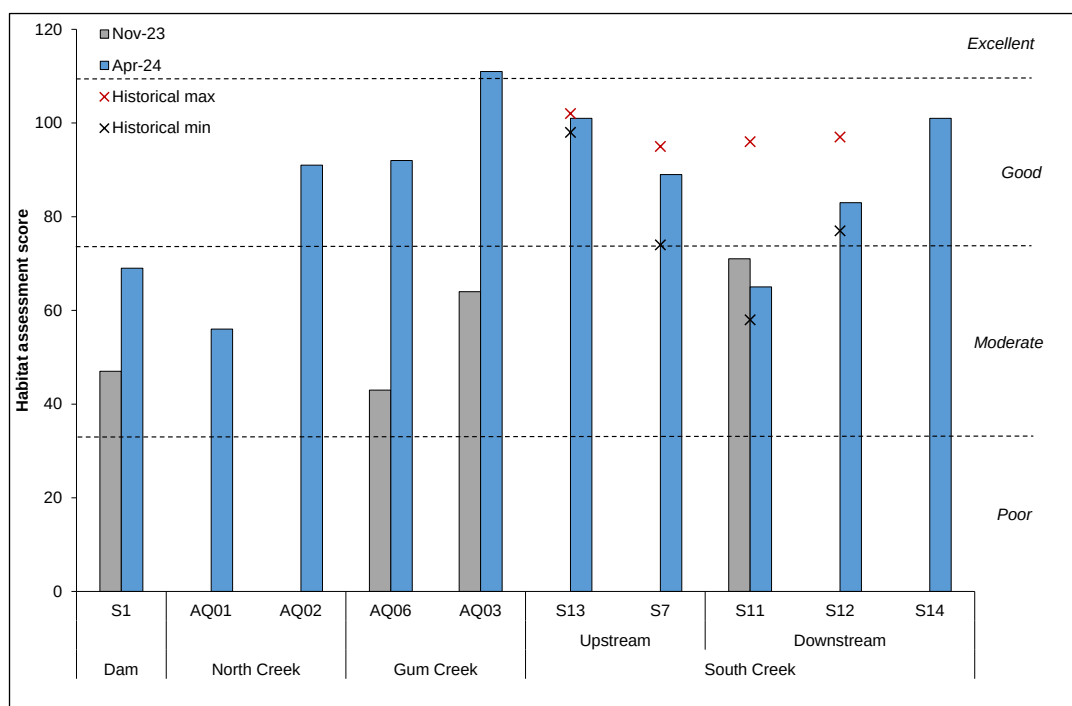


Figure 11: Habitat condition assessment at sites where macroinvertebrates were collected over time.

7.4 SURFACE WATER QUALITY

In-situ results recorded at each site during the April 2024 sampling event found the electrical conductivity in the upper headwaters of the smaller tributaries (i.e. S1 and AQ01) to be highly fresh (i.e. $<50 \mu\text{S}/\text{cm}$; Table 6). These highly vegetated sites also recorded low dissolved oxygen levels ($<40\%$ saturation) before increasing with increasing distance downstream (Table 6). Electrical conductivities increased at various instances within each watercourse, likely where the waters intersected with highly mineralised geology (i.e. by AQ02 and S13; Table 6). Despite this, all electrical conductivity values were suitable for effective sampling using an electrofisher.

The only influence of historical activities on in-situ water quality results in the downstream reaches of South Creek (S11, S12 and S14) is the elevated pH recorded at S11. The pH levels slowly decrease with increasing distance downstream (Table 6).

All sites were found to have low turbidity levels (i.e. generally $<5 \text{ NTU}$; Table 6). This allowed for effective sampling using visual methods (i.e. electrofishing, BRUVS and visual observations).

A full assessment of water quality within surface water systems associated with the project site is provided in C&R (2024a).

Table 6: In-situ water quality recorded at each site during the April 2024 sampling event.

Quality characteristic	Units	Dam	North Creek		Gum Creek		South Creek				
		S1	AQ01	AQ02	AQ06	AQ03	S13	S7	S11	S12	S14
Temperature	°C	26.6	25.1	23.7	28.2	25.6	24.4	25.8	28.2	26.9	24.1
Electrical conductivity	µS/cm	42.8	47.6	615	165.5	186.4	560	450.3	356.9	396.2	341.2
pH	–	6.44	6.26	7.42	7.84	7.64	6.96	7.55	8.28	7.89	7.3
Dissolved oxygen	% Sat	38.2	4.66	74.5	124.1	104.5	74.2	105.2	103	113.2	90.7
	mg/L	3.11	0.39	6.31	9.68	8.52	6.25	8.66	8.05	9.01	7.6
Turbidity	NTU	1.01	4.66	0.52	0.91	0.48	3.23	1.11	0.6	6.31	0.46
Oxidation reduction potential	mV	183.6	94.6	165.4	146.9	150.2	169.7	151	142.4	169.5	165.6

7.5 SEDIMENT QUALITY

7.5.1 PARTICLE SIZE DISTRIBUTION

Particle size distribution of each collected sample was analysed along with metal concentrations (refer to Appendix B for certificate of analyses [COAs]). Although the particle size distribution of the collected samples does not provide a definitive account for a site, it indicates the type of sediments contributing to the substrate at each location.

The particle size distribution analysis details four potential categories of sediments occurring in each sample:

- Fine sediments (fines; $\leq 75 \mu\text{m}$);
- Sands ($> 75 \mu\text{m}$ and $\leq 2 \text{ mm}$);
- Gravel ($> 2 \text{ mm}$ and $\leq 60 \text{ mm}$); and
- Cobble ($> 60 \text{ mm}$).

Particle size distribution was recorded in each sediment sample on every sampling occasion. The results show that all watercourses generally have high levels of gravel and sand, with fewer fine sediments (Figure 12). As expected, the substrate at the raw water dam site (S1) was dominated by fine sediments, with a low percentage ($< 10\%$) of gravel (Figure 12).

The sediment composition of each site can influence the macroinvertebrate communities inhabiting the substrate. Therefore, these sediment composition results should be taken into consideration when assessing the macroinvertebrate results (see Section 7.6).

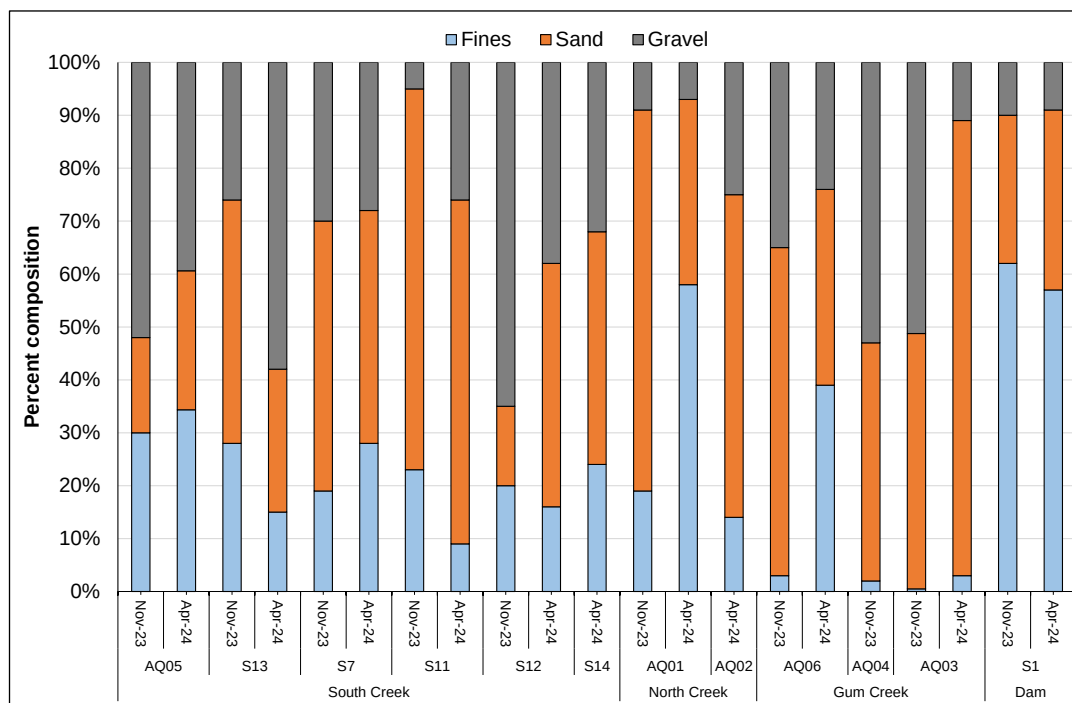


Figure 12: Percent composition of sediment samples collected at each site.

7.5.2 SEDIMENT QUALITY

Sediment samples collected from all sites were tested for a range of metals and metalloids outlined in Section 5.2.5 (refer to Appendix B for COAs). These results are presented in Table 7 and Table 8. Note that a recent update to the DCM EA (July 2023), resulted in more stringent SQOs being administered. The results of the current assessment are compared to these SQOs for reference only.

The results show exceedances of SQOs for several quality characteristics – at various sites both background and downstream of historical DCM operations (Table 7 and Table 8). Elevated quality characteristics compared to SQOs include:

- Aluminium: at various sites within all watercourses sampled;
- Arsenic: only at the upstream Gum Creek site in November 2023;
- Cadmium: only at South Creek sites, downstream of DCM operations;
- Copper: above the SQO-low limit at downstream sites in North Creek and Gum Creek, as well as upstream sites in South Creek; downstream sites in South Creek (S11, S12 and S14) are above the SQO-high limit;
- Fluoride: elevated above the SQO-low limit at almost every site on at least one occasion, irrelevant of watercourse or position compared to historical DCM activities;
- Manganese: as with fluoride, manganese levels were elevated against relevant SQOs at almost every site on at least one occasion, irrelevant of watercourse or position compared to historical DCM activities;
- Sulphate: recorded similar findings to manganese and fluoride; and
- Zinc: generally only elevated at South Creek sites downstream of historical DCM operations.

Based on these results, it is suggested that several quality characteristics occur at elevated levels naturally within sediments of the region, likely due to weathering of the highly mineralised geology (refer to Section 3.3). This includes aluminium, fluoride, manganese and sulphate. It is likely that the SQOs detailed within the EA for these quality characteristics are overly conservative and not relevant to the background conditions experienced within watercourses of the region.

Cadmium, copper and zinc are signature contaminants from historical DCM mining operations (C&R, 2024c). Previous REMP assessments have found these quality characteristics to be elevated within the downstream South Creek sites – at concentrations with the potential to impact aquatic fauna assemblages (C&R, 2022, 2023, 2024c). These signature contaminants – and the impacts that they can have on the downstream aquatic ecological values associated with the receiving environment – must be taken into consideration during the impact assessment for the proposed project.

Table 7: Sediment quality data collected at S1 and within North Creek and Gum Creek over the two sampling events.

Quality characteristic	Units	Dam		North Creek				Gum Creek					SQO	
		S1		AQ01		AQ02		AQ06		AQ04	AQ03			
		Nov-23	Apr-24	Nov-23	Apr-24	Nov-23	Apr-24	Nov-23	Apr-24	Nov-23	Nov-23	Apr-24	Low	High
Aluminium	mg/kg	5,720	10,400	7,780	9,230	9,710	11,900	8,820	11,800	9,380	7,070	10,900	10,660 ¹	31,980 ²
Antimony	mg/kg	0.5	0.4	0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.2	0.1	NA	NA
Arsenic	mg/kg	<5	5	8	8	7	8	24	6	15	15	9	20	70
Boron	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	25	50
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.5	10
Chromium	mg/kg	9	14	18	18	12	14	9	10	9	7	11	80	370
Copper	mg/kg	15	22	14	19	641	245	25	26	35	172	266	114 ¹	351 ²
Fluoride	mg/kg	420	480	460	300	420	610	550	480	490	440	480	400 ¹	1,200 ²
Lead	mg/kg	13	20	18	19	23	23	20	22	21	15	19	50	220
Manganese	mg/kg	68.6	109	287	197	328	297	728	201	346	448	168	202.8 ¹	608.4 ²
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	1
Nickel	mg/kg	8	14	12	13	14	15	12	13	11	9	12	21	52
Selenium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	4
Sulphate	mg/kg	170	290	180	450	360	760	360	380	830	1,470	490	400 ¹	1,200 ²
Zinc	mg/kg	28	47	31	44	183	114	58	63	63	91	96	200	410

Indicates exceedance of SQO-low.

Indicates exceedance of SQO-high.

*SQO extracted from Schedule C – Table 3 of DCM EA, unless otherwise specified.

¹SQO-low derived from 80th percentile of reference sites (2021–2024).

²SQO-high derived from three times the 80th percentile of reference sites (2021–2024).

NA – None available.

Table 8: Sediment quality results from South Creek during the reporting period at AQ05 and S14 compared to minimum, median and maximum data collected at REMP sites S13, S7, S11 and S12^a.

Quality characteristic	Units	South Creek															SQO	
		AQ05		S13			S7			S11			S12			S14		
		Nov-23	Apr-24	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Apr-24	Low	High
Aluminium	mg/kg	7,990	11,300	4,880	9,615	11,900	4,280	10,035	11,100	5,280	9,000	11,200	4,950	10,300	11,800	14,600	10,660 ¹	31,980 ²
Antimony	mg/kg	0.3	0.3	0.3	0.5	0.7	0.3	0.55	1	0.4	0.5	0.5	0.3	0.4	0.8	0.2	NA	NA
Arsenic	mg/kg	<5	6	6	7.5	9	5	7	8	5	7	10	5	7.5	10	6	20	70
Boron	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	25	50
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	2	<1	<1	2	2	1.5	10
Chromium	mg/kg	19	26	10	13.5	16	8	14	15	7	13	14	7	13	14	15	80	370
Copper	mg/kg	54	92	62	96.5	117	34	105.5	117	474	1,170	2,110	540	1,080	1,450	1,480	114 ¹	351 ²
Fluoride	mg/kg	430	420	190	380	480	180	390	440	160	335	410	150	430	450	460	400 ¹	1,200 ²
Lead	mg/kg	16	20	16	23	27	11	21	60	10	19	31	9	19.5	45	17	50	220
Manganese	mg/kg	190	257	98.6	185	320	68.4	157.5	205	149	290	293	137	254.5	472	259	202.8 ¹	608.4 ²
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	1
Nickel	mg/kg	12	17	8	13.5	17	7	14	16	8	14	17	8	14.5	18	18	21	52
Selenium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.1	<0.1	<0.1	0.2	0.1	1	4
Sulphate	mg/kg	210	630	22.9	330	500	230	280	460	21.5	410	660	260	500	670	350	400 ¹	1,200 ²
Zinc	mg/kg	40		37	62	78	29	60.5	293	120	192	275	118	231.5	413	376	200	410

Indicates exceedance of SQO-low.

Indicates exceedance of SQO-high.

^a Minimum, median and maximum data calculated from six data points collected from each site between November 2021 and April 2024.

*SQO extracted from Schedule C – Table 3 of DCM EA, unless otherwise specified.

¹SQO-low derived from 80th percentile of reference sites (2021–2024).

²SQO-high derived from three times the 80th percentile of reference sites (2021–2024).

NA – None available.

7.6 MACROINVERTEBRATE COMMUNITIES

Macroinvertebrate samples were collected during the November 2023 and April 2024 surveys. Samples were collected from bed and edge habitats, where macroinvertebrates were present. No best-practice guideline values for macroinvertebrate indices are available for the region. Instead, results must be compared to each other, with inferences made from similar studies conducted in neighbouring systems.

Most sites were dry during the November 2023 sampling round and data are thus not available for many of the targeted sites. Also, on both sampling occasions, sufficient (i.e. >10 m in length) structurally complex edge habitat was often not available at several sites (refer to Table 5). Therefore, edge samples were only able to be collected from AQ03 and AQ06 for comparison. Full details of the macroinvertebrate data are provided in Appendix B.

7.6.1 TAXONOMIC RICHNESS

During the November and April survey rounds, a total of 38 macroinvertebrate families were identified. This was slightly higher than what has previously been recorded in bed habitats at DCM during the REMP surveys (maximum of 33 families; C&R, 2022).

Taxonomic richness within the composite samples – collected at the S1 dam in both sampling rounds and the dam adjacent to AQ06 in November 2023 – were relatively high compared to the bed samples from the watercourse sites. The April sample from S1 recorded the highest number of families of any site (20 families; Figure 13). This is likely because the composite samples included macrophyte beds as well as substrate, whereas the watercourse bed samples targeted sandy, gravel and cobble substrates only. Therefore, on each sampling occasion, the composite samples were found to be more diverse due to the increased structural diversity in habitat. Additionally, dam habitats are known to provide increased primary production that will also assist in supporting a more diverse community assemblage (Baxter, 1977; McCartney et al., 2001).

Within South Creek, taxonomic richness was higher at the upstream sites compared to the sites downstream of the mine, with S14 recorded the lowest taxonomic richness across all sites (Figure 13). These findings are in line with previous DCM REMP reports (C&R, 2021a, 2022, 2023, 2024c) that indicate macroinvertebrate communities within the DCM receiving environment of South Creek have been influenced by historical mining activities and releases (via seepage and overtopping) from the current MAW dam.

Samples collected from the downstream Gum Creek site AQ03 – located downstream of the South Creek confluence – recorded a similar richness to all other background watercourse sites (in North Creek, upstream Gum Creek² and upstream South Creek), ranging from 11 to 15 taxa over the April 2024 sampling event (Figure 13). This suggests that historical (and potentially ongoing) releases from DCM are having negligible influence on the downstream receiving environment of Gum Creek. However, further sampling is required to determine the extent of any influence.

² Note: In November 2023, macroinvertebrate sampling targeted the adjacent farm dam because Gum Creek at the AQ06 site was completely dry.

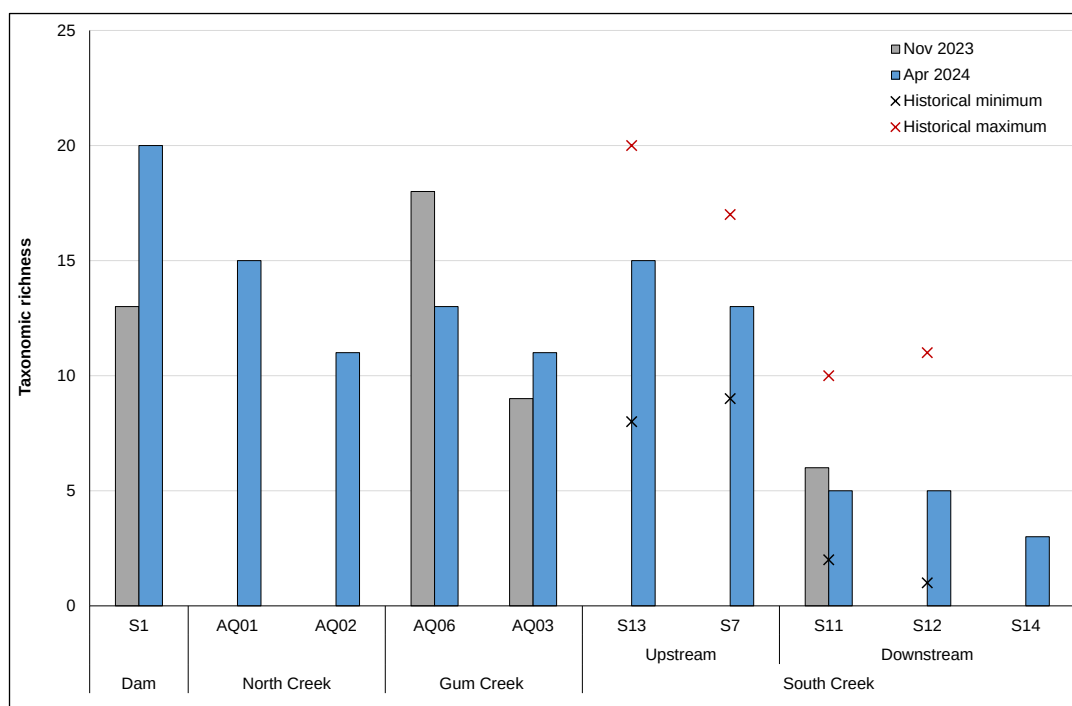


Figure 13: Taxonomic richness of macroinvertebrate communities within bed habitats at each site.

Macroinvertebrate communities were collected from edge habitats at the two Gum Creek sites (AQ03 and AQ06) in April 2024. Similar to bed habitats, the results show that the upstream site (AQ06; 14 species) had higher taxonomic richness compared to the downstream site (AQ03; nine species; Figure 14). At AQ06, the edge habitat (Figure 14) only had one fewer compared to the bed habitat sample (Figure 14). Conversely, the taxonomic richness was identical in the different habitats at AQ03 (Figure 13 and Figure 14). Typically edge habitats are more structurally diverse than bed habitats, resulting in a more diverse macroinvertebrate community (Choy et al., 2002). However, due to the geology of the area, most of the creeks around DCM are either deeply incised – with limited riparian community and associated trailing vegetation – or flat bedrock banks, limiting the availability of structurally complex edge habitats.

Thomson et al. (2002) reported mean taxonomic richness values from edge habitats in the Palmer River between 20 and 23 families in four different sites sampled over various times/seasons. Although this is higher than recorded in the current study, it is expected that the edge habitats encountered within the main channel of the Palmer River are entirely different to those observed in the higher upper reaches of the small tributaries that feed the system.

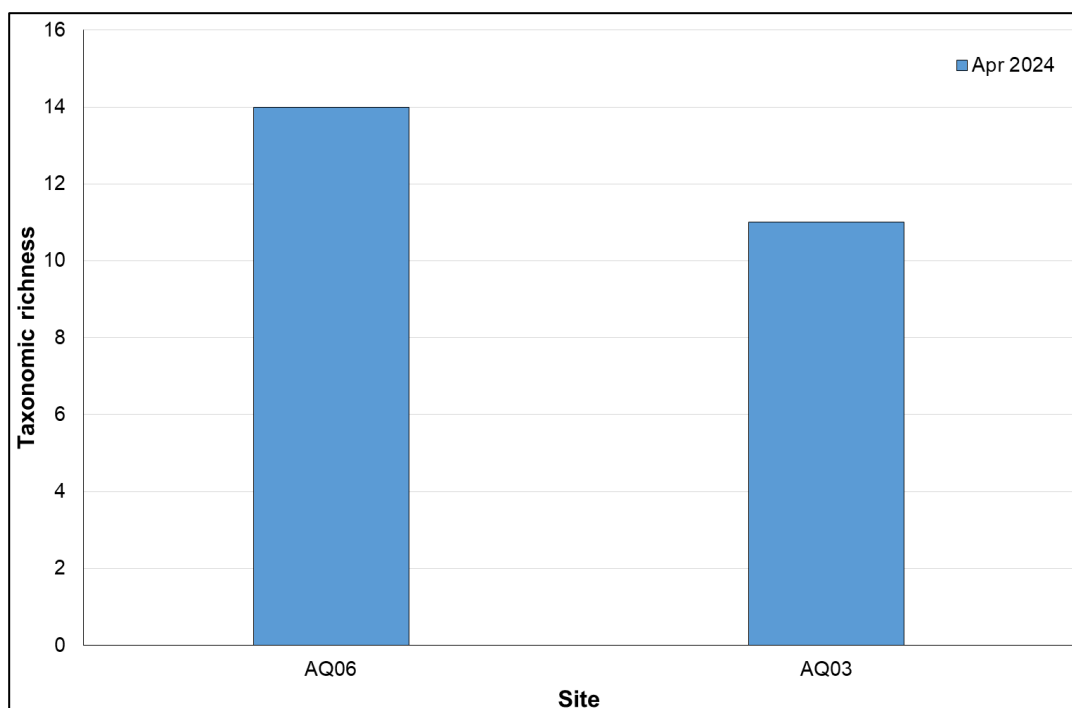


Figure 14: Taxonomic richness of macroinvertebrate communities within edge habitats at each site.

7.6.2 PET RICHNESS

PET richness is calculated by the sum of the number of Plecoptera (stoneflies), Ephemeroptera (mayflies) and Trichoptera (caddisflies) families present at a site. PET taxa are generally sensitive to environmental change and anthropogenic disturbances. Therefore, the number of PET taxa inhabiting a site can be a measure of site condition, or – in a non-impacted system – provide an indication of the macroinvertebrate community's potential to be influenced by proposed anthropogenic activities. PET richness levels between 2 and 5 are considered relatively standard in tropical north Australian systems (DEHP, 2009). Bed habitats dominated by finer sediments generally score at the lower end. Conversely, edge habitats and/or riffle zones normally record PET taxa values at the higher end of this range or above.

During the reporting period, total PET richness was low across several sites. The results ranged from no PET families present at S11, S12 and S14 in April 2024 to five PET families at AQ06, with edge habitat results closely mirroring those of the bed habitat (Figure 15 and Figure 16). PET richness at upstream South Creek sites and Gum Creek sites were within the high end of the range expected for bed habitats within north Queensland (Figure 15; DEHP, 2009). However, the lack of PET families inhabiting the downstream reaches of South Creek shows the distinct differences between the non-impacted and impacted aquatic environments associated with historical DCM operations (C&R, 2024c).

The low result from the raw water dam site (S1) and the North Creek sites is associated with the type of environments present. In the case of:

- S1: it is the pooled water (i.e. no flows) and a substrate heavily comprised of fine sediments (refer to Section 7.5.1). Such low PET richness results are typical of these lentic environments.
- North Creek: the substrates were found to be composed of coarser sediments, devoid of complex structure with large amounts of bedrock and no riparian vegetation to promote trailing vegetation and/or woody debris (refer to Section 7.5.1).

The result within the background reaches of South Creek and Gum Creek were similar to those that Thomson et al. (2002) recorded in the edge habitats of the Palmer River. This is a notable result, given the substantial differences in catchment sizes, stream order and diversity of physical habitat characteristics. It was expected that the relatively small creeks surrounding DCM would contain fewer PET families. This may suggest that the macroinvertebrate communities inhabiting background watercourses of the area are susceptible to environmental change and likely act as suitable indicators of potential impacts from anthropogenic disturbances.

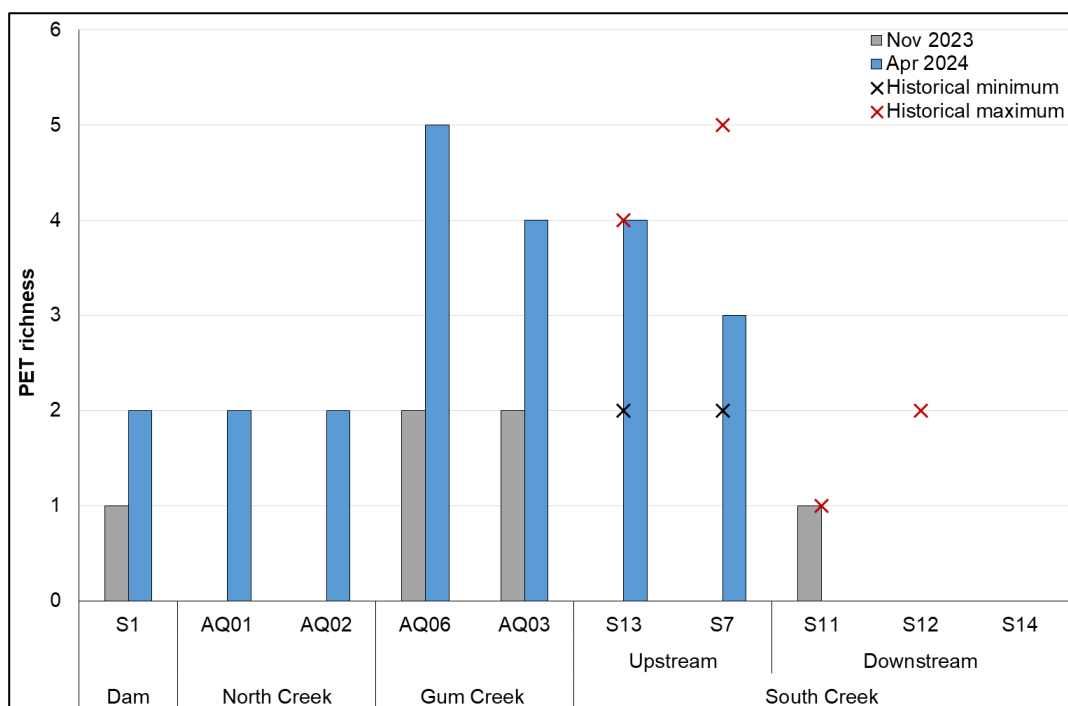


Figure 15: Total PET richness of macroinvertebrate communities in bed habitats at each site.

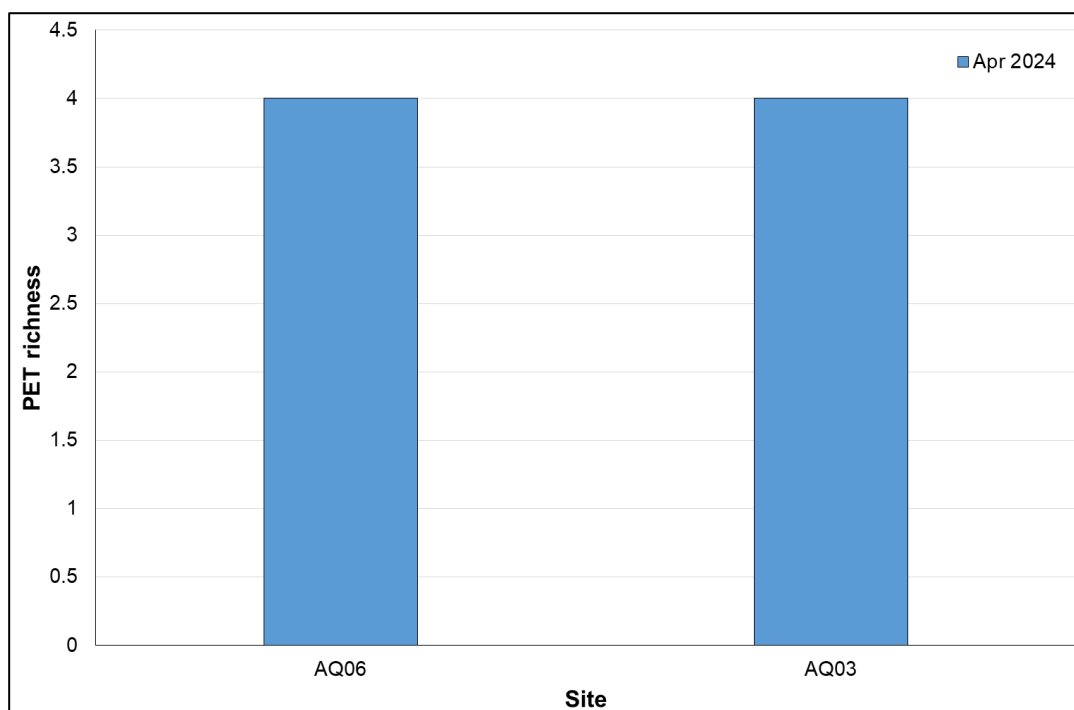


Figure 16: Total PET richness of macroinvertebrate communities in edge habitats at each site.

7.6.3 SIGNAL INDEX

SIGNAL index values provide an indication of the sensitivity a macroinvertebrate community has to environmental change. It is calculated as the average SIGNAL score of each family recorded at a site (non-weighted in accordance with Queensland methods; DES, 2018). Macroinvertebrate families with a SIGNAL index value of equal to or less than three are considered to be highly tolerant to environmental change. Conversely, those with a value equal to or greater than eight are highly sensitive to environmental change.

SIGNAL index values from bed habitats show that the macroinvertebrate communities recorded across the DCM sites are moderately tolerant to environmental change, with SIGNAL index values typically between three and five (Figure 17). The dam site (S1) had the lowest SIGNAL index value (<3), likely due to the lentic environment typical of such systems. Generally, the more sensitive macroinvertebrate species prefer aquatic habitats that have clear, flowing water and contain a variety of habitat types (riffles, pool, edge) and substrate types (sand, gravel, cobbles).

The downstream South Creek site S11 recorded a SIGNAL index value of >4 during the November survey round, with S12 and S14 recording values of 4 in April 2024. These downstream sites regularly record elevated (above 4) SIGNAL index values (Figure 17). However, these results are generally calculated from very few families (i.e. <6). Therefore, the high value is likely driven by the limited number of families rather than an increase in community sensitivity. Gum Creek generally scored the highest SIGNAL index values (Figure 17). This is expected given the larger size and stream order of the creek, its structurally more complex habitats and likely greater permanency of water.

Samples collected from the edge habitats at AQ03 and AQ06 show similar results to the bed habitat findings (Figure 18 and Figure 17). This is not unexpected considering the assemblages in both habitats were found to be highly similar (refer to Section 7.6.1).

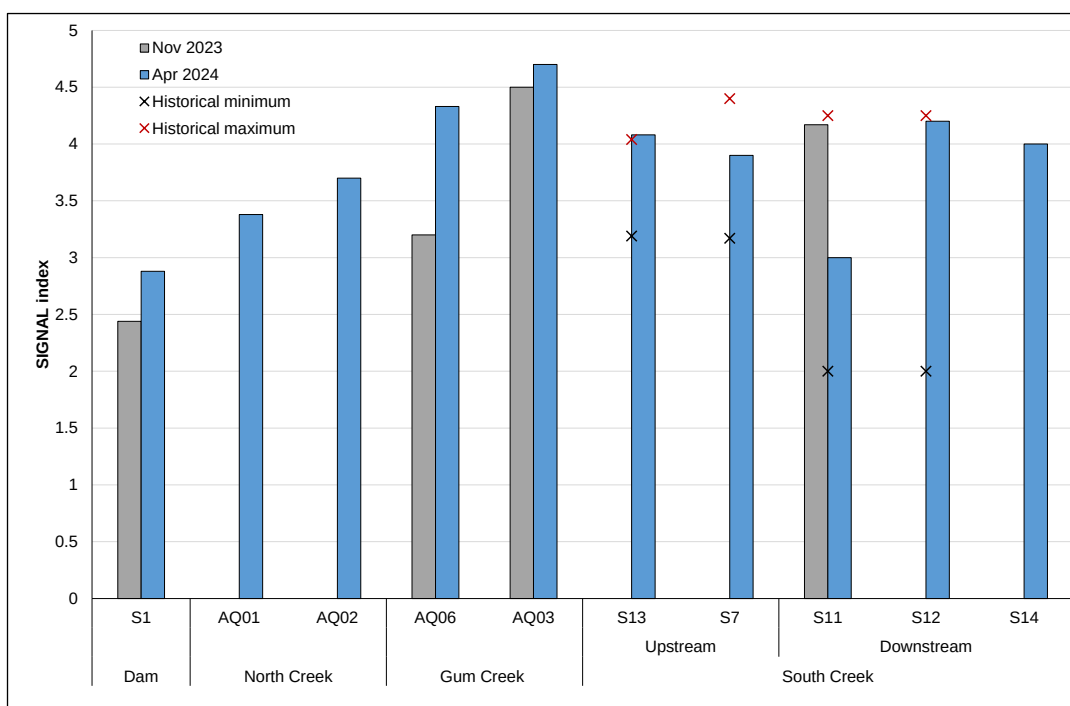


Figure 17: SIGNAL index values of macroinvertebrate communities in bed habitats at each site.

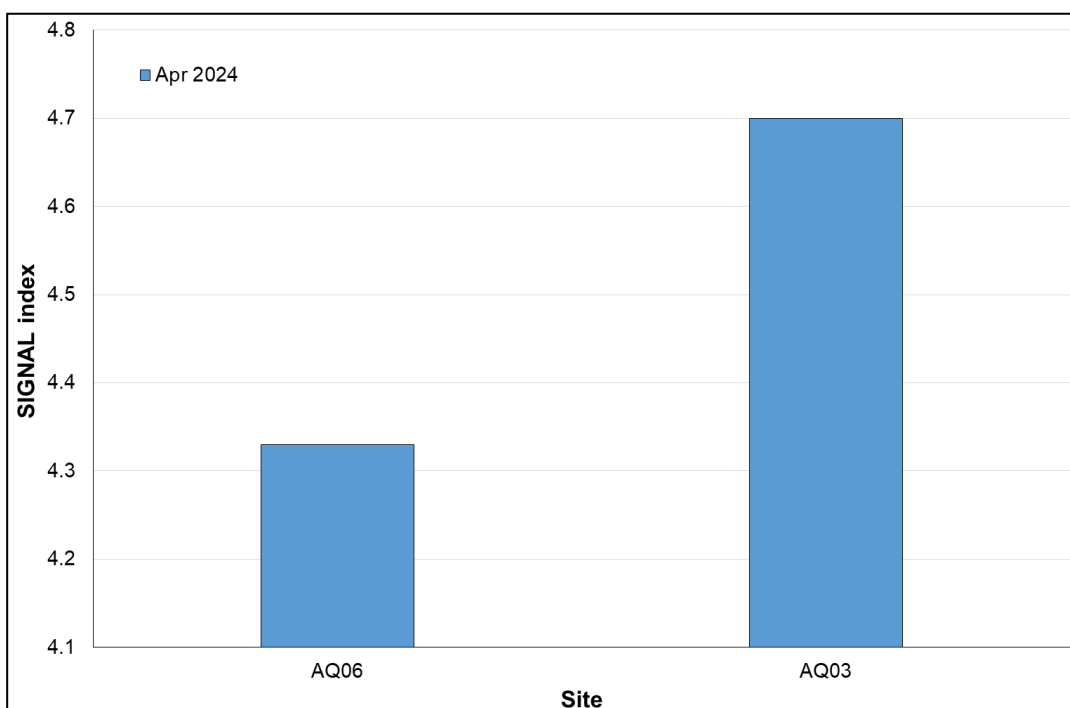


Figure 18: SIGNAL index values of macroinvertebrate communities in edge habitats at each site.

7.6.4 SHANNON-WIENER AND EVENNESS

Values for the Shannon-Wiener diversity index generally score between 1.5 and 3.0, with the higher values signifying greater biodiversity. Most sites within the project site scored less than 2, indicating that the diversity of macroinvertebrate communities inhabiting the bed habitats throughout the project site is moderate (Figure 19). As expected with the known impact to the downstream reaches of South Creek (C&R, 2024c), the Shannon-Wiener values are lowest at those sites.

The background sites sampled in North Creek, South Creek and Gum Creek recorded similar levels. These results suggest that moderate diversity values based on the Shannon-Wiener diversity index are likely standard for such systems.

Evenness values range between 0 and 1. The higher the value, the more even the spread of organisms across all families recorded. A result of 1 indicates that all families present have an equal abundance. The lower the evenness value, the more the community is represented as a monoculture. The evenness results show that all sites displayed a similar level of evenness of families within the communities present (Figure 19). All samples are skewed by some families having higher abundance than others. However, the results show that no assemblage from any of the sites is considered a monoculture.

Notably, the upstream Gum Creek site AQ06 also recorded the lowest value for evenness. This site had a high abundance in mayflies from the families Caenidae (SIGNAL grade of 4) and Leptophlebiidae (SIGNAL grade of 8). Being PET families (from the order Ephemeroptera; Centre for Freshwater Ecosystems, 2024), both are considered sensitive to environmental change. Both species are found Australia-wide, preferring clear, flowing, stony mountain streams. These physical characteristics were present at AQ06 in April and may explain the high abundance of mayflies in the sample.

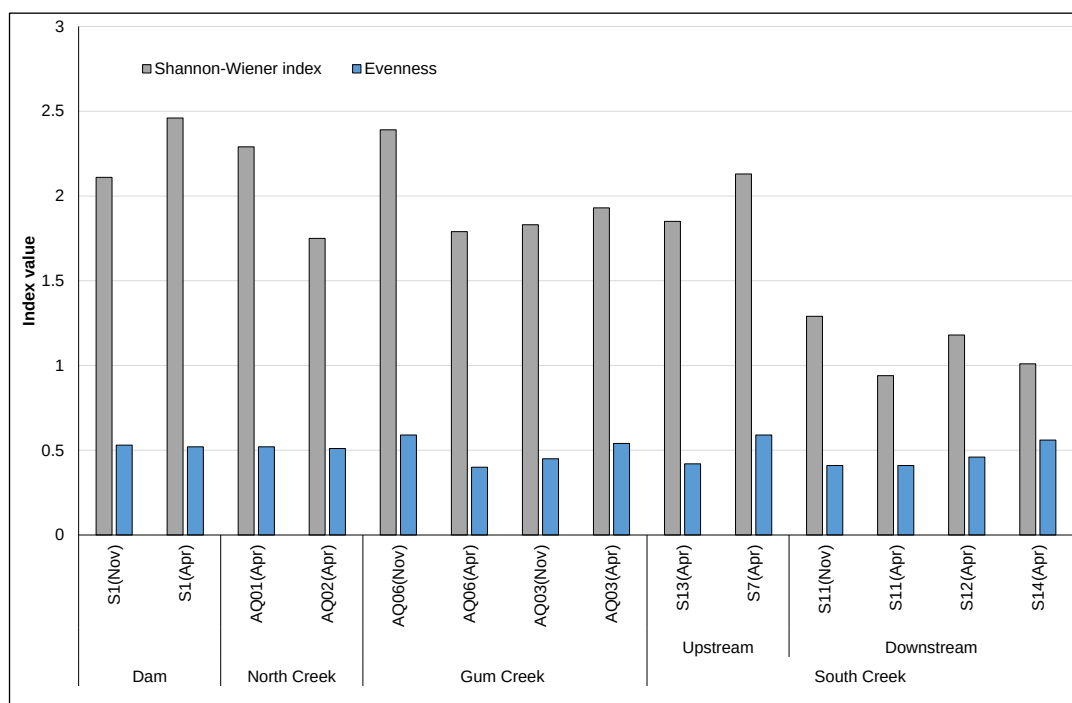


Figure 19: Shannon-Wiener diversity index and evenness at each site.

7.6.5 DECAPODS

A total of three decapod species were caught in traps (box, fyke and opera), or observed during electrofishing or on BRUVS (Table 9), including:

- Freshwater crab (*Austrothelphusa agassizi*);
- Freshwater prawn (*Macrobrachium australiense*); and
- Redclaw crayfish (*Cherax quadricarinatus*).

Freshwater crabs were only captured during the post-wet season survey in April 2024, whereas crayfish and prawns were recorded during both surveys. It is understood that redclaw may have been artificially stocked into the on-site raw water dams.

Table 9: Decapod invertebrate species observed during dry and post-wet season sampling.

Site	Season	<i>Macrobrachium australiense</i>	<i>Cherax quadricarinatus</i>	<i>Austrothelphusa agassizi</i>
2023				
S1	Dry	1	3	0
2024				
S1	Post-wet	1	1	0
S12	Post-wet	0	0	1
S13	Post-wet	0	0	1
S7	Post-wet	0	1	0
S14	Post-wet	0	0	2
AQ06	Post-wet	0	1	0
AQ03b	Post-wet	1	0	0

7.7 AQUATIC FLORA COMMUNITIES

The aquatic flora surveys identified a total of eleven different species inhabiting the raw water dam and watercourse sites across the study area (Table 10). The raw water dam was the most diverse (ten species), likely a result of the permanent, lentic environment experienced within the system. A diverse array of macrophyte types were recorded at that site, including submerged, emergent and floating attached (Table 10). Watercourse sites recorded species diversity between zero and four, which is considered typical of such upper-catchment, non-perennial streams (Table 10). Watercourse sites that contained pools (Table 5) generally displayed a greater diversity of macrophyte communities (Table 10).

None of the observed macrophytes are listed under the EPBC Act or NC Act.

Table 10: Macrophyte species inhabiting each monitoring site during the seasonal sampling events.

Scientific name	Type	Dam		North Creek		Gum Creek				South Creek						
		S1		AQ01	AQ02	AQ06		AQ03a	AQ03b	AQ05	S13	S7	S11		S12	S14
		Nov-23	Apr-24	Apr-24	Apr-24	Nov-23	Apr-24	Nov-23	Apr-24	Apr-24	Apr-24	Apr-24	Nov-23	Apr-24	Apr-24	Apr-24
<i>Blyxa</i> sp.	Submerged	✓	✓													
<i>Cyperus</i> sp.	Emergent	✓	✓							✓		✓				
<i>Eleocharis dulcis</i>	Emergent	✓	✓													
<i>Filamentous algae</i>	Algae	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
<i>Limnophila</i> sp.	Submerged	✓	✓								✓					
<i>Lomandra multiflora</i>	Emergent			✓												
<i>Lomandra</i> sp.	Emergent	✓	✓		✓			✓	✓			✓				
<i>Nymphoides indica</i>	Floating attached	✓	✓			✓	✓				✓	✓				
<i>Marsilea mutica</i>	Floating attached	✓	✓													
<i>Potamogeton tricaratus</i>	Floating attached	✓	✓													
<i>Ceratophyllum demersum</i>	Submerged	✓	✓													
Species richness		11	11	1	2	2	2	2	2	1	3	4	1	1	1	0

7.8 FISH COMMUNITIES

7.8.1 SPECIES RICHNESS

In total, seven species of fish were detected at nine sites across the project area. Although no historical data are directly comparable from previous surveys of Gum Creek in the available literature, this species list is comparable to previously documented freshwater fish communities of both the Palmer River and the greater Mitchell River catchment area (Table 11). MacLeay (1882), one of the first surveys of freshwater fishes in the upper Palmer River (presumably in the vicinity of Maytown), identified seven (species). Conversely, Midgley (1988) collected a total of 15 species from King Junction Waterhole (also on the Palmer River). More recently, Herbert et al. (1995) sampled nine sites, including several smaller, rocky tributaries along the length of the Palmer River, with 24 species recorded. Overall, a total of 46 species of freshwater fish have been documented from the greater Mitchell River catchment (Pusey et al., 2004), with the species observed during the current study considered a subset of this wider assemblage. No introduced/invasive fish species were recorded during the field surveys and none of the fish species observed during the current project are listed under either the EPBC Act or the NC Act.

Full species composition data and relevant aquatic ecology information are provided in Appendix D.

Species diversity was highest during the April 2024 survey event. Sites AQ06 and AQ03b had the highest diversity, with six and five species, respectively (Figure 20). AQ02, AQ03, S11 and S12 recorded the lowest diversity of any site, with two species. Given the non-perennial nature of Gum Creek and its associated tributaries in the upper reaches of the Palmer River catchment, the lower total species richness observed in this study is directly comparable to that observed in three intermittent tributary streams of the Palmer River by Herbert et al. (1995). In that study, the species richness of Spear Creek, Prospect Creek and an unnamed upper Palmer River tributary consisted of eight, seven and three species, respectively.

The higher species diversity observed at both AQ06 and AQ03b are likely due to the presence of large, deeper pools and corresponding greater diversity of aquatic habitats (refer to Table 5). In an intermittent system such as Gum Creek, these deep pools likely retain water well into the dry season in most years, serving as refugia until the onset of wet-season rains. Such locations are therefore in direct contrast with most of the other surveyed sites.

Fish community assemblages at sites surveyed in the current study consisted of small- to medium-sized fish species. Each possess a strong dispersal capacity and/or rheotactic response (upstream movement) to flowing water, particularly prior to spawning at the onset of the wet season (Pusey et al., 2004). Northern purple-spotted gudgeons (*Mogurnda mogurnda*), spangled perch (*Leiopotherapon unicolor*) and chequered rainbowfish (*Melanotaenia splendida inornata*) were the most ubiquitous species during the study. These species were observed at 8 (100%), 7 (87.5%) and 6 (75%) sites, respectively. The dispersal capabilities of these species are further demonstrated by their presence within the dam at S1, with the construction of the dam wall presenting a significant barrier to fish movement. Their presence in the dam at S1 potentially preceded the construction of the dam wall to the exclusion of others.

The presence of species such as sooty grunTERS (*Hephaestus fuliginosus*), Hyrtl's catfish (*Neosilurus hyrtl*) and black catfish (*Neosilurus ater*) at the most upstream site on Gum Creek (AQ06) demonstrates both the dispersal capacity of these species and the importance of connectivity of Gum Creek to major river reaches such as the Palmer River.

Table 11: Fish species diversity by system.

Family	Scientific name	Common name	Macleay (1882)	Midgley (1988)	Herbert et al. (1995)	Pusey et al. (2004)	Current Study
			Palmer River	Palmer River	Palmer River	Mitchell R. Catchment	Gum Creek (Palmer River)
Ambassidae	<i>Ambassis agrammus</i>	Sailfin glassfish				✓	
	<i>Ambassis macleayi</i>	MacLeay's glassfish			✓		
	<i>Ambassis</i> sp.	Glass perch		✓			
	<i>Ambassis muelleri</i>	Mueller's glassfish			✓		
	<i>Ambassis vachelli</i>	Vachelli's glassfish				✓	
	<i>Denarusia bandata</i>	Pennyfish				✓	
Apogonidae	<i>Glossamia aprion</i>	Mouth almighty		✓	✓	✓	✓
Ariidae	<i>Neoarius berneyi</i>	Berney's catfish				✓	
	<i>Neoarius graffei</i>	Lesser-fork tailed catfish		✓	✓	✓	
	<i>Neoarius leptaspis</i>	Triangular shield catfish				✓	
	<i>Neoarius midgleyi</i>	Shovel-nosed catfish		✓	✓	✓	
	<i>Sciades paucus</i>	Fork-tailed catfish				✓	
Atherinidae	<i>Craterocephalus stercusmuscarum</i>	Fly-specked hardyhead		✓	✓	✓	
Belonidae	<i>Strongylura krefftii</i>	Freshwater longtom			✓	✓	
Butidae	<i>Oxyeleotris lineolatus</i>	Sleepy cod		✓	✓	✓	
	<i>Oxyeleotris nullipora</i>	Poreless gudgeon				✓	
	<i>Oxyeleotris selheimi</i>	Giant gudgeon	✓		✓	✓	
Clupeidae	<i>Nematolosa erebi</i>	Bony bream	✓	✓	✓	✓	
Eleotridae	<i>Mogurnda mogurnda</i>	Northern purple-spotted gudgeon			✓	✓	✓
Engraulidae	<i>Thryssa scratchleyi</i>	Freshwater anchovy				✓	

Family	Scientific name	Common name	Macleay (1882)	Midgley (1988)	Herbert et al. (1995)	Pusey et al. (2004)	Current Study
			Palmer River	Palmer River	Palmer River	Mitchell R. Catchment	Gum Creek (Palmer River)
Gobidae	<i>Chlamydogobius ranunculus</i>	Tadpole goby				✓	
	<i>Glossogobius aureus</i>	Golden goby				✓	
	<i>Glossogobius giurus</i>	Flathead goby				✓	
	<i>Glossogobius</i> sp. 1	Roman-nosed goby		✓	✓	✓	
	<i>Glossogobius</i> sp. 2	Munro's goby				✓	
	<i>Glossogobius</i> sp. 3	Dwarf goby				✓	
Hemiramphidae	<i>Arramphus scleroplepis</i>	Snub-nosed garfish			✓	✓	
	<i>Zenarchopterus novaeguineae</i>	Fly River garfish				✓	
Latidae	<i>Lates calcarifer</i>	Barramundi		✓	✓	✓	
Megalopidae	<i>Megalops cyprinoidees</i>	Tarpon			✓	✓	
Melanotaeniidae	<i>Melanotaenia splendida inornata</i>	Chequered rainbowfish	✓	✓	✓	✓	✓
Osteoglossidae	<i>Scleropages jardini</i>	Northern saratoga				✓	
Plotosidae	<i>Anodontiglanis dahli</i>	Toothless catfish			✓	✓	✓
	<i>Neosilurus ater</i>	Black catfish			✓	✓	✓
	<i>Neosilurus hyrtl</i>	Hyrtl's catfish	✓	✓	✓	✓	
	<i>Porochilus argenteus</i>	Silver tandan				✓	
	<i>Porochilus obbesi</i>	Obbes' catfish				✓	
	<i>Porochilus rendahli</i>	Rendahl's catfish			✓	✓	
Poeceliidae	<i>Poecilia reticulata</i>	Guppy				✓	
Soleidae	<i>Brachirus salinarum</i>	Saltpan sole				✓	
	<i>Brachirus selheimi</i>	Selheim's sole	✓			✓	
Terapontidae	<i>Amniataba percoides</i>	Barred grunter	✓	✓	✓	✓	

Family	Scientific name	Common name	Macleay (1882)	Midgley (1988)	Herbert et al. (1995)	Pusey et al. (2004)	Current Study
			Palmer River	Palmer River	Palmer River	Mitchell R. Catchment	Gum Creek (Palmer River)
	<i>Hephaestus carbo</i>	Coal grunter				✓	
	<i>Hephaestus fuliginosus</i>	Sooty grunter		✓	✓	✓	✓
	<i>Leiopotherapon unicolor</i>	Spangled perch	✓	✓	✓	✓	✓
	<i>Pingalla gilberti</i>	Gilbert's grunter				✓	
	<i>Scortum ogilbyi</i>	Gulf grunter				✓	
	<i>Variichthys lacustris</i>	Lake grunter				✓	
Toxotidae	<i>Toxotes chartareus</i>	Seven-spot archerfish		✓	✓	✓	
<u>Species richness</u>			<u>7</u>	<u>15</u>	<u>24</u>	<u>46</u>	<u>7</u>

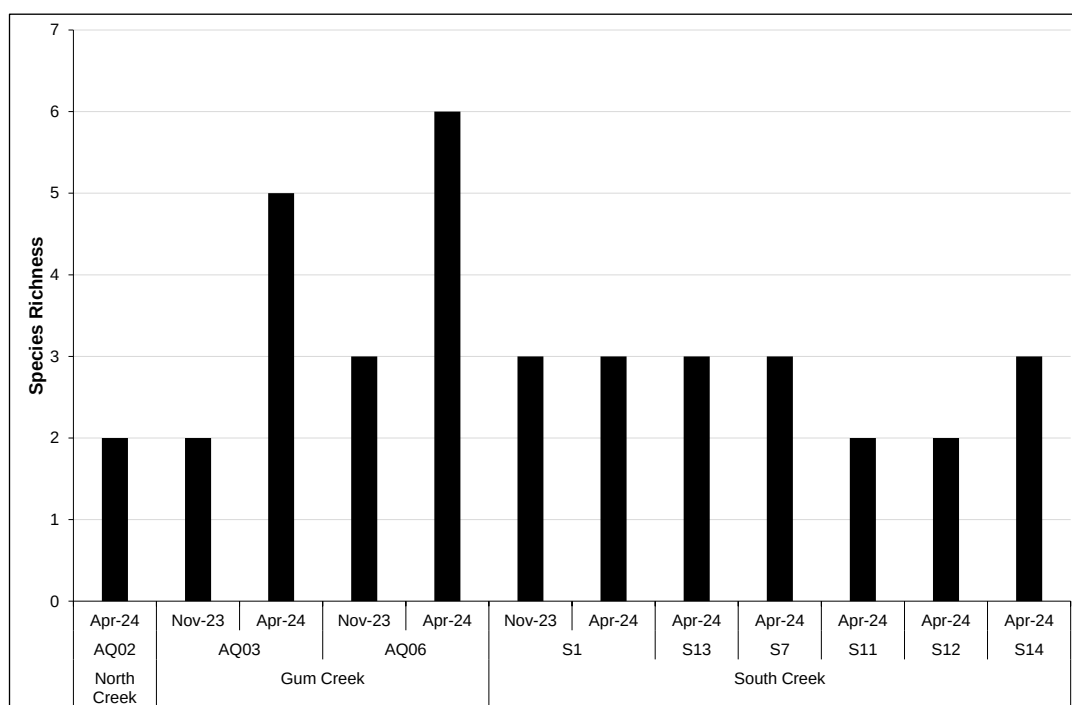


Figure 20: Seasonal species richness recorded at each sampled site.

7.8.2 SPECIES ABUNDANCE

The results for total fish abundance were variable but closely matched trends in species richness. The highest total abundances were observed at AQ03a ($n = 110$) and at AQ06 ($n = 106$) during late-dry and post-wet season sampling, respectively (Figure 21).

As with trends in species richness (see Section 7.8.1), high total abundances observed at sites (AQ03a and AQ06) within Gum Creek are attributed to chequered rainbowfish (*Melanotaenia splendida inornata*), followed by northern purple-spotted gudgeons (*Mogurnda mogurnda*) and spangled perch (*Leiopotherapon unicolor*). These sites were characterised as large, refugial sites likely to retain water well into the dry season. The water possibly persists until connectivity is restored throughout the upper catchment creek systems via rainfall from the onset of the wet season.

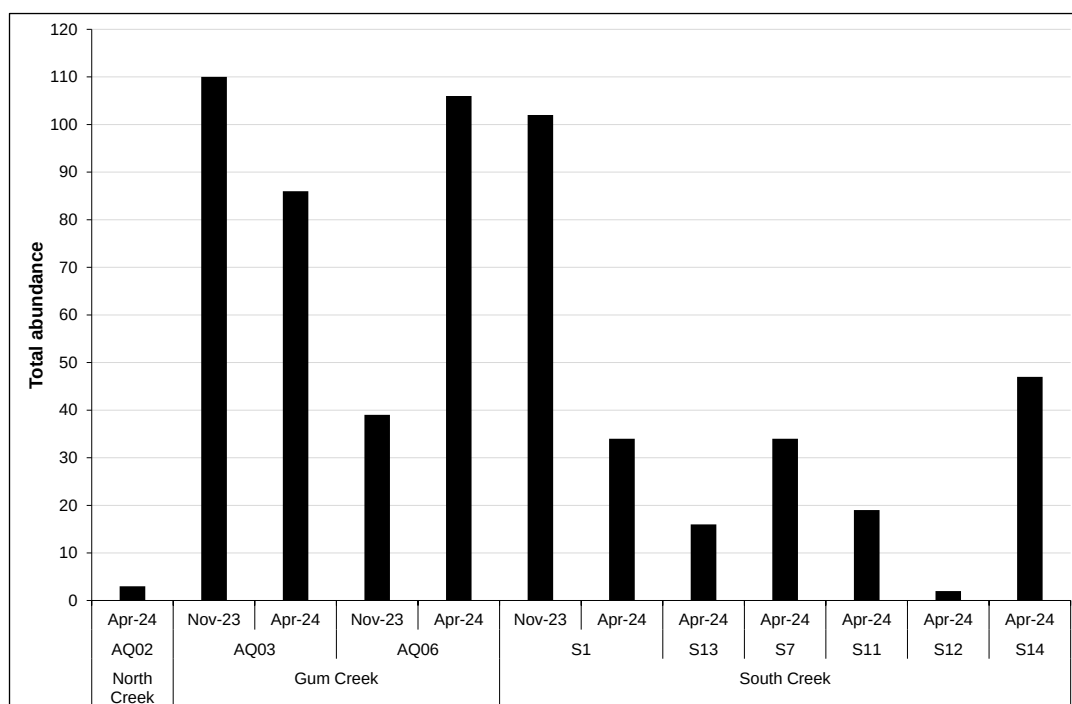


Figure 21: Total seasonal fish abundance at each site. The data were pooled across all sampling techniques, including the relative abundance (MaxN) collected via BRUVS.

7.8.3 POTENTIAL FOR EPBC-LISTED FISH TO INHABIT THE PROJECT AREA

No listed species were identified inhabiting the project site or downstream waters during field surveys. The largemouth sawfish (*Pristis pristis*) – listed in the EPBC Act – was flagged in database searches as potentially occurring within the region. However, no other studies of similar systems within the Palmer River or greater Mitchell River catchment areas have found the species (refer to Table 11). The habitats present on site – high-gradient small creek systems in the very upper catchment area of the Palmer River – are also not considered the preferred habitat types of these species. Therefore, it is considered highly unlikely that the species would utilise any of the receiving environments associated with the project site.

7.9 TURTLE COMMUNITIES

No turtle species – or evidence thereof – were observed during both the late-dry and post-wet season surveys. There are approximately 5 species of freshwater turtles known to occur in the greater Mitchell River catchment. Lentic species such as northern long-necked turtles (*Chelodina rugosa*) and Cann's long-necked turtles (*Chelodina canni*) are known to occur within the Palmer River and the greater Mitchell River catchment. However, these species are wetland specialists and/or reliant on permanent freshwater refugia (Cann and Sadler, 2017). As such, they are unlikely to occur within the rocky upper catchment areas of Gum Creek and its associated tributaries within the DCM project area unless translocated. Short-necked turtles such as the northern yellow-faced turtle (*Emydura tanybaraga*), Krefft's river turtle (*Emydura macquarii krefftii*) and saw-shelled turtle (*Myuchelys laisternum*) are all riverine species that have been recorded in the Mitchell River and/or Palmer River proper. Both the northern yellow-faced turtle and Krefft's river turtle are riverine species that are reliant on large, permanent refugia to survive in rivers with seasonally intermittent flow (Cann and Sadler, 2017). Consequently, these species are unlikely to inhabit in the narrow, rocky, upper-catchment reaches of Gum Creek and its associated tributaries. The saw-shelled turtle (*Myuchelys latisternum*) is known to occur in the perennial headwaters of streams and rivers

in the Mitchell River catchment but not in the Palmer River. Given this species' preferences for lotic conditions (flowing, permanent water), the mid-catchment position of the DCM project area and the non-perennial/seasonal nature of the surrounding watercourses mean that this species is also unlikely to be present.

None of these freshwater turtle species are listed under either the EPBC Act or the NC Act.

7.9.1 POTENTIAL FOR EPBC-LISTED TURTLES TO INHABIT THE PROJECT AREA

There are no known EPBC- or NCA-listed turtle species known to inhabit the project area or adjacent areas.

7.10 OTHER AQUATIC VERTEBRATES

Database searches indicate that the freshwater crocodile (*Crocodylus johnstoni*) has the potential to occur in the project area. The EPBC Act lists the freshwater crocodile as a marine species under section 248 of the EPBC Act and as a migratory species under Section 209 of the EPBC Act, whereas the NC Act categorises it as *least concern*.

No freshwater crocodiles were observed at any surveyed sites within the project site. The Atlas of Living Australia (ALA, 2024), shows the nearest recorded location for freshwater crocodiles within the Palmer River catchment area to be greater than 100 km downstream of the project site. Based on this assessment, freshwater crocodiles are not expected to inhabit the project site.

Additionally, the WetlandInfo (DESI, 2024d) database search indicated that platypus (*Ornithorhynchus anatinus*) potentially occur within the Palmer River sub-catchment. Examination of records from the combined Wildnet (DESI, 2024c) and ALA (2024) database searches show that these are restricted to the very upmost headwaters of perennial creeks and streams located with the northern wet-tropics bioregion. From ALA (2024), the closest record for platypus to the DCM project site is located approximately 50.4 km east (in a straight line), on the western slope of Mount Windsor within Mount Windsor National Park. Apart from the very upper reaches, platypus in Queensland are not found in west-flowing rivers (Grant and Temple-Smith, 2003). Platypus are dependent on perennial water availability. Additional evidence suggests that platypus are less common in steep, upland streams compared with lowland streams due to a lower degree of permanency compared with lowland stream segments, and steep gradients, narrow channel widths and rocky banks (Grant and Temple-Smith, 2003; Milione and Harding, 2009). Consequently, platypus are very unlikely to occur within the DCM project area. This species is not currently listed under the EPBC Act and is listed as *special least concern* under the NC act.

8. IMPACT ASSESSMENT

This section of the report reviews the activities undertaken for the project throughout construction, operation and post-mining phases, and determines the potential risks posed to the identified aquatic ecology values (discussed throughout the preceding sections of this report), while taking into consideration the adoption of appropriate mitigation measures.

The following project activities have the potential to give rise to impacts on aquatic ecosystems, and are described in further detail in Section 8.1:

- Physical disturbance/clearing of upstream catchment areas, generating erosion and sediment-laden runoff;
- Mining and associated activities, giving rise to changes in the groundwater regime, including changes in groundwater levels and groundwater quality impacting GDEs;
- MAW (including existing volumes stored on site) releases to the downstream receiving environment; and
- The potential for project activities to introduce or spread weeds and feral animals.

The information in Section 8.1 is drawn from the description of the historical and proposed operations detailed in Section 2 as well as a range of other specialist reports, including the groundwater and surface water report (C&R, 2024a) and the DCM water management plan (WMP; Engeny, 2024). Section 8.1 provides a summary of the key points from these studies, as relevant to potential impacts on aquatic ecology.

Section 8.2 describes the potential impact of these activities on each of the aquatic habitats within the study area and on aquatic flora and fauna, including threatened and migratory species and MSES.

8.1 IMPACTS AND MITIGATION MEASURES

8.1.1 PHYSICAL DISTURBANCES

The historical mining area is relatively small, covering just 14.1 ha. The proposed disturbance footprint is approximately 50 ha, greater than a three-fold increase in cleared/disturbed area. Large portions of this cleared land will then be covered and/or internally drained, limiting any sediment-laden runoff entering the downstream receiving environments. The natural topography of the project site also assists in limiting the potential to disturb neighbouring catchments. The entire proposed disturbance area (except for the mine camp) is situated within one catchment area associated with a minor tributary of South Creek.

The DCM WMP (Engeny, 2024) also details the clean-water diversion drains surrounding the entire operational mining area (everything but the site office and camp; Figure 4), the internal water management infrastructure, and an associated soil erosion and sediment control plan. The proposed internal water management infrastructure channels all MAW and potentially sediment-laden water to the one release dam positioned at the current location for the settling dam. It is proposed that the historical settling dam will be decommissioned and remediated prior to a new, lined dam being appropriately designed and constructed in the former's location. Although it is proposed that much of the collected water will be reused on site for various operations, this location corresponds with the existing, licenced release point associated with DCM activities. To limit any potential impacts from sediment-laden runoff, the existing settling dam will be remediated and a new release dam should be constructed before undertaking any other clearing in the upstream catchment area.

This relatively small, closed-system approach to water management allows for the effective control of sediment-laden runoff from the proposed operations, limiting any potential impacts to downstream aquatic environmental values.

Note: The redevelopment of the access track/road also has the potential to create physical disturbance within on site watercourses. The track is currently a single-lane, four-wheel drive track that will require reworking and potentially widening to allow use by haul trucks. The access track currently crosses a couple of waterways mapped as low risk to fish passage. However, the end design of any creek crossing developments should take into consideration the potential impacts to fish passage.

8.1.2 GROUNDWATER DEPENDENT ECOSYSTEMS

Most of the waterways within the local area are considered GDEs because water (flows and remnant pools) is maintained for an extended period (i.e. months) following significant rainfalls. This is due to the fractured rock geology of the region creating connectivity between groundwater and surface water systems (refer to sections 3.3 and 7.2.1).

The mine plan includes excavating to a depth of approximately 110 m below ground level. This total depth target means that the pit will likely intersect groundwater systems. Engeny (2024) state that the inflow of groundwater to the pit is expected to be approximately 32 ML/year, although it is noted that further work is required to assess potential drawdown impacts. Any reduction in the water table may also reduce the volume and/or duration of inputs into any associated watercourses following significant rainfall events.

8.1.3 RELEASES OF MAW

Currently, the mine is permitted to release MAW from the settling dam at RP1 in accordance with the requirements of the EA. However, since the mine was placed in 'care and maintenance' in the mid-1980s and effectively abandoned (i.e. no maintenance of the existing facilities), the settling dam would have had uncontrolled releases during subsequent wet seasons but also developed a seep below the dam wall. REMP assessments undertaken across the site have found that these historical (and potentially ongoing) releases have impacted the downstream receiving environment.

Since taking control of the site, Mineral Projects have taken steps to reduce the potential for uncontrolled releases to continue to occur. With the development of the recommencement project, the settling dam will be decommissioned, rehabilitated and reconstructed into the release dam.

The release dam will continue to capture MAW, with the potential to undertake controlled releases via a release point. However, the system will be designed, built and managed in accordance with current best-practice standards, limiting the potential for any further seepage and/or uncontrolled releases. This, in turn, will be beneficial to the downstream receiving environment, allowing the system to slowly attenuate historical impacts.

8.1.4 BIOSECURITY

Several invasive species with the potential to impact native aquatic flora and fauna communities already inhabit the area, including feral pigs, feral dogs, feral cats, cane toads and feral cattle. There is currently no management of invasive species within the study area. Feral pigs and cattle can cause widespread damage to the structure and vegetation assemblages of creeks and wetlands because they can spread weeds and impact water quality.

Once the project is approved, pest flora and fauna management will be undertaken within the project site, particularly feral pig and cattle management, as well as pest plants. Note:

No aquatic pest species are known to inhabit the area. Refer to Section 8.2.4 for further discussion on the proposed controls for aquatic pests.

8.2 POTENTIAL IMPACTS

8.2.1 AQUATIC HABITATS

Under the VM Act watercourse mapping, a drainage line is mapped directly through the middle of the proposed disturbance footprint. However, the existing disturbance area had already been developed within this mapped drainage line (in the late 1970s), prior to the VM Act being established. The existing disturbance footprint included a raw water dam, overburden stockpile and settling dam located within the mapped drainage line. Therefore, this drainage line has not had any aquatic ecology values since the DCM operations were originally developed (i.e. the late 1970s). Hence, redeveloping these areas would not create any additional or new impacts the any aquatic habitats.

Similarly, with the redevelopment of the access road, all waterways are already traversed by the existing track. Therefore, the redevelopment will be following the same route, only impacting areas that have historically been cleared for the existing track. Hence, any impacts to aquatic habitats from the redevelopment are expected to be minimal.

8.2.2 WATER QUALITY

As discussed in Section 7.6 and in previous REMP assessments (C&R, 2022, 2023, 2024c), downstream ecosystems within South Creek already display impacts from releases of poor-quality MAW. Sections 2.2 and 8.1.3 detail the improvements that will be made to potential releases via the decommissioning of the existing settling dam and the development of the new release dam. Despite this, there is still a risk of an uncontrolled release of MAW to the receiving environment. The signature heavy metal contaminants associated with the operations and historical results suggest such a release will negatively influence the downstream aquatic ecology values associated with the receiving environment. However, the DCM WMP clearly details strategies to limit the potential of such a release occurring to within appropriate risk levels.

8.2.3 FISH PASSAGE

Apart from the historically impacted drainage line that runs through the middle of the site operations, little other construction/development is proposed within waterways. Such disturbance is limited to the upgrade of crossings associated with the access road. The mapped waterways intersected by the access road within the proposed disturbance footprint are all considered low risk from waterway barrier works (refer to Section 6.2.3.1 and Figure 9). All crossings associated with the road will consider fish passage design requirements under the accepted development requirements (ADRs) framework for low-risk waterways when designing and constructing any crossings. This will allow for fish passage to be maintained to a suitable/approved standard within the impacted waterways.

8.2.4 PESTS

Several invasive species with the potential to impact native aquatic flora and fauna communities already inhabit the area, including feral pigs, feral dogs, feral cats, cane toads and feral cattle. The presence of invasive species across the project site will be effectively managed through the adoption of a pest flora and fauna management plan. This will manage invasive species within an area that pests currently freely inhabit, with no management in place.

Although no aquatic pest species were observed inhabiting the area, the inclusion of several dams as part of the proposed water management system increases the potential for invasive aquatic flora and fauna species to establish populations within the region. The permanency of lentic environments within the area provides ideal habitat for invasive aquatic weeds and fish species regularly seen in such system throughout tropical north Queensland. Note: The potential for invasive aquatic species to be spread to the site is not increased by the development of the project. Instead, the project only increases the availability of suitable habitat for such species to flourish. Despite this, the management of on-site dams will include monitoring for potential pest species and the development of detailed plans for effective eradication practices to ensure no new aquatic invasive species establish self-sustaining populations. Based on this, it is predicted that the project will allow for the best-practice management of invasive species within the area where little management has previously been undertaken.

All dams constructed and utilised for the project (i.e. excluding the large Raw Water Dam) will be decommissioned and rehabilitated post-mining, limiting any long-term potential for such habitats to sustain introduced/pest species populations.

8.2.5 THREATENED AND MIGRATORY SPECIES

No threatened or migratory aquatic species were recorded within the project site or are expected to occur within the area.

8.2.6 MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE

The only MSES identified within the proposed disturbance footprint, with respect to aquatic ecology, are waterways providing fish passage, as shown in the waterway barrier works mapping (refer to Section 6.2.3.1 and Figure 9). However, the mapped waterways intersected by the proposed disturbance footprint are all considered low risk from waterway barrier works. Further, apart from the historical drainage line that is covered by the existing operations, only the existing access road, that requires redevelopment, intersects any mapped waterways. Crossings associated with the road within the disturbance footprint will take into consideration the fish passage design requirements under the ADRs framework when designing and constructing any crossings. Because any proposed crossings will allow for the relevant fish passage requirements, no environmental offsets are required for this MSES.

No other MSES are of concern with respect to the aquatic ecology values associated with the project site.

9. CONCLUSIONS

The aquatic ecology baseline assessment was composed of two major sections:

- A literature review that determined the relevant legislation, guidelines, policies and regulations pertinent to mine development and operations, as well as determining the regional setting and background existing aquatic values for the area; and
- A detailed survey of aquatic habitats, sediment quality, fauna and flora occurring within all surface aquatic environments.

The project site is located in the Palmer River catchment area of the Mitchell River within far north Queensland. Two freshwater reaches are associated with the site: North Creek and South Creek, which both converge with Gum Creek downstream of the project site. No wetlands of state or national significance occur within the project site or within the 20 km of the downstream reaches.

The local area has been targeted over the years for gold prospecting, with alluvial gold mining operations still occurring in the upper reaches of Gum Creek. The entire area has also been used for cattle grazing, with feral cattle still roaming the project site. These land uses – combined with historical operations associated with DCM that was established in the late 1970s – suggest that watercourses within the region are slightly to moderately disturbed with respect to water quality and aquatic ecosystems.

Evidence of historical impacts on the outlined environmental values was observed in the results of the current study. Habitat condition across the project site was generally found to be *moderate to good*. Sediment quality results indicated elevated levels of signature contaminants associated with historical operations at DCM within the downstream reaches of South Creek. The stream bed particle size distribution was dominated by coarse-grained fractions in watercourses, with finer-fractioned sediments dominating the raw water dam site. The coarser substrates (particularly gravel and cobble) are generally considered more structurally complex, promoting greater diversity of macroinvertebrate assemblages utilising the system.

The study identified healthy aquatic fauna and flora assemblages across the project site, although most communities were not considered highly diverse. Thirty-eight (38) macroinvertebrate taxa were identified inhabiting the freshwater reaches of the aquatic ecology study area. Additionally, three (3) species of macro-decapoda were recorded in the aquatic ecology study area. The macroinvertebrate community structure showed the impacts from historical operations within the downstream receiving environment of South Creek.

Seven (7) species of native fish and eleven (11) species of aquatic flora were also found during the field assessment. None of these species are listed under the EPBC Act and NC Act.

An impact assessment undertaken for the project identified the key potential hazards posed to the receiving aquatic ecosystems from the activities associated with the project during construction, operation and closure. Potential key hazards include:

- Physical disturbance of aquatic ecosystems, with such activities resulting in increased erosion and sediment-laden runoff;
- Mining and associated activities giving rise to changes in the groundwater regime, including changes in groundwater levels and groundwater quality, with flow-on effects to riverine GDEs ;
- Releases of MAW; and
- The potential for project activities to introduce or spread weeds and feral animals.



The risks to the identified aquatic ecology values from the majority of these hazards can be appropriately mitigated within the design phase of the project through the adoption of current best-practice measures. For instance, culverts will be designed to incorporate fish passage requirements relevant to the level of risk.

With the adoption of appropriate mitigation measures, the project was found to have a negligible influence on the aquatic environmental values identified within the aquatic ecology study area.

Note: The only MSES identified on site, with respect to aquatic ecology, were waterways providing fish passage. However, the adoption of ADR conditions within the design of any creek crossings was found to negate any requirement for discussing environmental offsets.

10. REFERENCES

- ALA (2024) *Atlas of living Australia*, <https://www.ala.org.au/> (accessed 7 August 2024).
- ANZG (2024) *Toxicant default guideline values for sediment quality*. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand governments and Australian state and territory governments, Canberra, Australia. <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants> (accessed 23 May 2024).
- Baxter, R.M. (1977) Environmental effects of dams and impoundments. *Annual Reviews of Ecological Systems*, 8: 255-283.
- BoM (2024a) *Climate Data Online*. Bureau of Meteorology, <http://www.bom.gov.au/climate/data/> (accessed 7 June 2024).
- BoM (2024b) *Past tropical cyclones – Severe tropical cyclone Jasper*. Bureau of Meteorology, <http://www.bom.gov.au/cyclone/history/jasper23.shtml> (accessed 7 August 2024).
- Burrows, D. (2008) *Report 7: freshwater fish*. In: Lukacs, G.P. Finlayson, C.M. (Eds.), A compendium of ecological information on Australia's northern tropical rivers. Sub-project 1 of Australia's tropical rivers – an integrated data assessment and analysis (DET18). A report to Land & Water Australia. National Centre for Tropical Wetland Research, Townsville, Queensland, pp. 20.
- C&R (2021a) *Diane Copper Mine – Receiving environment monitoring programme (REMP) design document*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 36.
- C&R (2021b) *Diane Copper Mine – REMP assessment report*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 52.
- C&R (2022) *Diane Copper Mine – REMP assessment report*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 72.
- C&R (2023) *Diane Copper Mine – REMP assessment report 2023*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 77.
- C&R (2024a) *Diane Copper Mine – Groundwater and surface water impact assessment report*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 74.
- C&R (2024b) *Diane Copper Mine – Terrestrial ecology report*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 182.
- C&R (2024c) *Diane Copper Mine – REMP assessment report 2024*. Report prepared for Mineral Projects Pty Ltd by C&R Consulting Pty Ltd, pp. 141.
- Cann, J., Sadler, R.A. (2017) *Freshwater turtles of Australia*. ECO Wear & Publishing, CSIRO Publishing, Clayton South, pp. 448.
- Centre for Freshwater Ecosystems (2024) *Australian freshwater invertebrates*. La Trobe University, <https://www.mdfrc.org.au/bugguide/> (accessed 15 July 2024).

- Chessman, B.C. (1995) Rapid assessment of rivers using macroinvertebrates: a procedure based on habitat-specific sampling, family level identification and a biotic index. *Australian Journal of Ecology*, 20: 122-129.
- Chessman, B.C. (2003) New sensitivity grades for Australian river macroinvertebrates. *Marine and Freshwater Research*, 54: 95-103.
- Choy, S.C., Thomson, C.B., Marshall, J.C. (2002) Ecological condition of central Australian arid-zone rivers. *Water Science and Technology*, 45(11): 225-232.
- DAF (2024) *Queensland waterways for waterway barrier works*. Department of Agriculture and Fisheries, Queensland Government, Brisbane, <https://www.data.qld.gov.au/dataset/queensland-waterways-for-waterway-barrier-works> (accessed 7 August 2024).
- DCCEEW (2024a) *Australian wetlands database*. Commonwealth Department of Climate Change, Energy, the Environment and Water, <https://www.dcceew.gov.au/water/wetlands/australian-wetlands-database> (accessed 7 August 2024).
- DCCEEW (2024b) *Protected Matters Search Tool*. Commonwealth Department of Climate Change, Energy, the Environment and Water, <https://pmst.awe.gov.au/> (accessed 7 August 2024).
- DEHP (2009) *Queensland water quality guidelines* (version 3). Department of Environment and Heritage Protection, Queensland Government, Brisbane, pp. 184.
- DEHP (2014) *Significant residual impact guideline – Queensland environmental offsets policy*. Biodiversity Integration and Offsets, Ecosystem Outcomes, Department of Environment and Heritage Protection, Queensland Government, Brisbane, pp. 20.
- DERM (2010) *Activities in a watercourse, lake or spring associated with mining operations*. Department of Environment and Resource Management Queensland Government, Brisbane.
- DES (2018) *Monitoring and sampling manual: Environmental Protection (Water) Policy*. Department of Environment and Science, Queensland Government, Brisbane, pp. 263.
- DES (2023) *Queensland environmental offsets policy* (version 1.15). Department of Environment and Science, Queensland Government, Brisbane, pp. 69.
- DESI (2024a) *Map of Great Barrier Reef wetland protection areas*. Department of Environment, Science and Innovation, Queensland Government, Brisbane, <https://environment.desi.qld.gov.au/wildlife/wetlands/map-referrable-wetlands> (accessed 10 June 2024).
- DESI (2024b) *Map of Queensland wetland environmental values*. Department of Environment, Science and Innovation, Queensland Government, Brisbane, <https://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/> (accessed 10 June 2024).
- DESI (2024c) *Request a species list*. Department of Environment, Science and Innovation, Queensland Government, Brisbane, <https://apps.des.qld.gov.au/report-request/species-list/> (accessed 10 June 2024).
- DESI (2024d) *WetlandInfo*. Department of Environment, Science and Innovation, Queensland Government, Brisbane, <https://wetlandinfo.des.qld.gov.au/wetlands/> (accessed 10 June 2024).

- DESI (2024e) *WetlandMaps*. Department of Environment, Science and Innovation, Queensland Government, Brisbane, <https://wetlandinfo.des.qld.gov.au/wetlandmaps/> (accessed 10 June 2024).
- DNRM (2001) *Queensland Australian River Assessment System (AusRivAS) sampling and processing manual*. Department of Natural Resources and Mines, Queensland Government, Rocklea, pp. 51.
- DoR (2024) *Queensland Globe*. Queensland Government Department of Resources, <https://qldglobe.information.qld.gov.au/> (accessed 10 June 2024).
- DSEWPac (2012) *Environment Protection and Biodiversity Conservation Act 1999 environmental offsets policy*. Commonwealth Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- Engeny (2024) *Diane Copper Mine – Water management plan*. Report prepared for Mineral Projects Pty Ltd.
- Grant, T.R., Temple-Smith, P.D. (2003) Conservation of the platypus, *Ornithorhynchus anatinus*: threats and challenges. *Aquatic Ecosystem Health & Management*, 6(1), 5-18.
- Herbert, B.W., Peeters, J.A., Graham, P.A., Hogan, A.E. (1995) *Freshwater fish and aquatic habitat survey of Cape York Peninsula*. Report prepared for the Cape York Peninsula Land Use Strategy. Queensland Department of Primary Industries.
- Horn, A.M, Derrington, E.A., Herbert, G.C., Lait, R.W., Hillier, J.R. (1995) *Groundwater resources of Cape York Peninsula*. Cape York Peninsula Land Use Strategy, Office of the Co-ordinator General of Queensland, Brisbane, Department of the Environment, Sport and Territories, Canberra, Queensland Department of Primary Industries, Brisbane and Mareeba, and Australian Geological Survey Organisation, Mareeba.
- Jones, D.S., Morgan, G.J. (2002) *A field guide to crustaceans of Australian waters*, 2nd edition. Western Australian Museum/Reed New Holland Publication, Sydney.
- McCartney, M.P., Sullivan, C., Acreman, M.C. (2001) *Ecosystem impacts of large dams: background paper Nr. 2*. Prepared for the International Union for Conservation of Nature and Natural Resources and the United Nations Environmental Programme.
- Macleay, W. (1882) *The fishes of the Palmer River*. In Proceedings of the Linnean Society of New South Wales (Vol. 7, pp. 69-71).
- Midgley, S.H. (1988) *Some river systems of Cape York Peninsula*. An account of a biological resource study of freshwaters conducted during July, August and September 1988. Unpublished report
- Milione, M., Harding, E. (2009) Habitat use by platypus (*Ornithorhynchus anatinus*) in a modified Australian Wet Tropics catchment, north-eastern Queensland. *Australian mammalogy*, 31(1), 35-46.
- Moller, G., Johnson, D., Van Manen, N. (2002) *State of the Rivers – Mitchell River and major tributaries*. Department of Natural Resources and Mines, Queensland Government.
- Murphy, N.P., Austin, C.M. (2004) Phylogeography of the widespread Australian freshwater prawn, *Macrobrachium australiense* (Decapoda, Palaemonidae). *Journal of Biogeography*, 31(7), 1065-1072.

- Naser, M.D., Davie, P.J., Waltham, N.J. (2018) Redescription of *Austrothelphusa wasselli* (Bishop, 1963) (Crustacea: Brachyura: Gecarcinucidae), and designation of a new species from the Gilbert River, north Queensland, Australia. *Zootaxa*, 4369(1), 109-127.
- Negus, P.M., Clifford, S.E., Pickering, G.E. McCabe, J.L. (2023) *Threats and condition of Queensland's Gulf rivers: Q-catchments*. Water Planning Ecology. Department of Environment and Science, Queensland Government, Brisbane.
- Pusey, B.J., Burrows, D.W., Kennard, M.J., Perna, C.N., Unmack, P.J., Allsop, Q., Hammer, M.P. (2017) Freshwater fishes of northern Australia. *Zootaxa*, 4253(1), 1-104.
- Pusey, B., Kennard, M.J., Arthington, A.H. (2004) *Freshwater fishes of north-eastern Australia*. CSIRO Publishing, Victoria, pp. 684.
- Queensland Government (2024) *Wetland data – version 6 – Queensland series*. Open Data Portal, <https://www.data.qld.gov.au/> (accessed 10 June 2024).
- Sainty, G.R., Jacobs, S.W. (2003) *Water plants in Australia: a field guide* (4th edition). Sainty and Associates, pp. 416.
- Simpson, S., Batley, G. (2016) *Sediment quality assessment: a practical guide* (2nd edition). CSIRO Publishing, Clayton South, Australia, pp. 346.
- Thomson, C., Marshall, C., Conrick, D., Choy, S. (2002) *Impact of landuse on ecological water quality in the Mitchell River catchment, north Queensland*. Freshwater biological monitoring report No. 38, Aquatic Ecosystem Health, Department of Natural Resources and Mines, Queensland Government, Rocklea.
- Townsend, S.A. (2002) Seasonal evaporative concentration of an extremely turbid water-body in the semiarid tropics of Australia. *Lakes & Reservoirs: Research and Management*, 7(2): 103-107.

Appendix A – Database search results



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

ML: 2810

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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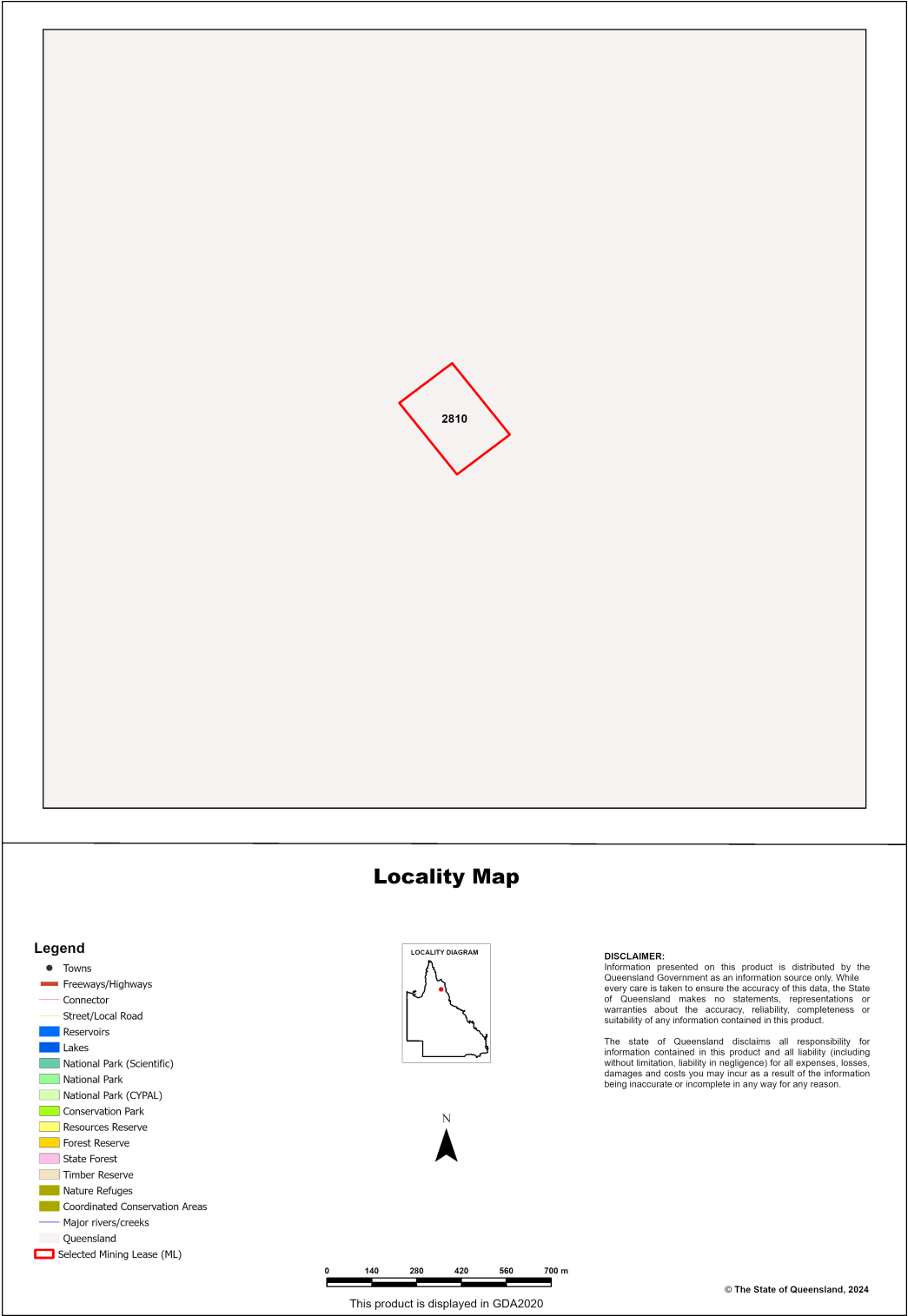
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: ML: 2810, with area 5.66 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Cook Shire	Mitchell	Einasleigh Uplands	Hodgkinson Basin



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;
- *Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004* ;
- *Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008*;
- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	0.2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways**4. Strategic Environmental Areas (SEA)**

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species**7a. Threatened (endangered or vulnerable) wildlife**

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>	Keys boronia	V	None
<i>Calyptrorhynchus lathamii</i>	Glossy black cockatoo	V	None
<i>Casuarius casuarius johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Euastacus bindal</i>	Mount Elliot crayfish	CR	None
<i>Euastacus binzayedii</i>		CR	None
<i>Euastacus eungella</i>		E	None
<i>Euastacus hystricosus</i>		E	None
<i>Euastacus jagara</i>	Jagara hairy crayfish	CR	None
<i>Euastacus maidae</i>		CR	None
<i>Euastacus monteithorum</i>		E	None
<i>Euastacus robertsi</i>		E	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Melaleuca irbyana</i>	swamp tea-tree	E	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>	bopple nut	V	None
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	None
<i>Petrogale coenensis</i>	Cape York rock-wallaby	V	None
<i>Petrogale purpureicollis</i>	purple-necked rock-wallaby	V	None
<i>Petrogale sharmani</i>	Sharmans rock-wallaby	V	None
<i>Petrogale xanthopus celeris</i>	yellow-footed rock-wallaby (Qld subspecies)	V	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets**9a. Legally secured offset areas - offset register areas**

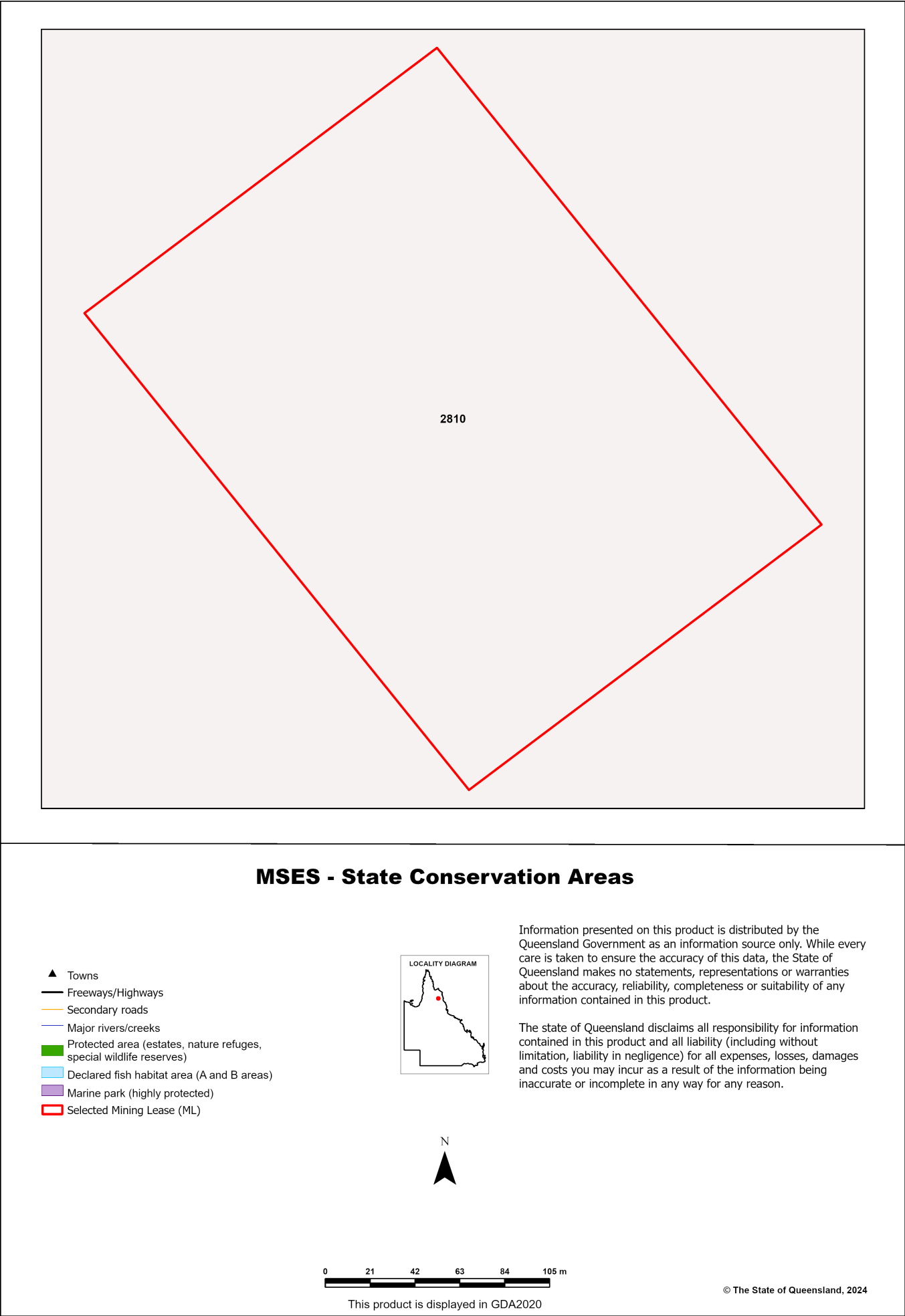
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

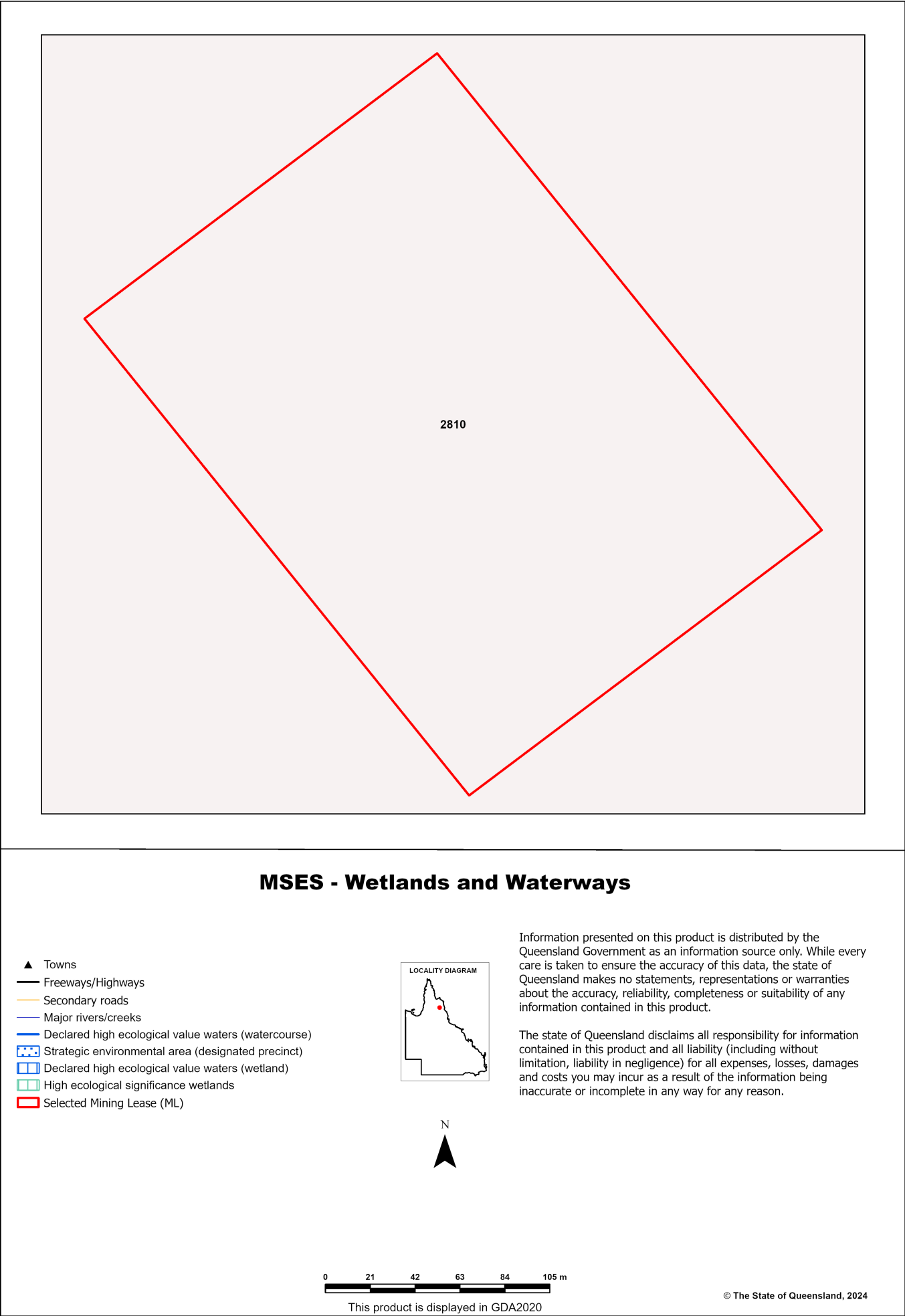
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

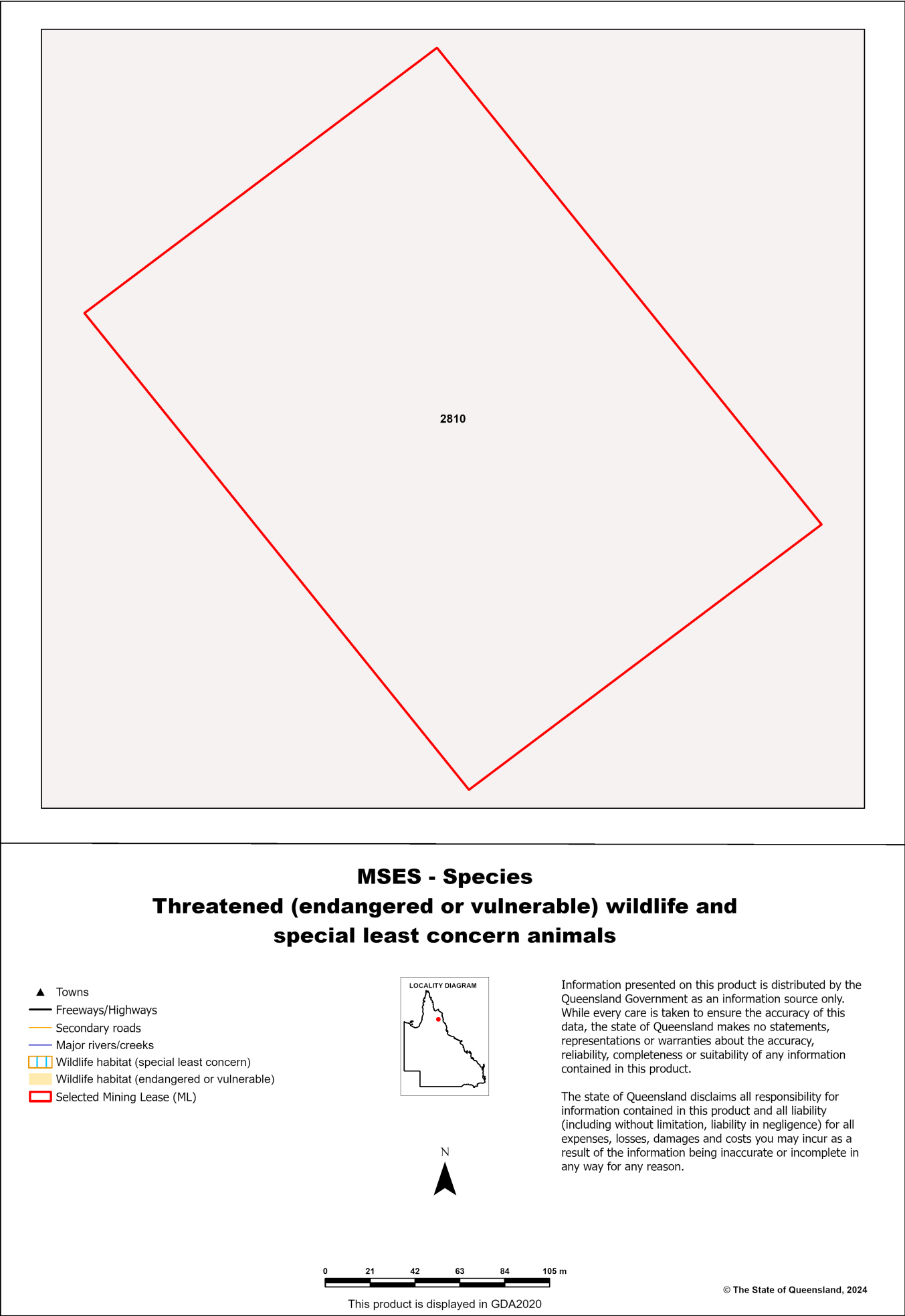
Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways



Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



MSES - Species Koala habitat area (SEQ)

-  Towns
-  Freeways/Highways
-  Secondary roads
-  Major rivers/creeks
-  Koala habitat area (core)
-  Koala habitat area (locally refined)
-  Selected Mining Lease (ML)

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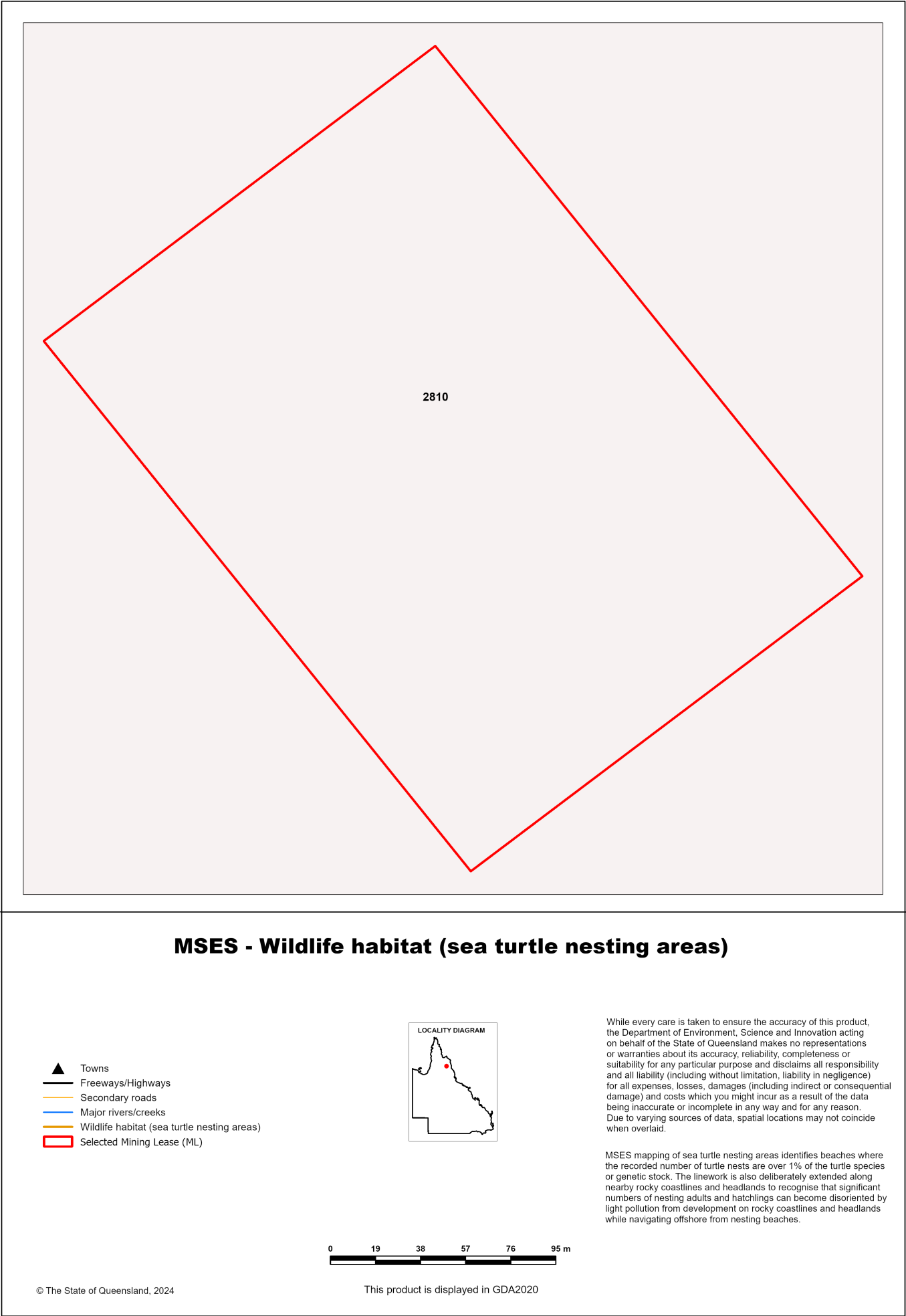
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

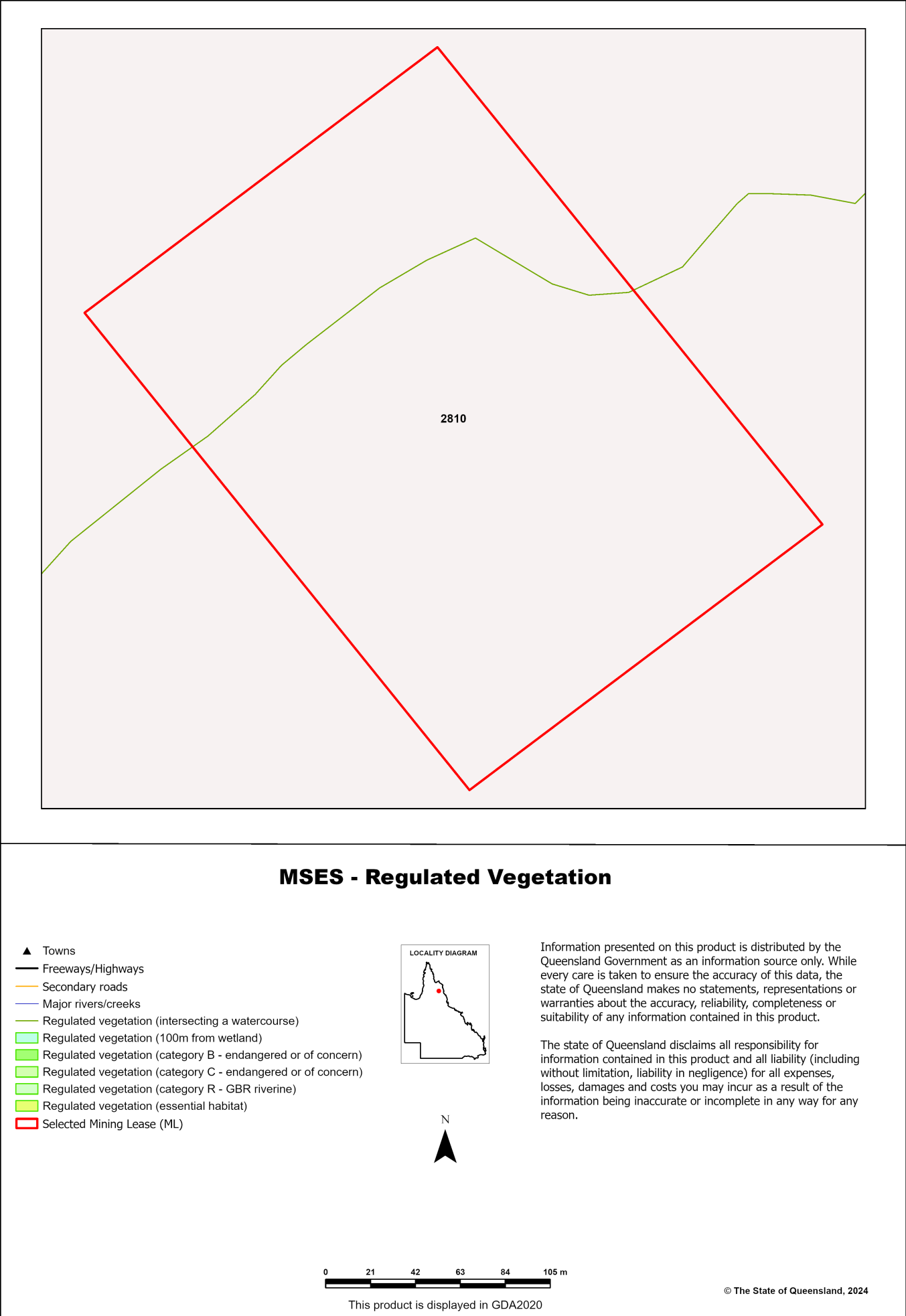
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This product is displayed in GDA2020

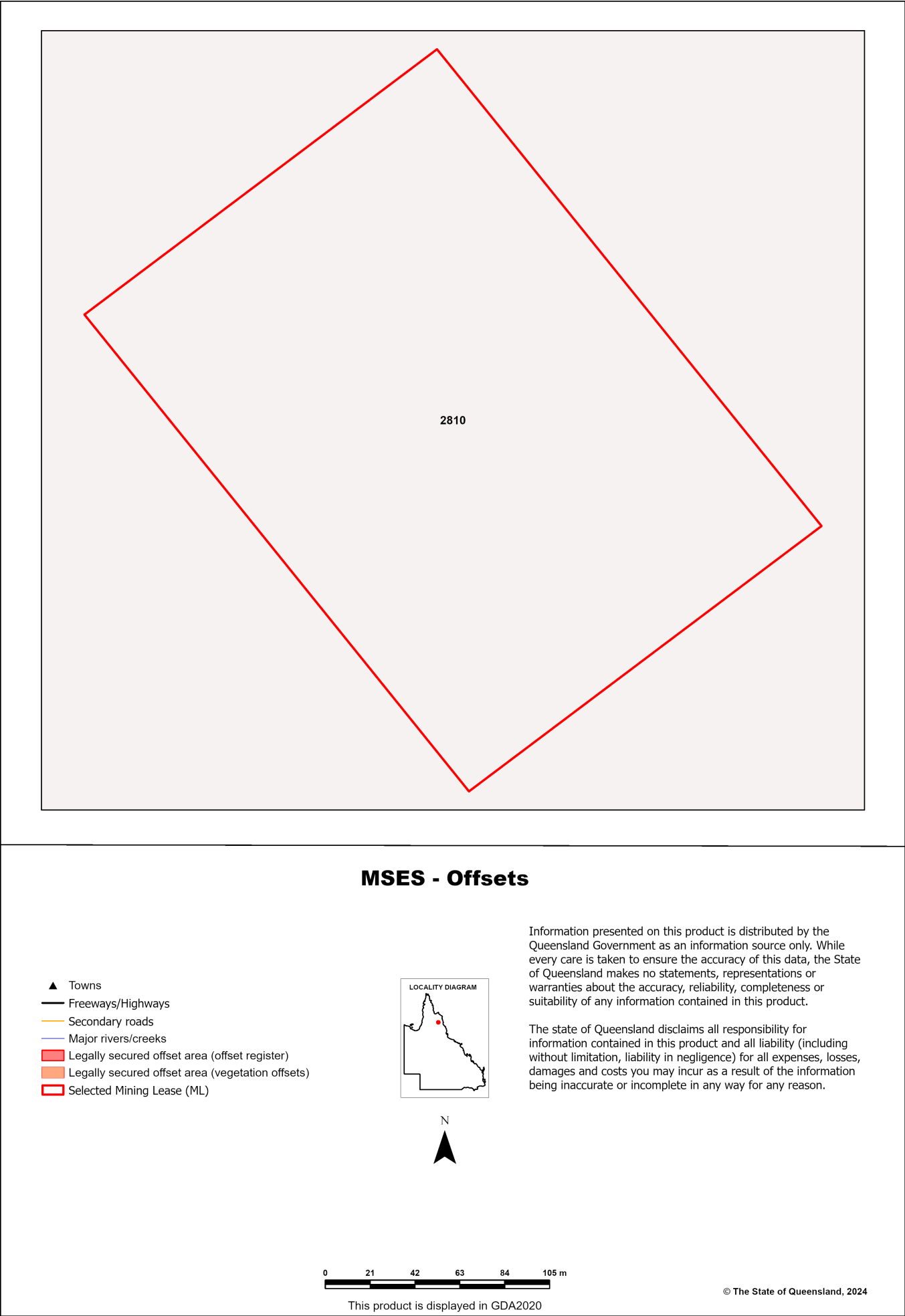
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

<http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html> .

Appendix 2 - Source Data

The datasets listed below are available on request from:

<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	current QSpatial data (http://qspatial.information.qld.gov.au)
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DESI	- Department of Environment, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

ML: 2810

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Details for area of interest: ML: 2810, with area 5.66 ha

Local Government(s)	
Cook Shire	
Bioregion(s)	Subregion(s)
Einasleigh Uplands	Hodgkinson Basin
Catchment(s)	
Mitchell	

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Einasleigh Uplands v1.1	Eastern Gulf of Carpentaria v1.1	Eastern Gulf of Carpentaria v.1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	3.92	69.17

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment, Science and Innovation's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	3.92	69.17

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Lacustrine wetlands	1
Total number of non-riverine wetlands	1

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(No Records)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment, Science and Innovation's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	5.66	100.01

Table 8: Summary table, aquatic conservation significance (non-riverine)

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very Low	1.16	20.50

Biodiversity Planning Assessments

Introduction

The Department of Environment, Science and Innovation (DESI) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DESI. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	3.92	69.17

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar

sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	3.92	69.17

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	0.00	0.00	3.92	69.17
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	3.92	69.17	0.00	0.00
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	3.92	69.17	0.00	0.00
C: Tract Size	0.00	0.00	3.92	69.17	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	3.92	69.17	0.00	0.00	0.00	0.00	0.00	0.00
D2: Relative RE Size (Subregion)	3.92	69.17	0.00	0.00	0.00	0.00	0.00	0.00
F: Ecosystem Diversity	0.00	0.00	3.92	69.17	0.00	0.00	0.00	0.00
G: Context and Connection	3.92	69.17	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	3.92	69.17

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Id: Limits of Geographic Ranges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ie: High Species Richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;

- Include and maximise connectivity between large tracts/patches of remnant vegetation;
 - Include and maximise connectivity between remnant vegetation in good condition; and
- Riparian
- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
	3.92	69.17

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

(No Records)

Expert panel decision descriptions:

(No Records)

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland Info:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	5.66	100.01

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	5.66	100.01	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	5.66	100.01	0.00	0.00
3. Diversity and richness	0.00	0.00	5.66	100.01	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	5.66	100.01	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very Low	1.16	20.50

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	0.00	0.00	0.00	0.00	1.16	20.50
2. Naturalness catchment	0.00	0.00	0.00	0.00	1.16	20.50	0.00	0.00
3. Diversity and richness	0.00	0.00	0.00	0.00	1.16	20.50	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	1.16	20.50
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DESI internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.*

***I - wetland indicator species; D - wetland dependent species.*

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. Furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

(No Records)

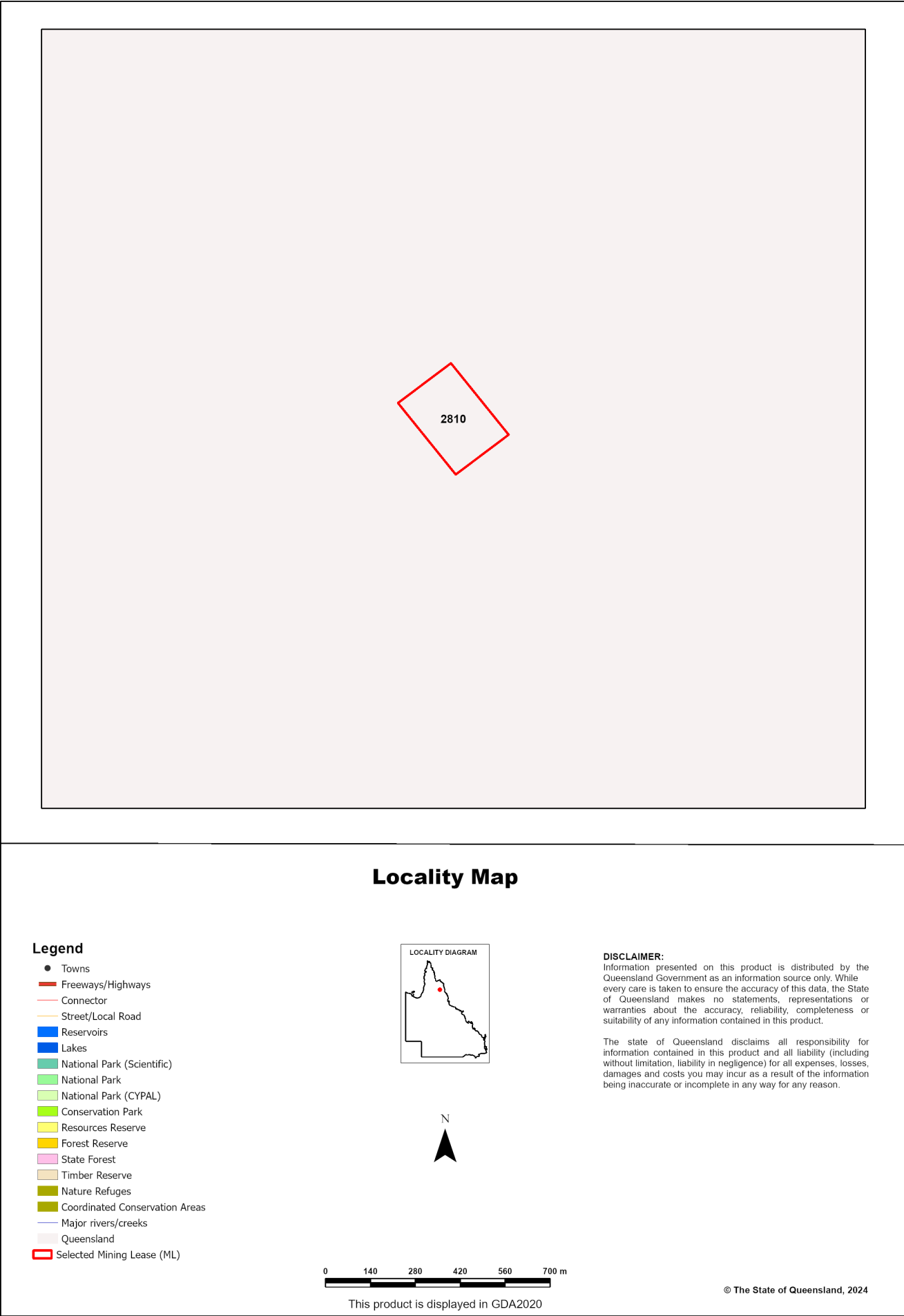
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

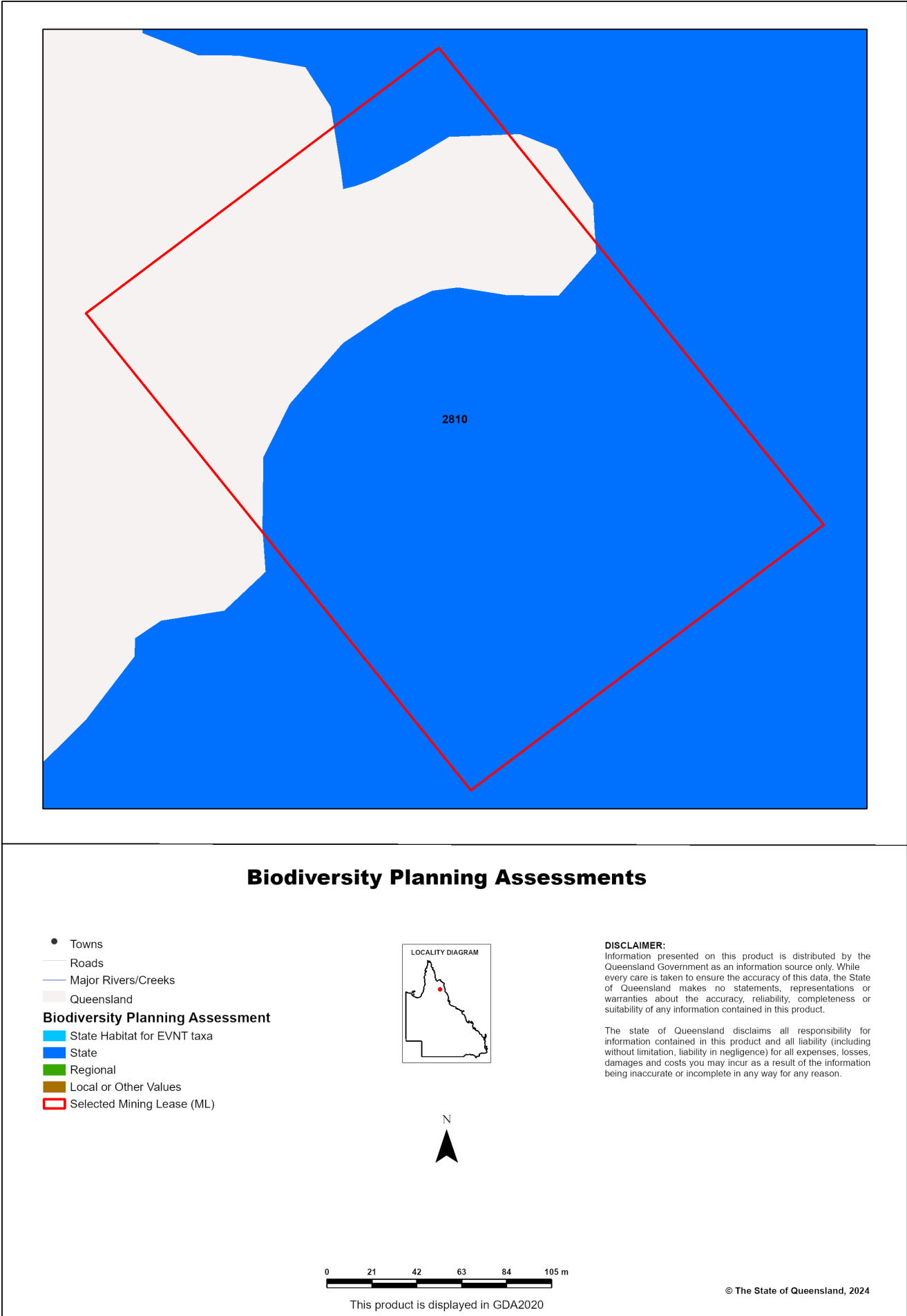
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

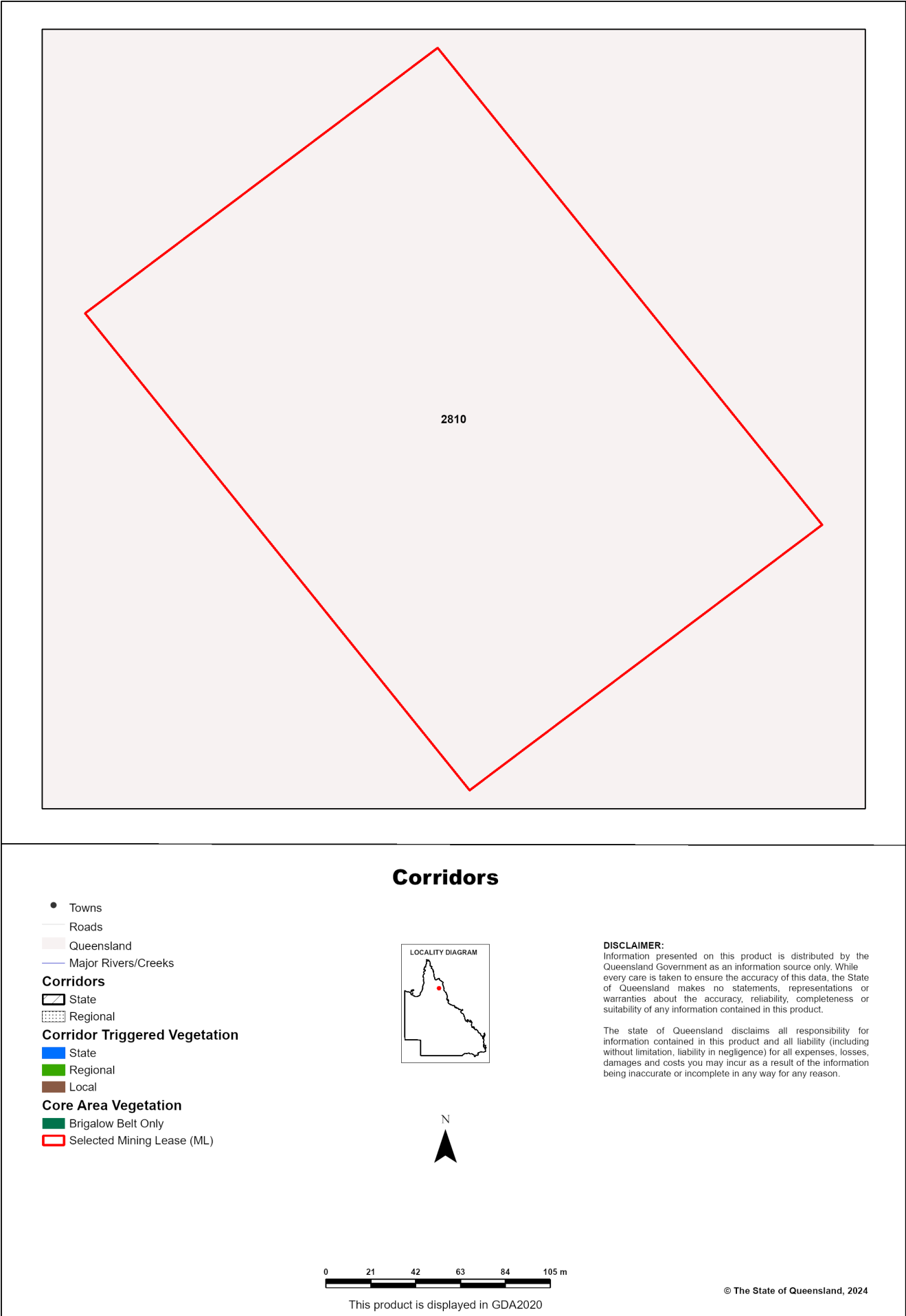
Map 1 - Locality Map



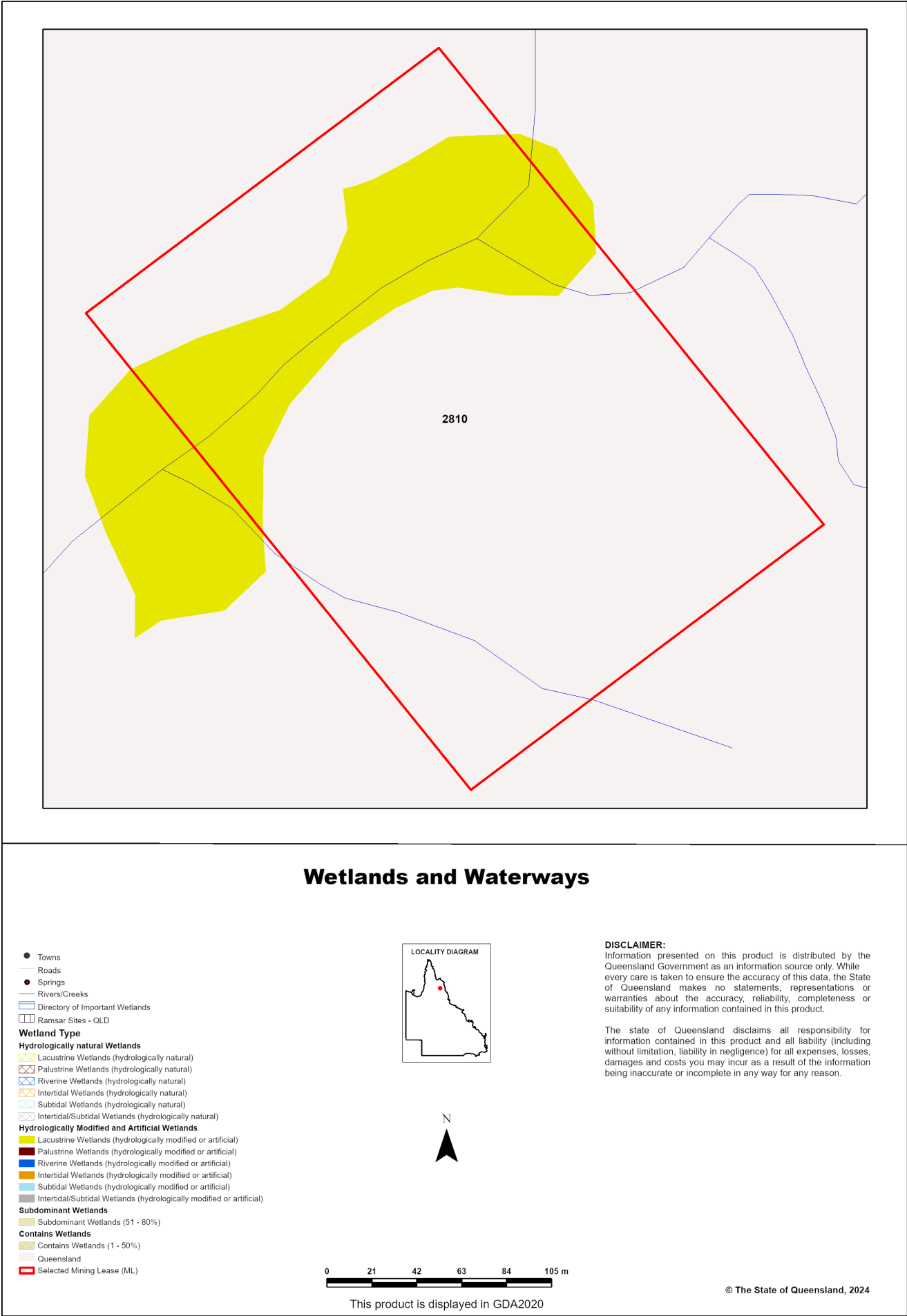
Map 2 - Biodiversity Planning Assessment (BPA)



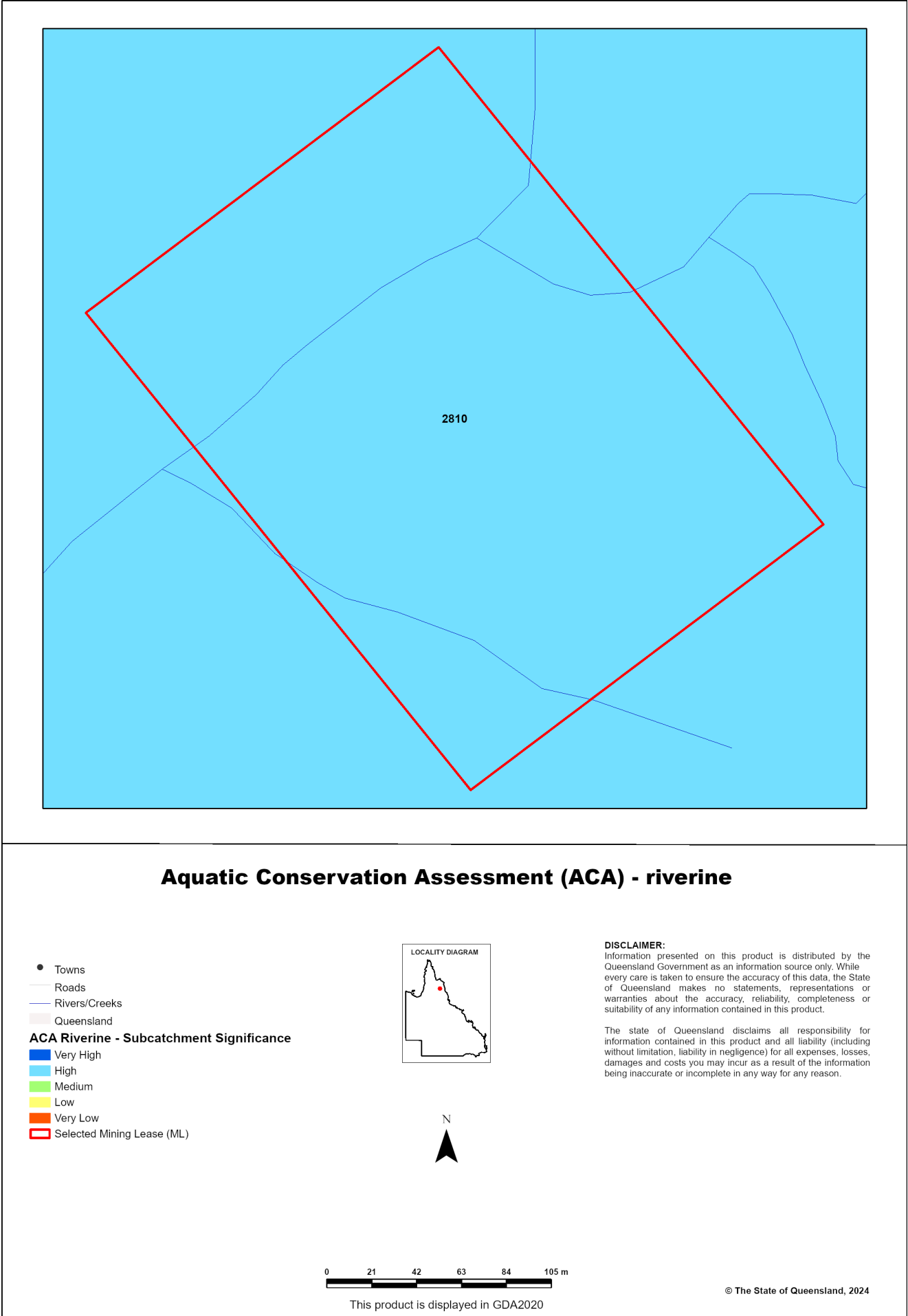
Map 3 - Corridors



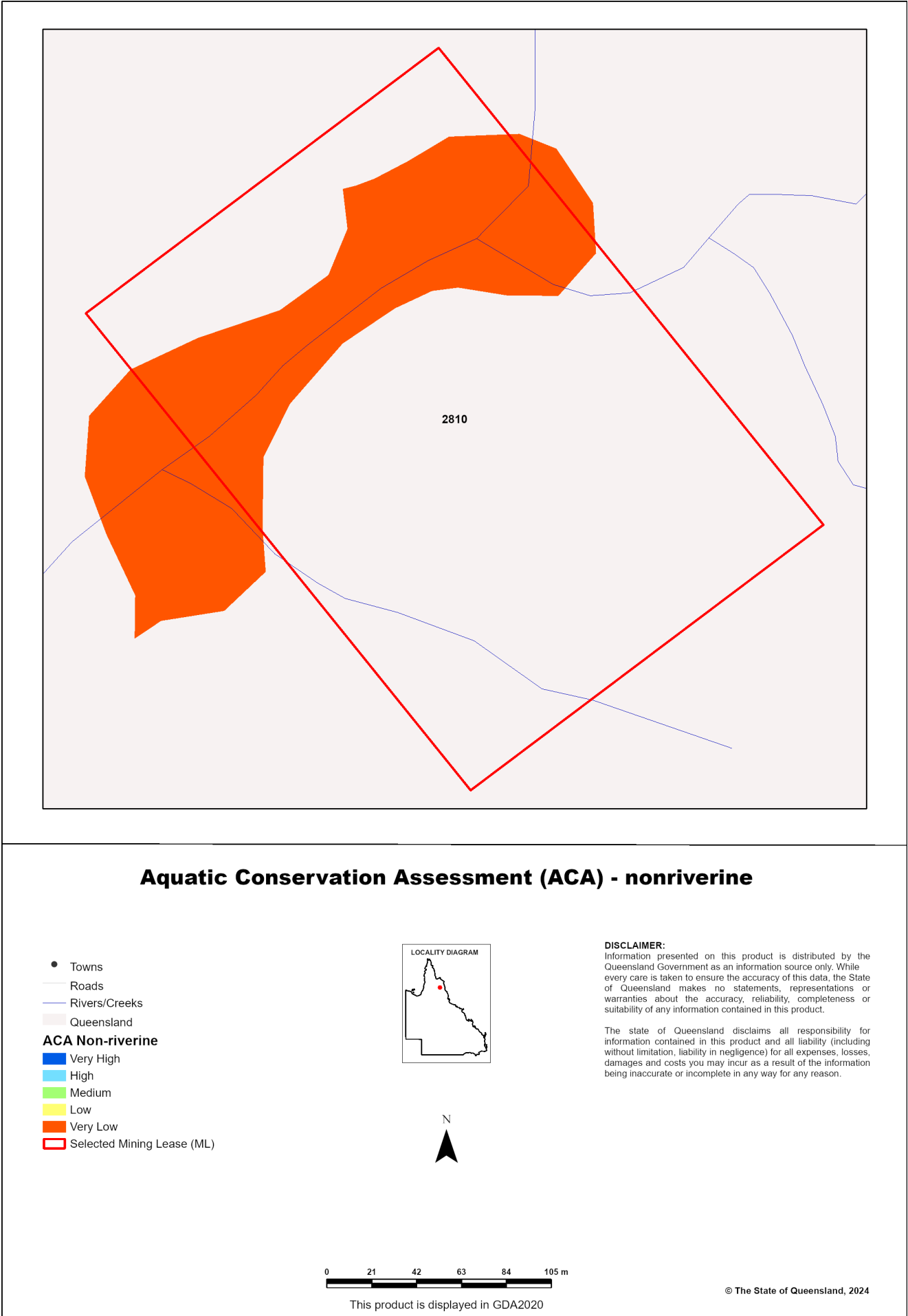
Map 4 - Wetlands and waterways



Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environment and Heritage Protection 2014, *Biodiversity Assessment and Mapping Methodology*. Version 2.2. Department of Environment and Heritage Protection, Brisbane.

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDBB Non-riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1 WBBGBRCC Non-riverine ACA v2.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDBB Riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1 WBBGBRCC Riverine ACA v2.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einiasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DESI	- Department of Environment, Science and Innovation
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA2020	- Geocentric Datum of Australia 2020
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

ML: 2811

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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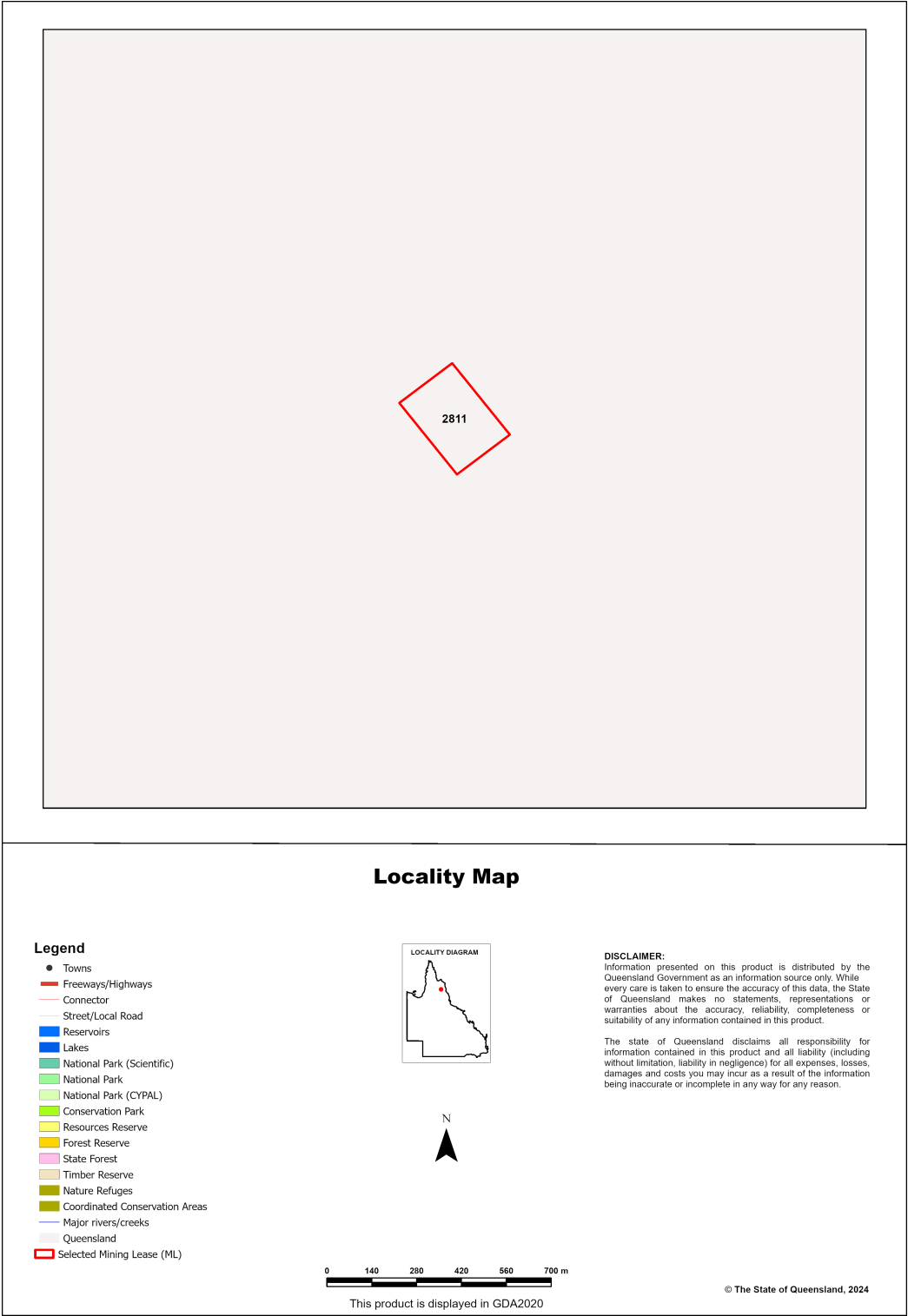
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: ML: 2811, with area 5.66 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Cook Shire	Mitchell	Einasleigh Uplands	Hodgkinson Basin



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;
- *Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004 ;*
- *Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;*
- *Threatened wildlife under the Nature Conservation Act 1992 and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;*
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014 ;*
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	0 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways**4. Strategic Environmental Areas (SEA)**

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species**7a. Threatened (endangered or vulnerable) wildlife**

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>	Keys boronia	V	None
<i>Calyptrorhynchus lathamii</i>	Glossy black cockatoo	V	None
<i>Casuarius casuarius johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Euastacus bindal</i>	Mount Elliot crayfish	CR	None
<i>Euastacus binzayedii</i>		CR	None
<i>Euastacus eungella</i>		E	None
<i>Euastacus hystricosus</i>		E	None
<i>Euastacus jagara</i>	Jagara hairy crayfish	CR	None
<i>Euastacus maidae</i>		CR	None
<i>Euastacus monteithorum</i>		E	None
<i>Euastacus robertsi</i>		E	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Melaleuca irbyana</i>	swamp tea-tree	E	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>	bopple nut	V	None
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	None
<i>Petrogale coenensis</i>	Cape York rock-wallaby	V	None
<i>Petrogale purpureicollis</i>	purple-necked rock-wallaby	V	None
<i>Petrogale sharmani</i>	Sharmans rock-wallaby	V	None
<i>Petrogale xanthopus celeris</i>	yellow-footed rock-wallaby (Qld subspecies)	V	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

Not applicable

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets**9a. Legally secured offset areas - offset register areas**

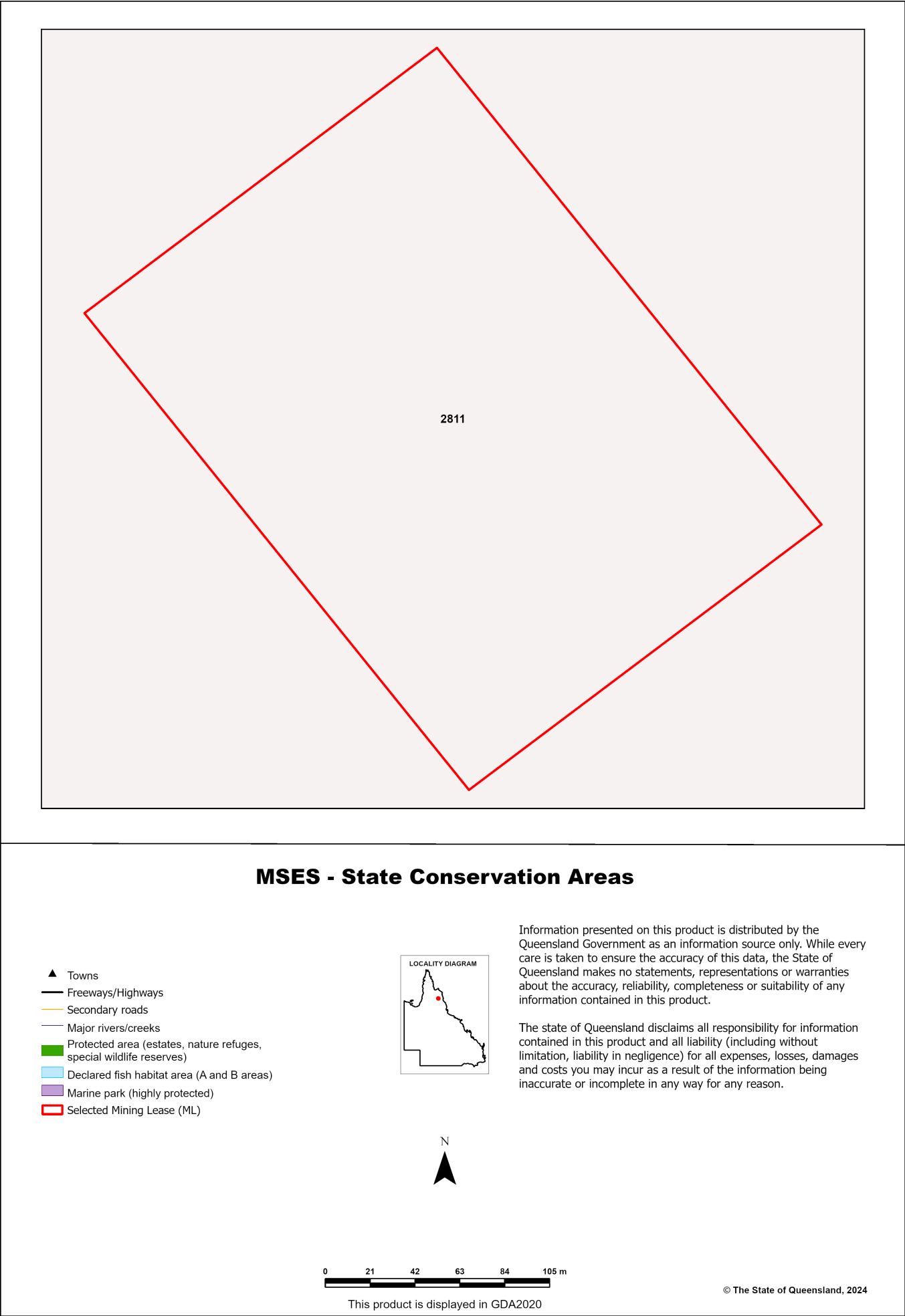
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

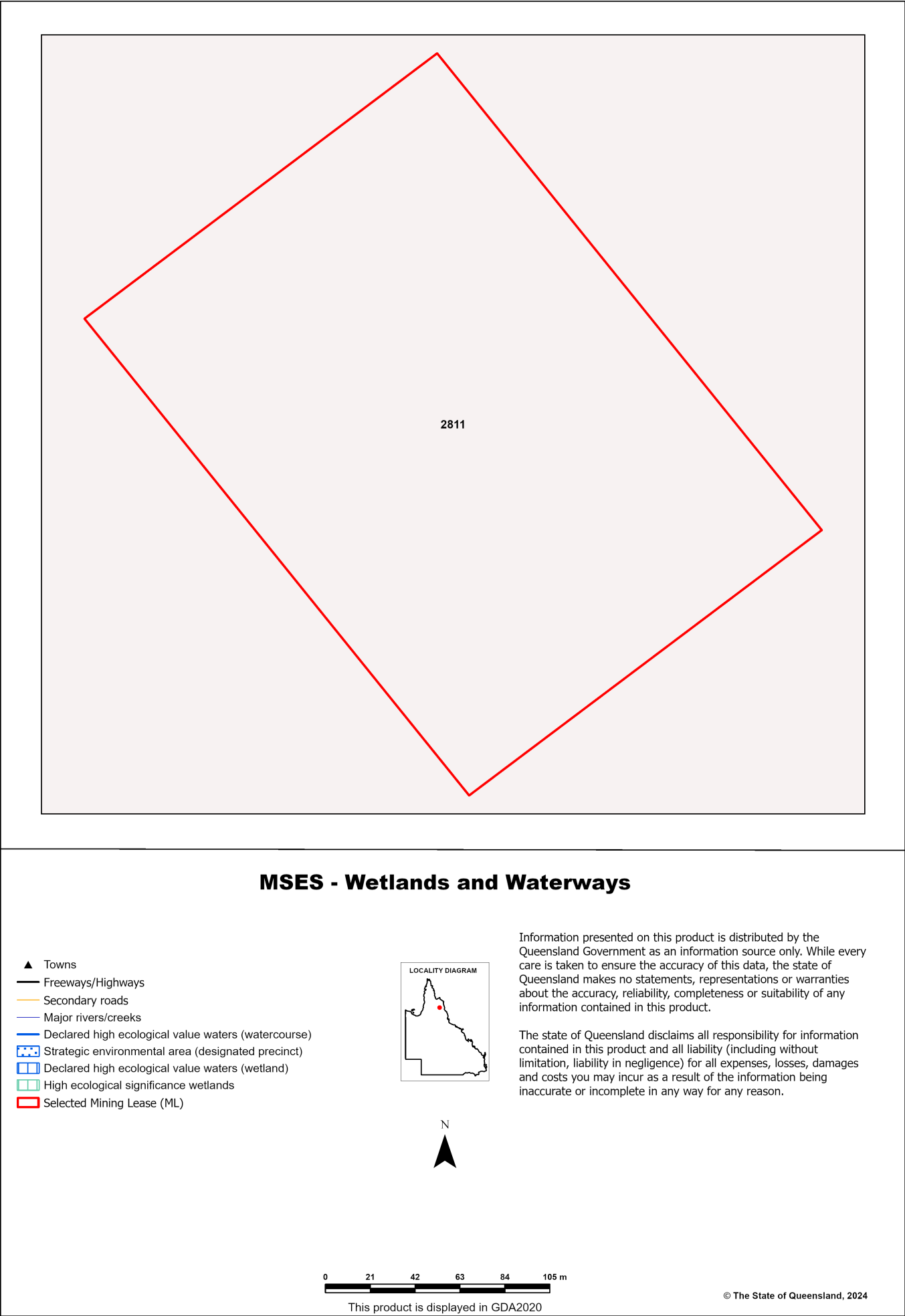
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

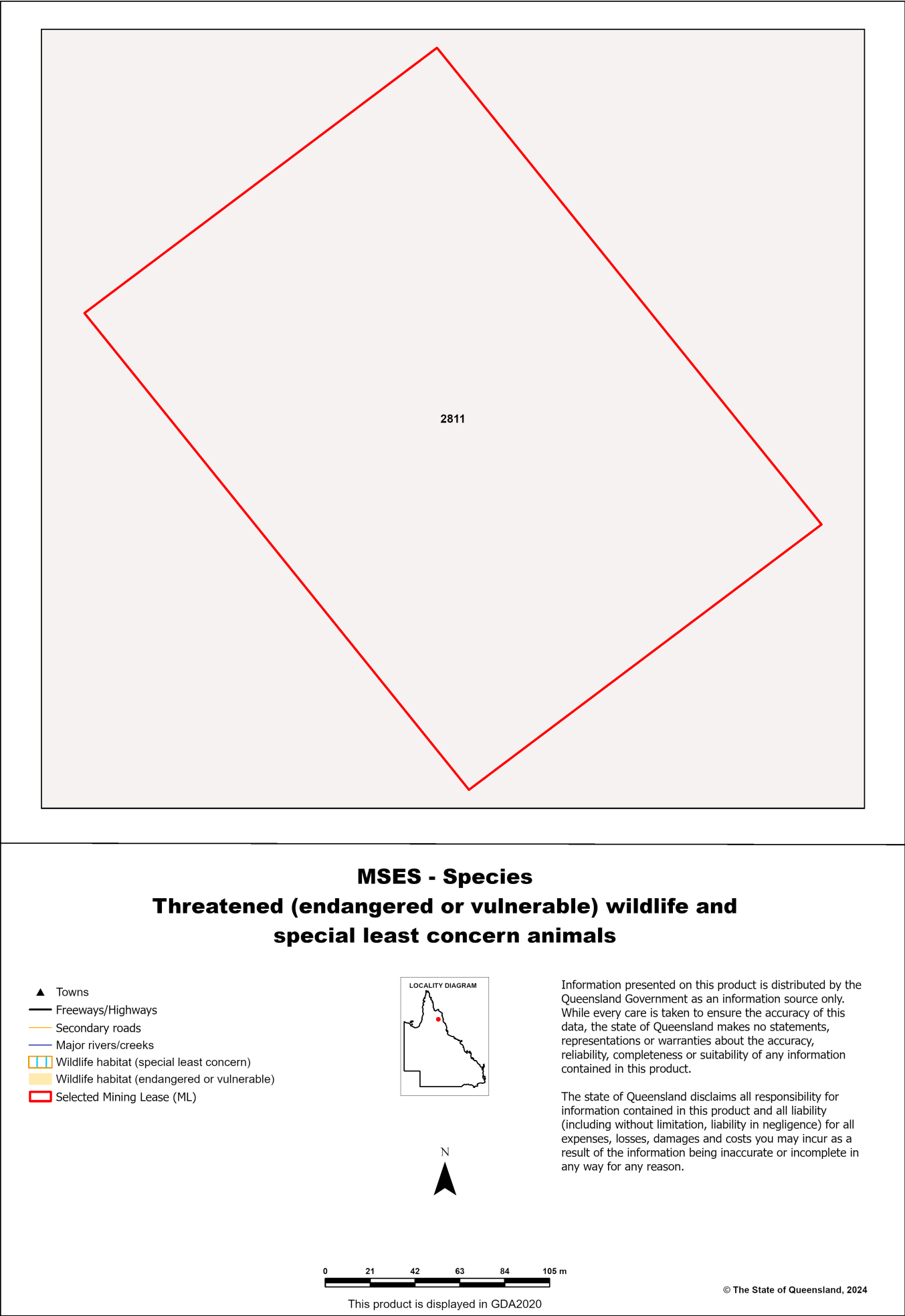
Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways



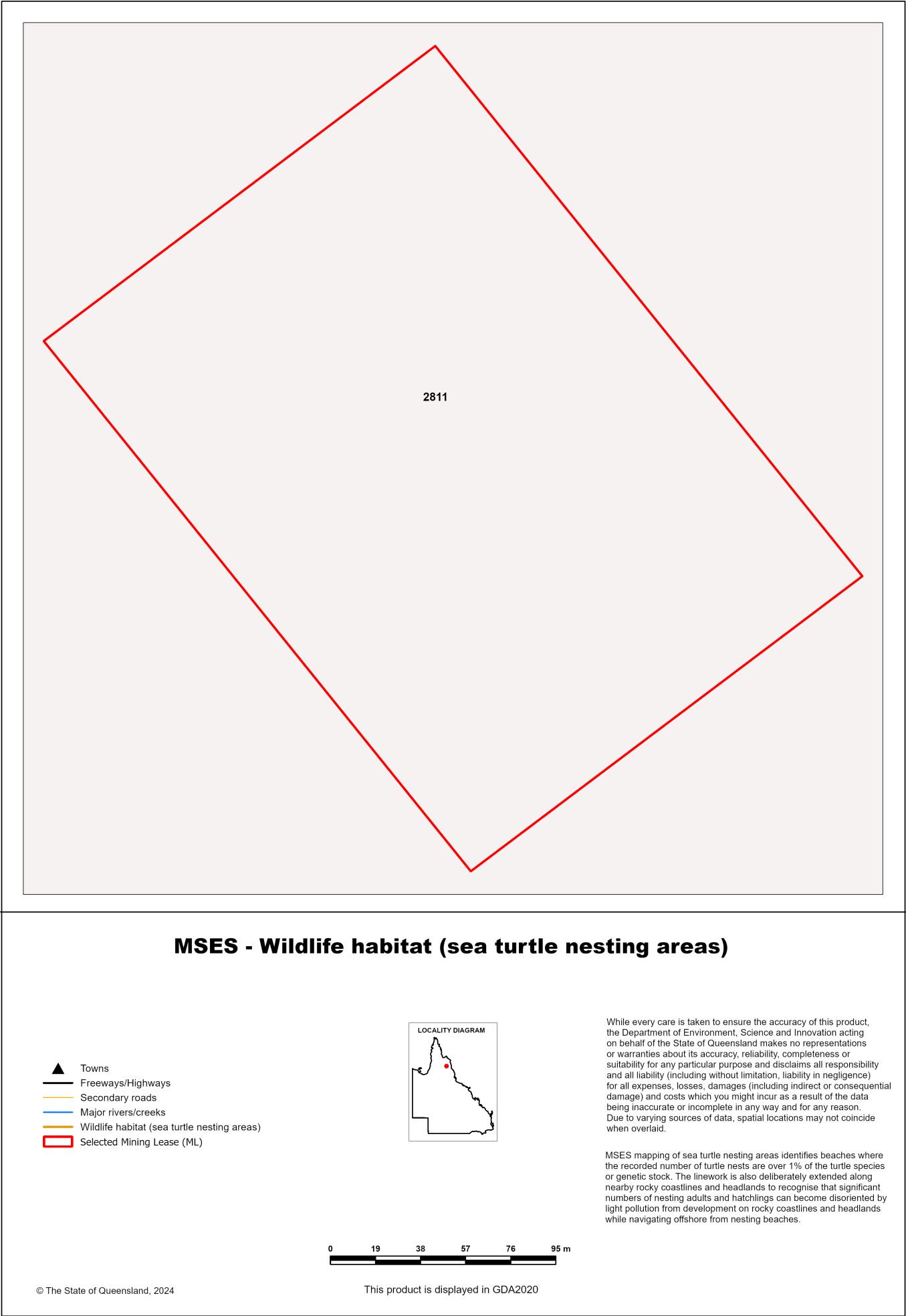
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



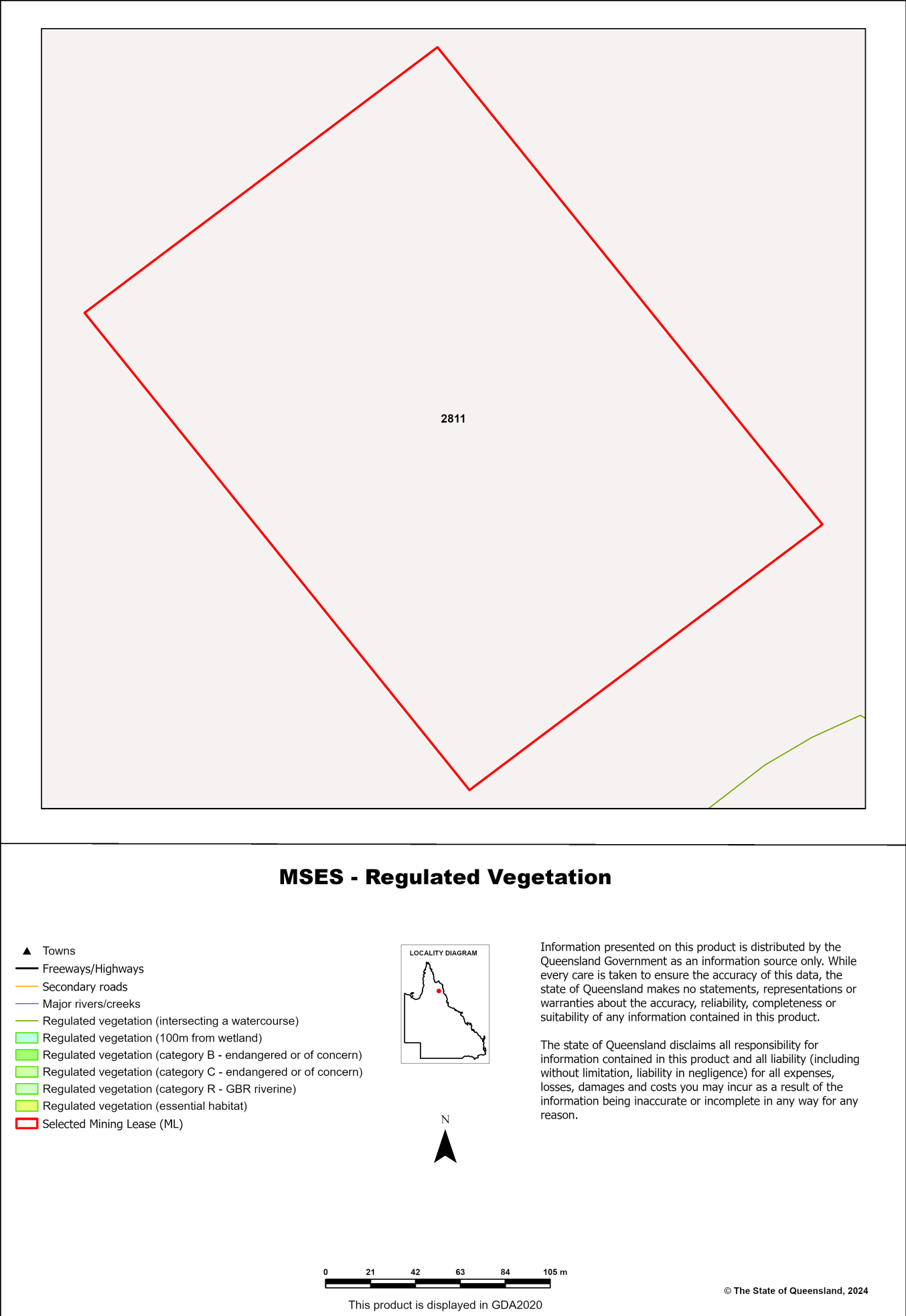
A square rotated 45 degrees, outlined in red, with a light gray fill. The number 2811 is centered within the square.

The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

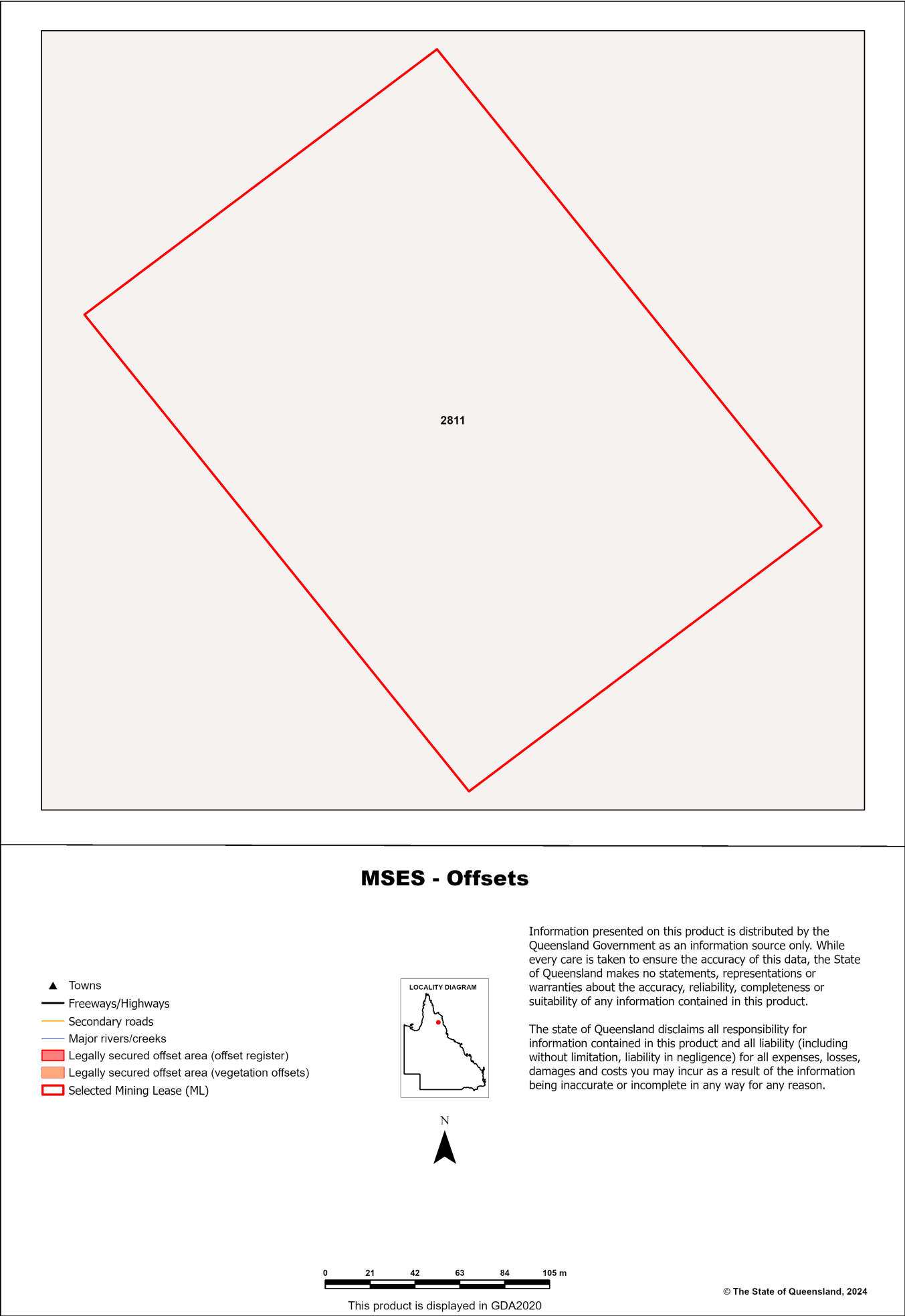
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

<http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html> .

Appendix 2 - Source Data

The datasets listed below are available on request from:

<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	current QSpatial data (http://qspatial.information.qld.gov.au)
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DESI	- Department of Environment, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

ML: 2811

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Details for area of interest: ML: 2811, with area 5.66 ha

Local Government(s)	
Cook Shire	
Bioregion(s)	Subregion(s)
Einasleigh Uplands	Hodgkinson Basin
Catchment(s)	
Mitchell	

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Einasleigh Uplands v1.1	Eastern Gulf of Carpentaria v1.1	Eastern Gulf of Carpentaria v.1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	3.25	57.45

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment, Science and Innovation's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	3.25	57.45

Table 5: Non-riverine wetlands intersecting the AOI

(No Records)

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(No Records)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment, Science and Innovation's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	5.66	100.01

Table 8: Summary table, aquatic conservation significance (non-riverine)
(No Records)

Biodiversity Planning Assessments

Introduction

The Department of Environment, Science and Innovation (DESI) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DESI. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	3.25	57.45

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar

sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	3.25	57.45

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	0.00	0.00	3.25	57.45
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	3.25	57.45	0.00	0.00
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	3.25	57.45	0.00	0.00
C: Tract Size	0.00	0.00	3.25	57.45	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	3.25	57.45	0.00	0.00	0.00	0.00	0.00	0.00
D2: Relative RE Size (Subregion)	3.25	57.45	0.00	0.00	0.00	0.00	0.00	0.00
F: Ecosystem Diversity	0.00	0.00	3.25	57.45	0.00	0.00	0.00	0.00
G: Context and Connection	3.25	57.45	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	3.25	57.45

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Id: Limits of Geographic Ranges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ie: High Species Richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;

- Include and maximise connectivity between large tracts/patches of remnant vegetation;
 - Include and maximise connectivity between remnant vegetation in good condition; and
- Riparian
- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
	3.25	57.45

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

(No Records)

Expert panel decision descriptions:

(No Records)

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland Info:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	5.66	100.01

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	5.66	100.01	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	5.66	100.01	0.00	0.00
3. Diversity and richness	0.00	0.00	5.66	100.01	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	5.66	100.01	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

(No Records)

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Diversity and richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DESI internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.*

***I - wetland indicator species; D - wetland dependent species.*

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

(No Records)

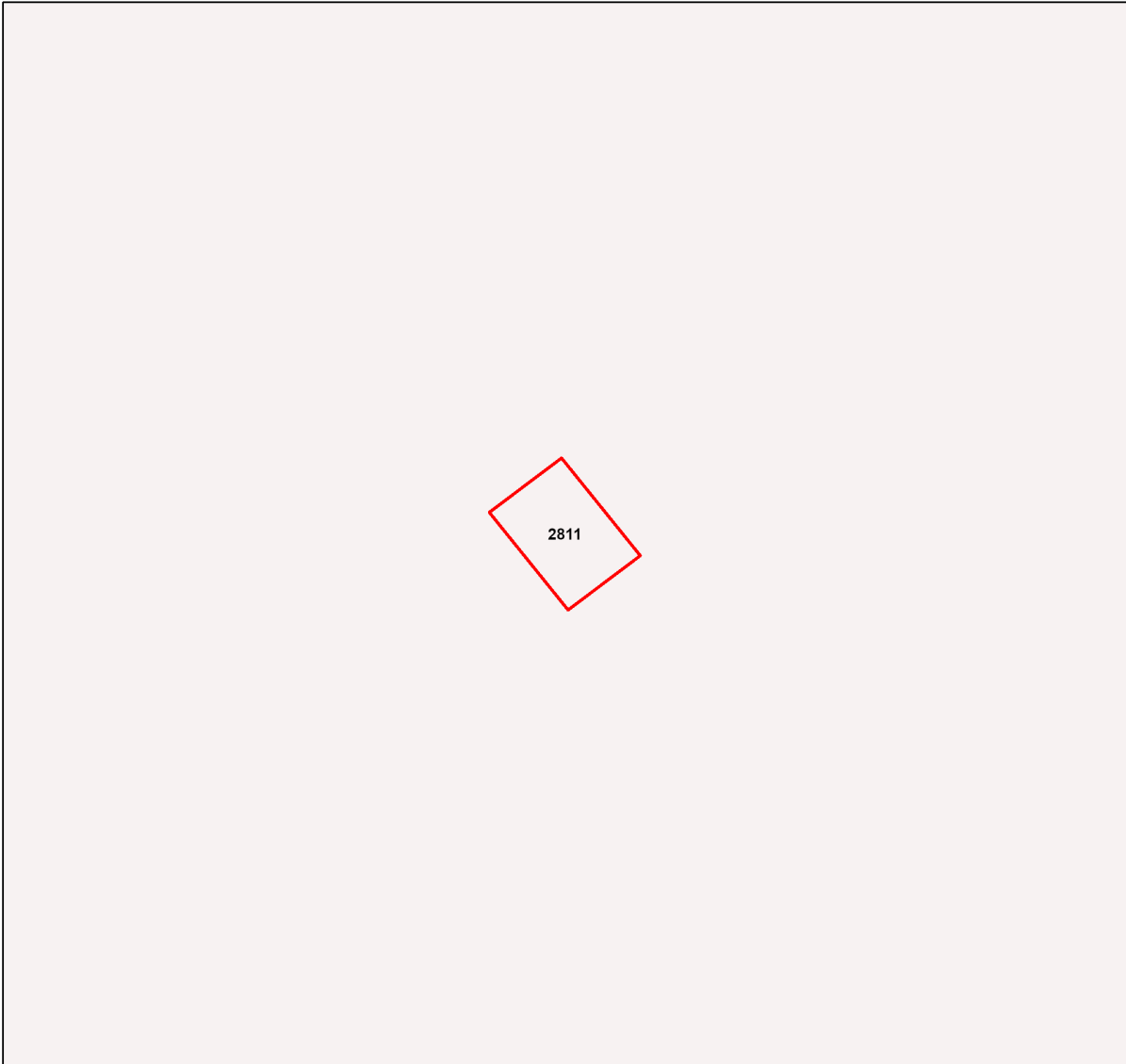
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

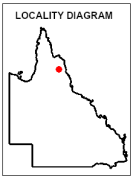
Maps

Map 1 - Locality Map



Locality Map

- Legend**
- Towns
 - Freeways/Highways
 - Connector
 - Street/Local Road
 - Reservoirs
 - Lakes
 - National Park (Scientific)
 - National Park
 - National Park (CYPAL)
 - Conservation Park
 - Resources Reserve
 - Forest Reserve
 - State Forest
 - Timber Reserve
 - Nature Refuges
 - Coordinated Conservation Areas
 - Major rivers/creeks
 - Queensland
 - Selected Mining Lease (ML)



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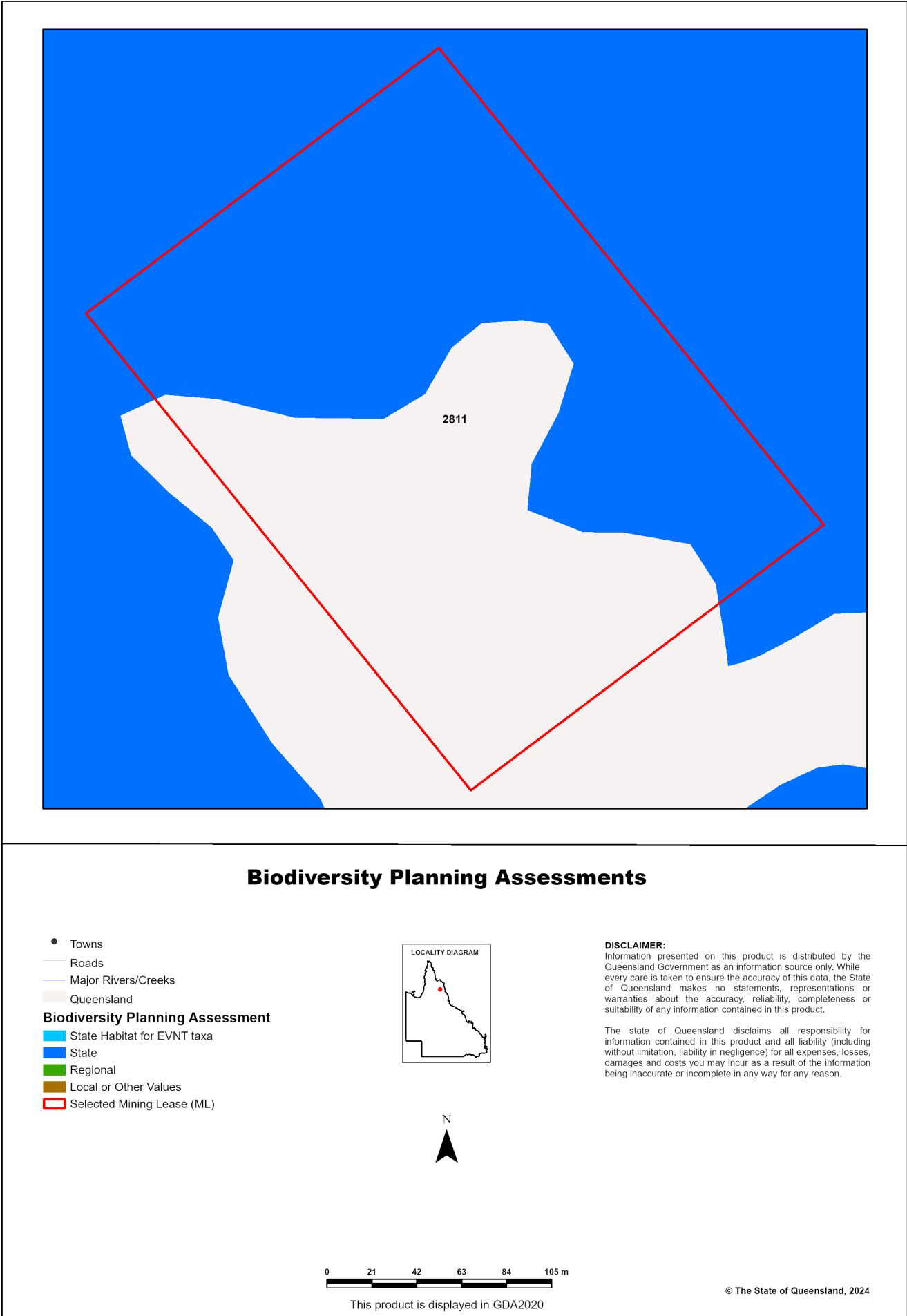
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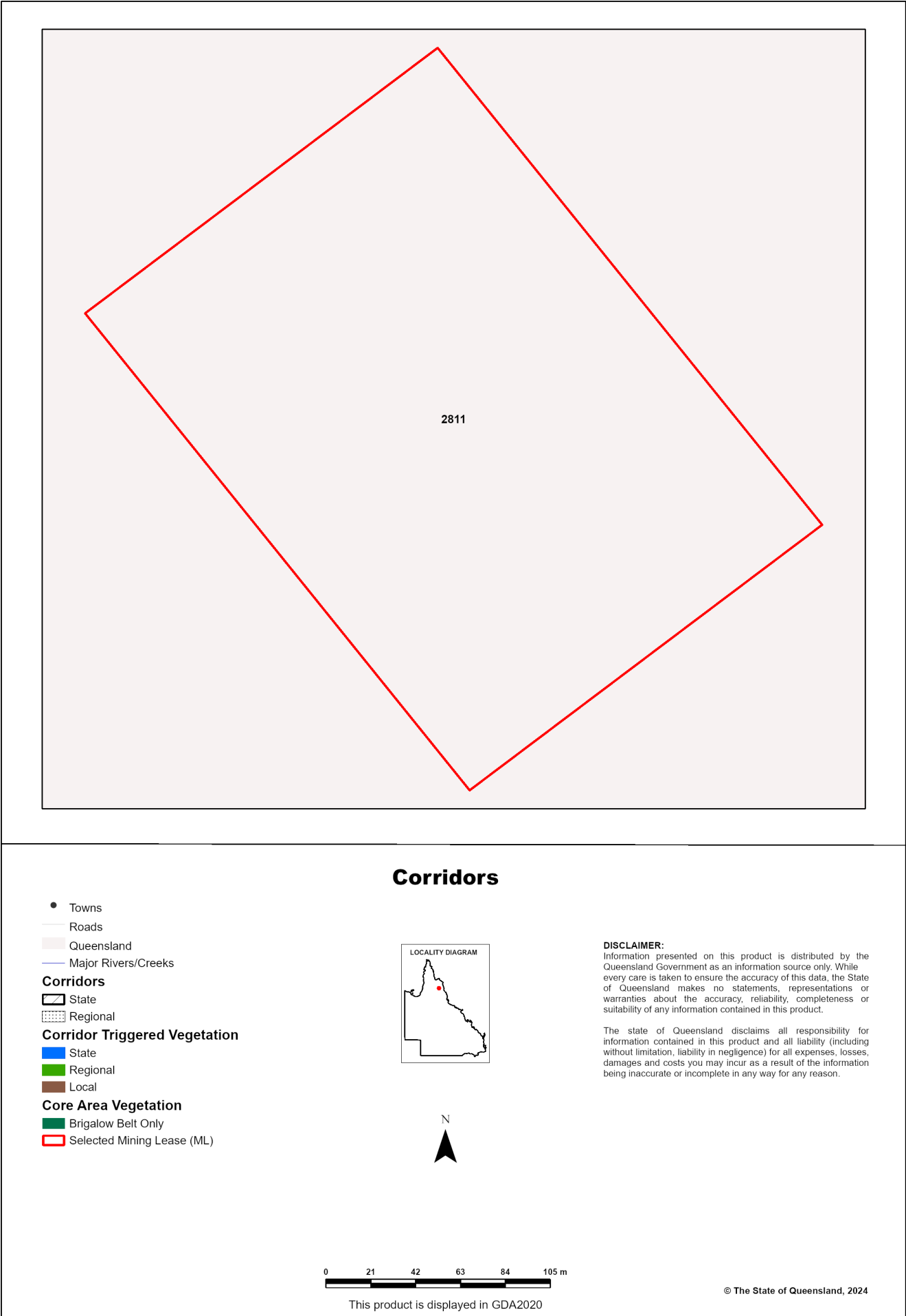
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Map 2 - Biodiversity Planning Assessment (BPA)



Map 3 - Corridors



2811

Wetlands and Waterways

Legend

- Towns
- Roads
- Springs
- Rivers/Creeks
- Directory of Important Wetlands
- Ramsar Sites - QLD

Wetland Type

Hydrologically natural Wetlands

- Lacustrine Wetlands (hydrologically natural)
- Palustrine Wetlands (hydrologically natural)
- Riverine Wetlands (hydrologically natural)
- Intertidal Wetlands (hydrologically natural)
- Subtidal Wetlands (hydrologically natural)
- Intertidal/Subtidal Wetlands (hydrologically natural)

Hydrologically Modified and Artificial Wetlands

- Lacustrine Wetlands (hydrologically modified or artificial)
- Palustrine Wetlands (hydrologically modified or artificial)
- Riverine Wetlands (hydrologically modified or artificial)
- Intertidal Wetlands (hydrologically modified or artificial)
- Subtidal Wetlands (hydrologically modified or artificial)
- Intertidal/Subtidal Wetlands (hydrologically modified or artificial)

Subdominant Wetlands

- Subdominant Wetlands (51 - 80%)

Contains Wetlands

- Contains Wetlands (1 - 50%)

□ Queensland

□ Selected Mining Lease (ML)

LOCALITY DIAGRAM

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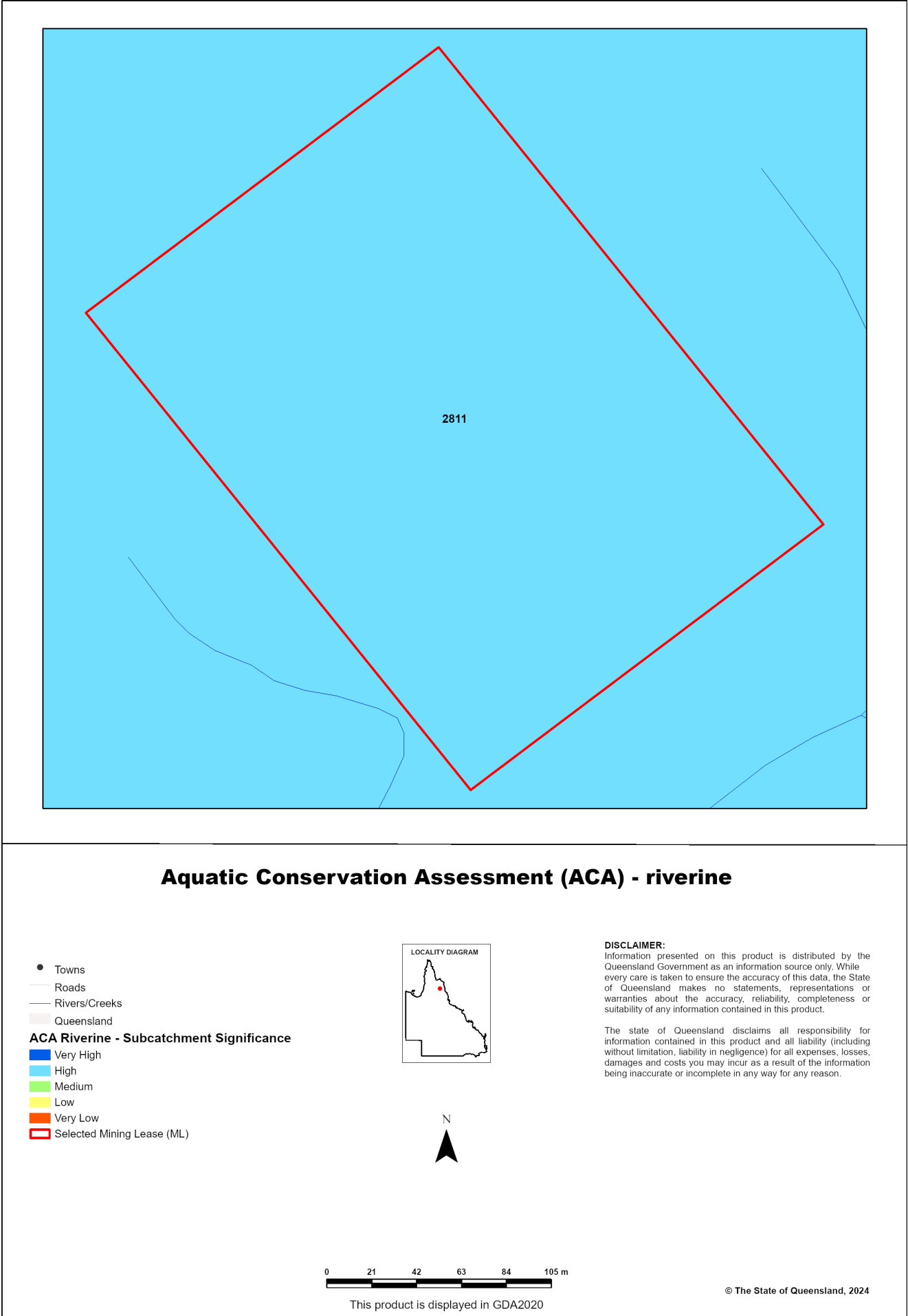
N

0 21 42 63 84 105 m

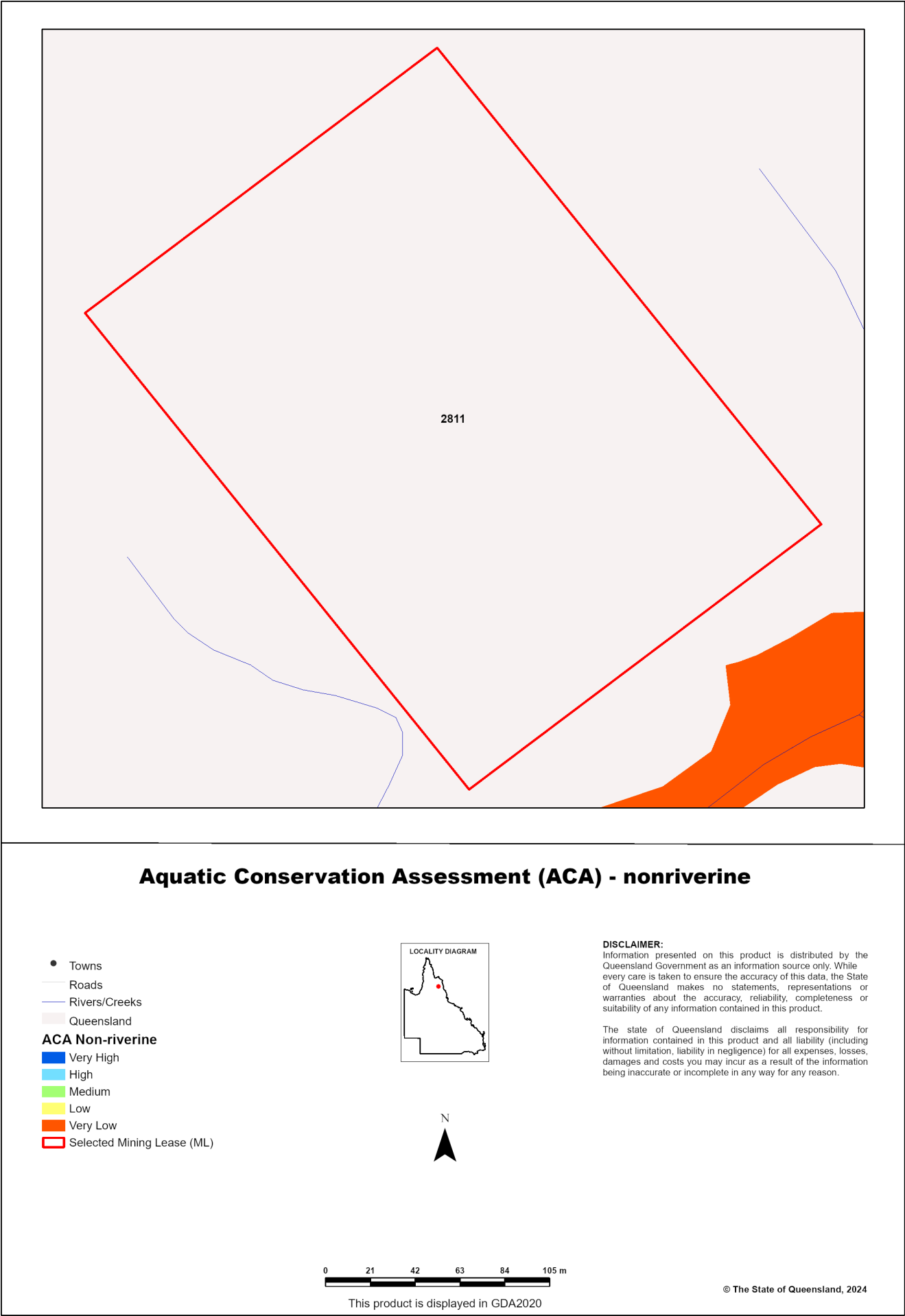
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Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environment and Heritage Protection 2014, *Biodiversity Assessment and Mapping Methodology*. Version 2.2. Department of Environment and Heritage Protection, Brisbane.

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDBB Non-riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1 WBBGBRCC Non-riverine ACA v2.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDBB Riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1 WBBGBRCC Riverine ACA v2.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einiasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DESI	- Department of Environment, Science and Innovation
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA2020	- Geocentric Datum of Australia 2020
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

ML: 2833

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

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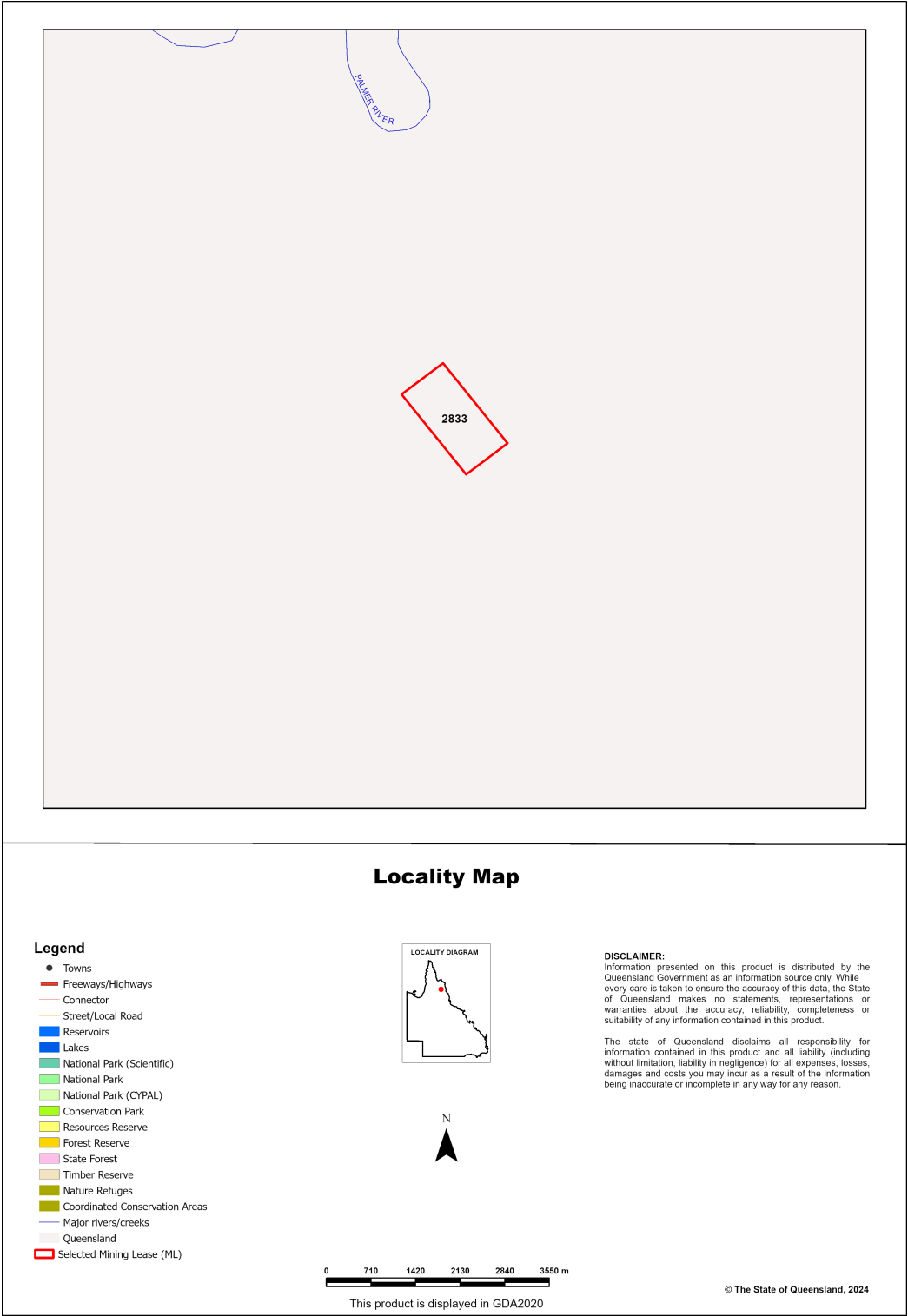
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: ML: 2833, with area 129.38 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Cook Shire	Mitchell	Einasleigh Uplands	Hodgkinson Basin



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;
- *Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004* ;
- *Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008*;
- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	4.9 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways**4. Strategic Environmental Areas (SEA)**

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species**7a. Threatened (endangered or vulnerable) wildlife**

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>	Keys boronia	V	None
<i>Calyptrorhynchus lathamii</i>	Glossy black cockatoo	V	None
<i>Casuarius casuarius johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Euastacus bindal</i>	Mount Elliot crayfish	CR	None
<i>Euastacus binzayedii</i>		CR	None
<i>Euastacus eungella</i>		E	None
<i>Euastacus hystricosus</i>		E	None
<i>Euastacus jagara</i>	Jagara hairy crayfish	CR	None
<i>Euastacus maidae</i>		CR	None
<i>Euastacus monteithorum</i>		E	None
<i>Euastacus robertsi</i>		E	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Melaleuca irbyana</i>	swamp tea-tree	E	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>	bopple nut	V	None
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	None
<i>Petrogale coenensis</i>	Cape York rock-wallaby	V	None
<i>Petrogale purpureicollis</i>	purple-necked rock-wallaby	V	None
<i>Petrogale sharmani</i>	Sharmans rock-wallaby	V	None
<i>Petrogale xanthopus celeris</i>	yellow-footed rock-wallaby (Qld subspecies)	V	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets**9a. Legally secured offset areas - offset register areas**

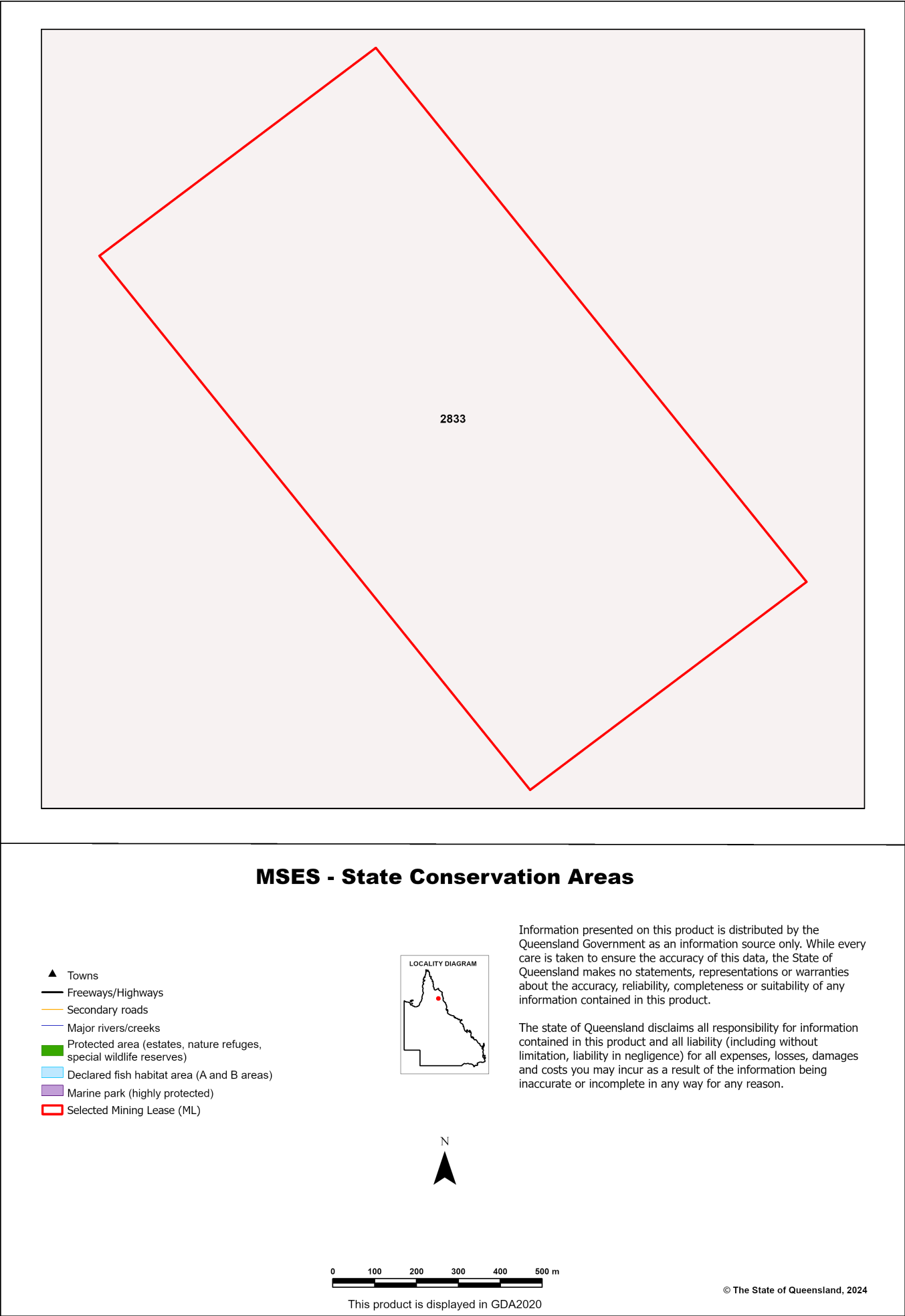
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

(No results)

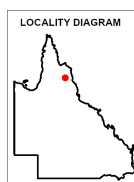
Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

Map 1 - MSES - State Conservation Areas



A diagram consisting of a light gray square background. Centered within this square is a red rhombus. The number "2833" is printed in a black, sans-serif font in the center of the rhombus.

- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Declared high ecological value waters (watercourse)
- ▣ Strategic environmental area (designated precinct)
- ▣ Declared high ecological value waters (wetland)
- ▣ High ecological significance wetlands
- ▣ Selected Mining Lease (ML)



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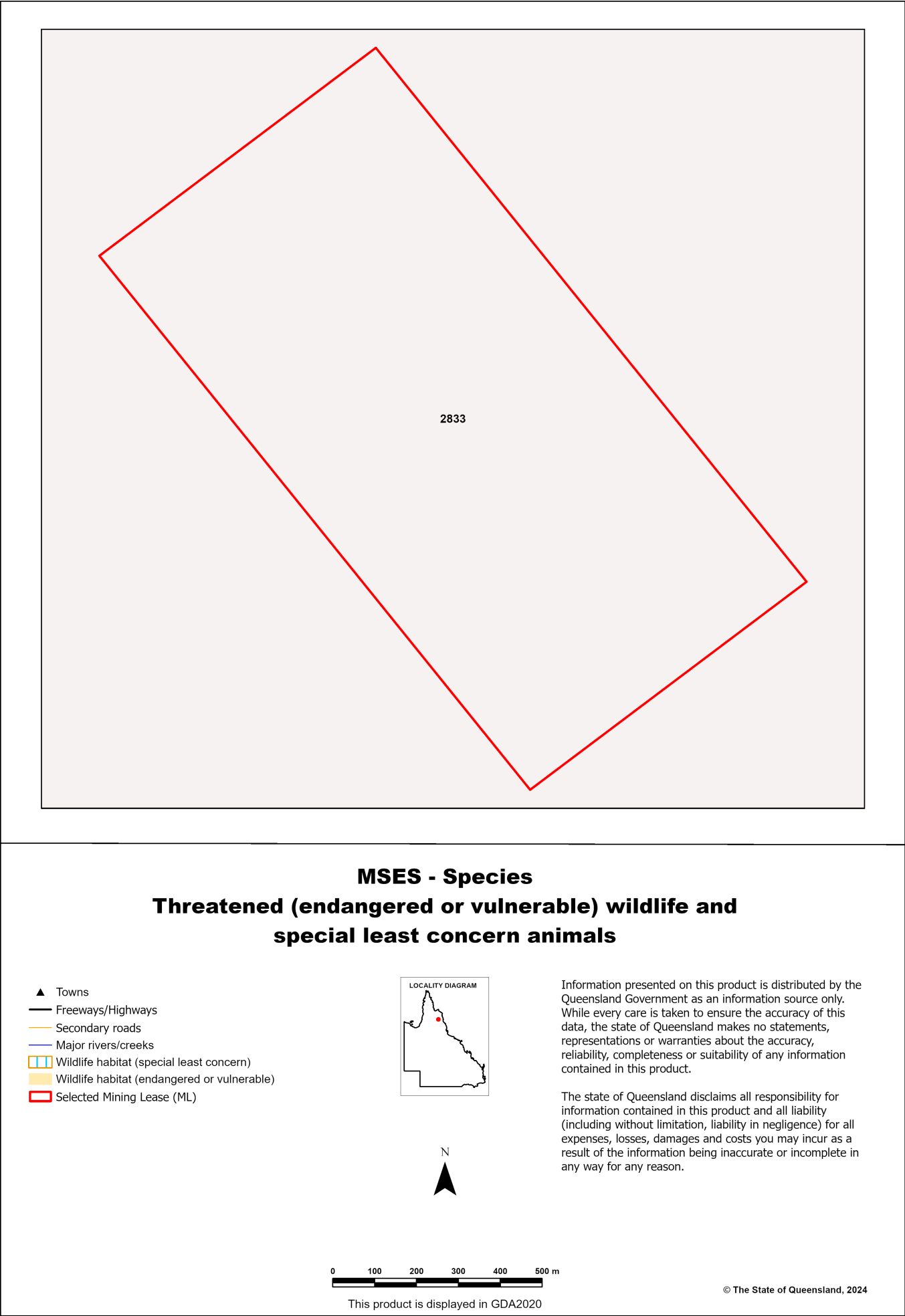
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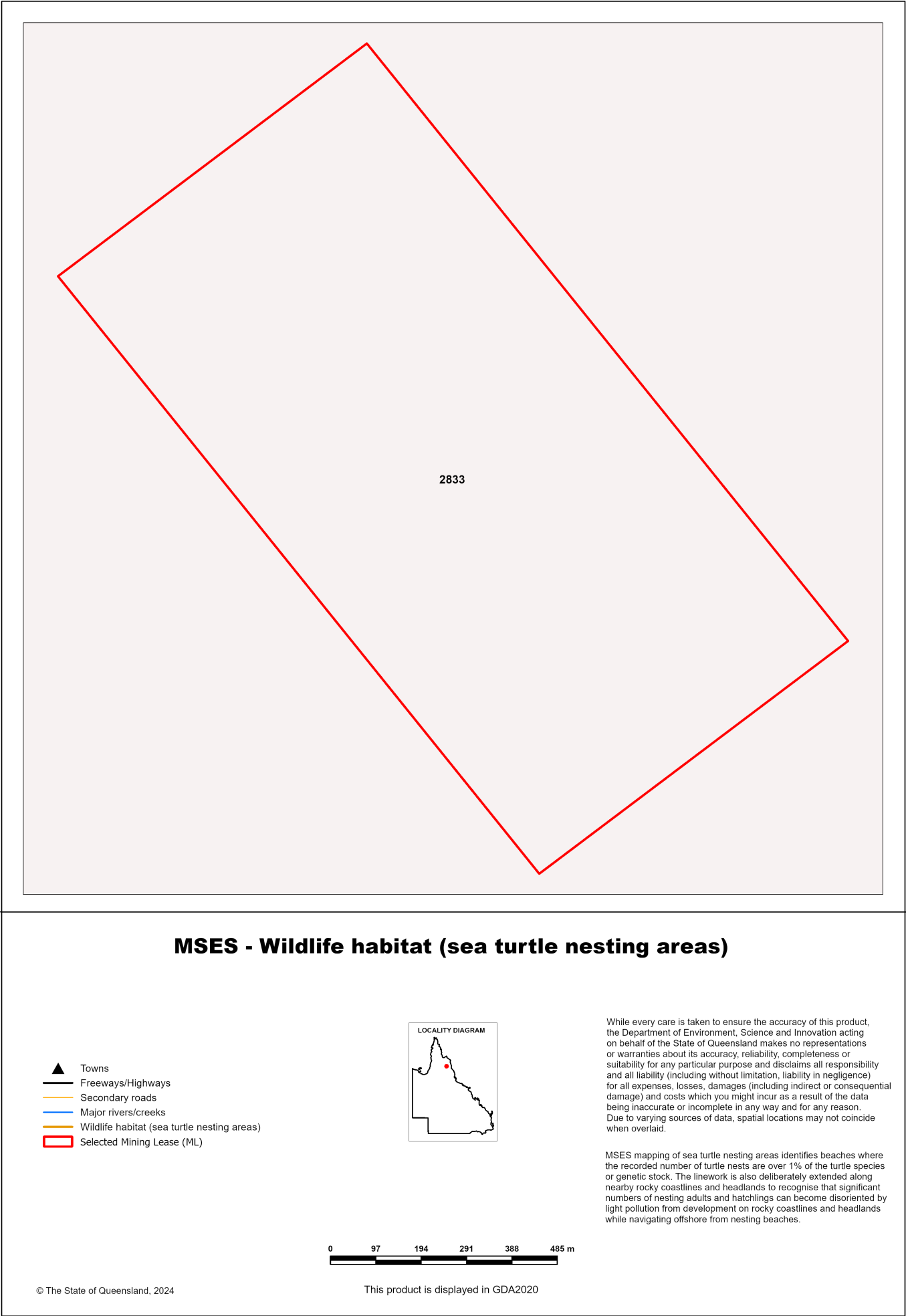
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



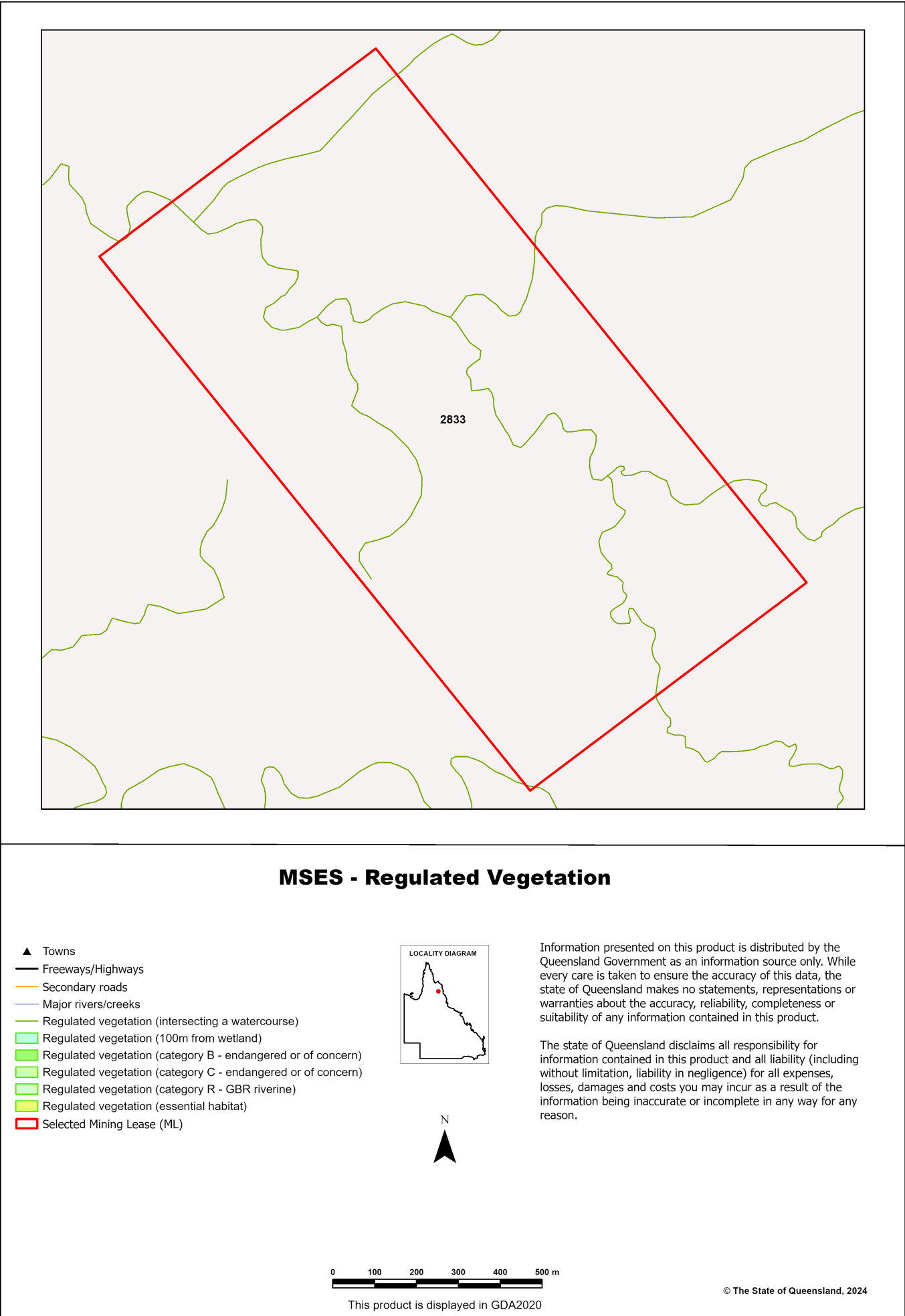
A diagram showing a red rhombus on a light gray background. The number 2833 is written in the center of the rhombus.

The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

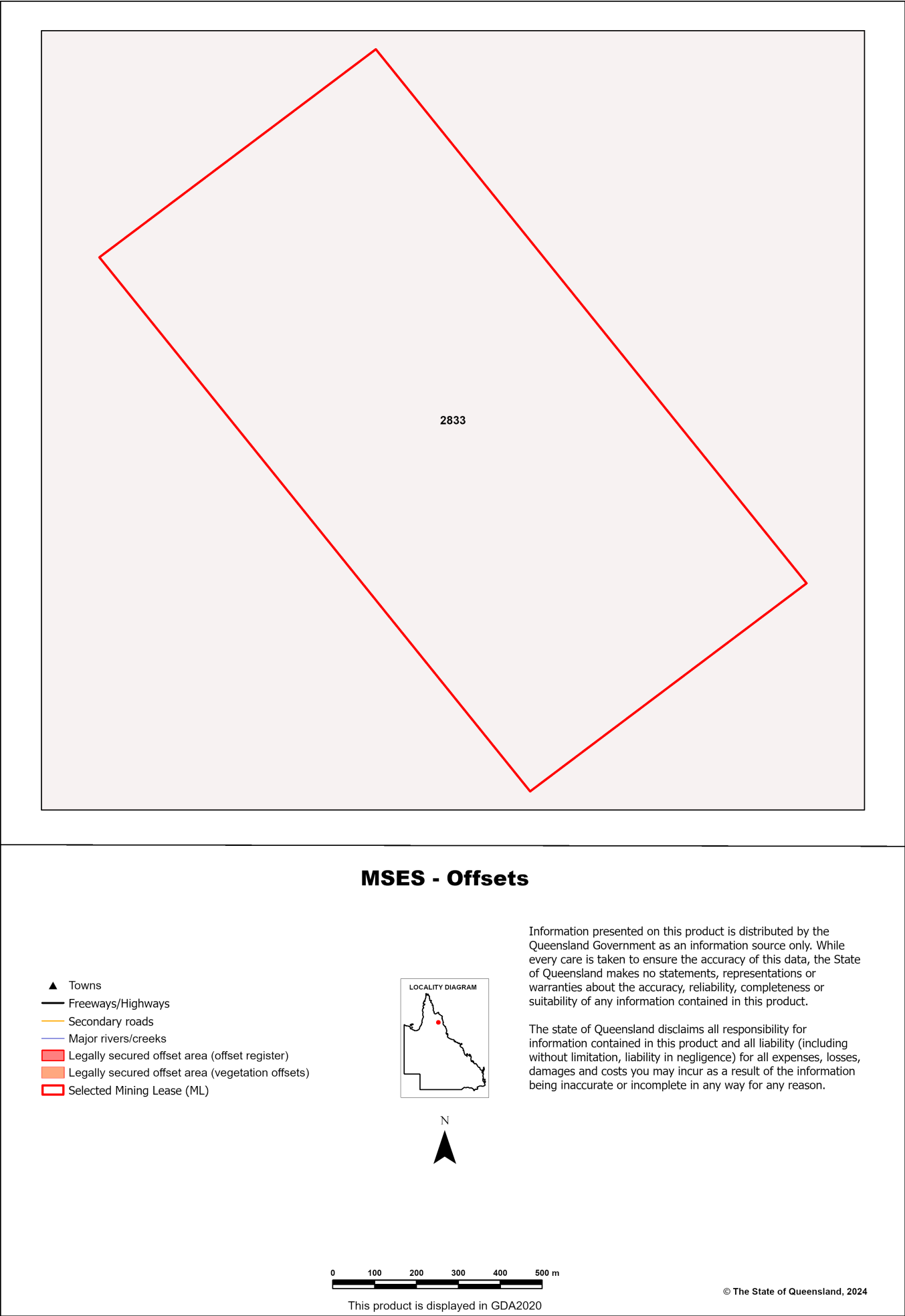
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

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Appendix 2 - Source Data

The datasets listed below are available on request from:

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- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	current QSpatial data (http://qspatial.information.qld.gov.au)
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
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Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
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VMA Essential Habitat	Vegetation management - essential habitat map
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Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DESI	- Department of Environment, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

ML: 2832

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

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The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

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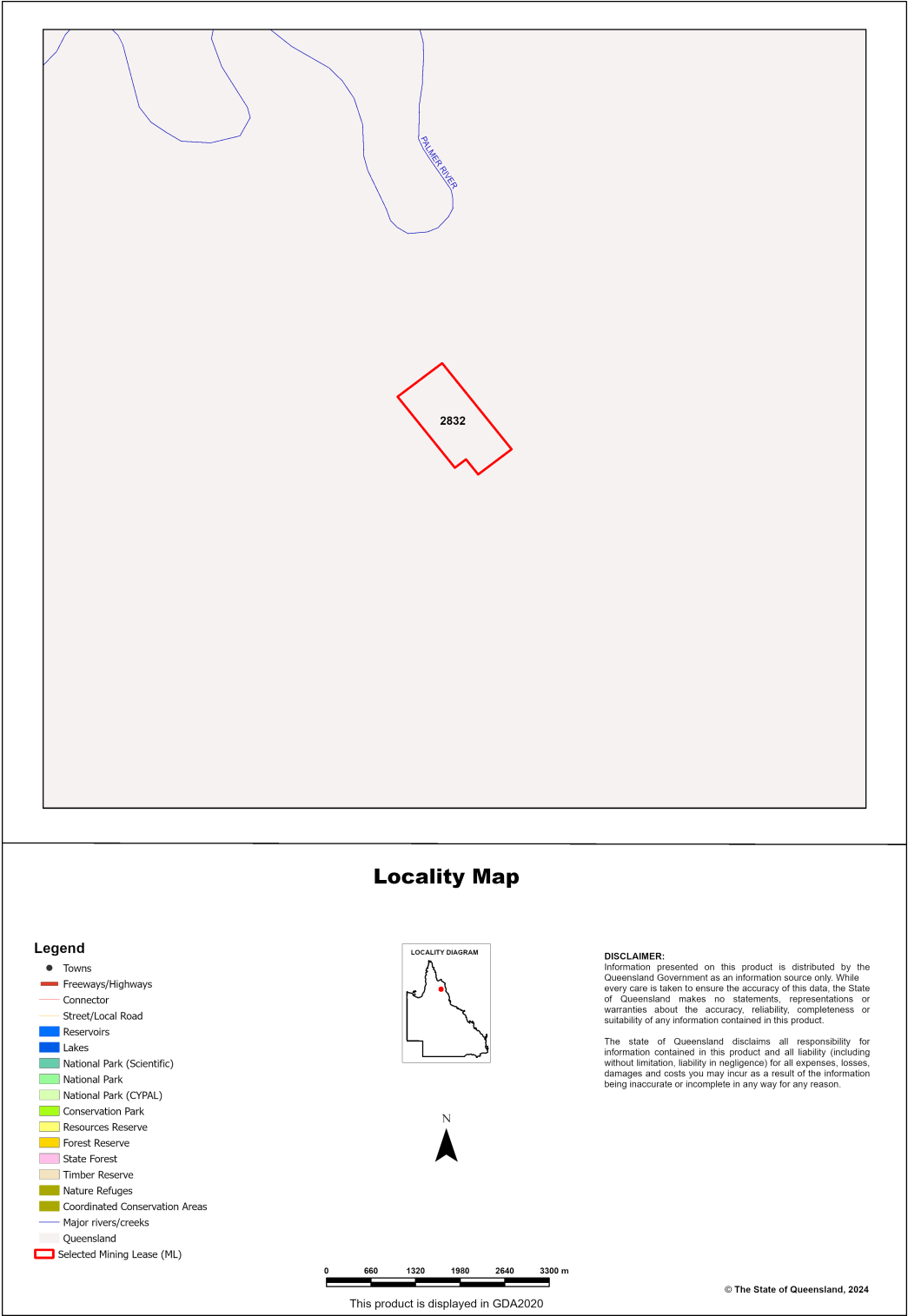
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: ML: 2832, with area 123.72 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Cook Shire	Mitchell	Einasleigh Uplands	Hodgkinson Basin



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;
- *Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004* ;
- *Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008*;
- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways**4. Strategic Environmental Areas (SEA)**

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species**7a. Threatened (endangered or vulnerable) wildlife**

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>	Keys boronia	V	None
<i>Calyptrorhynchus lathamii</i>	Glossy black cockatoo	V	None
<i>Casuarius casuarius johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Euastacus bindal</i>	Mount Elliot crayfish	CR	None
<i>Euastacus binzayedii</i>		CR	None
<i>Euastacus eungella</i>		E	None
<i>Euastacus hystricosus</i>		E	None
<i>Euastacus jagara</i>	Jagara hairy crayfish	CR	None
<i>Euastacus maidae</i>		CR	None
<i>Euastacus monteithorum</i>		E	None
<i>Euastacus robertsi</i>		E	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Melaleuca irbyana</i>	swamp tea-tree	E	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>	bopple nut	V	None
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	None
<i>Petrogale coenensis</i>	Cape York rock-wallaby	V	None
<i>Petrogale purpureicollis</i>	purple-necked rock-wallaby	V	None
<i>Petrogale sharmani</i>	Sharmans rock-wallaby	V	None
<i>Petrogale xanthopus celeris</i>	yellow-footed rock-wallaby (Qld subspecies)	V	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets**9a. Legally secured offset areas - offset register areas**

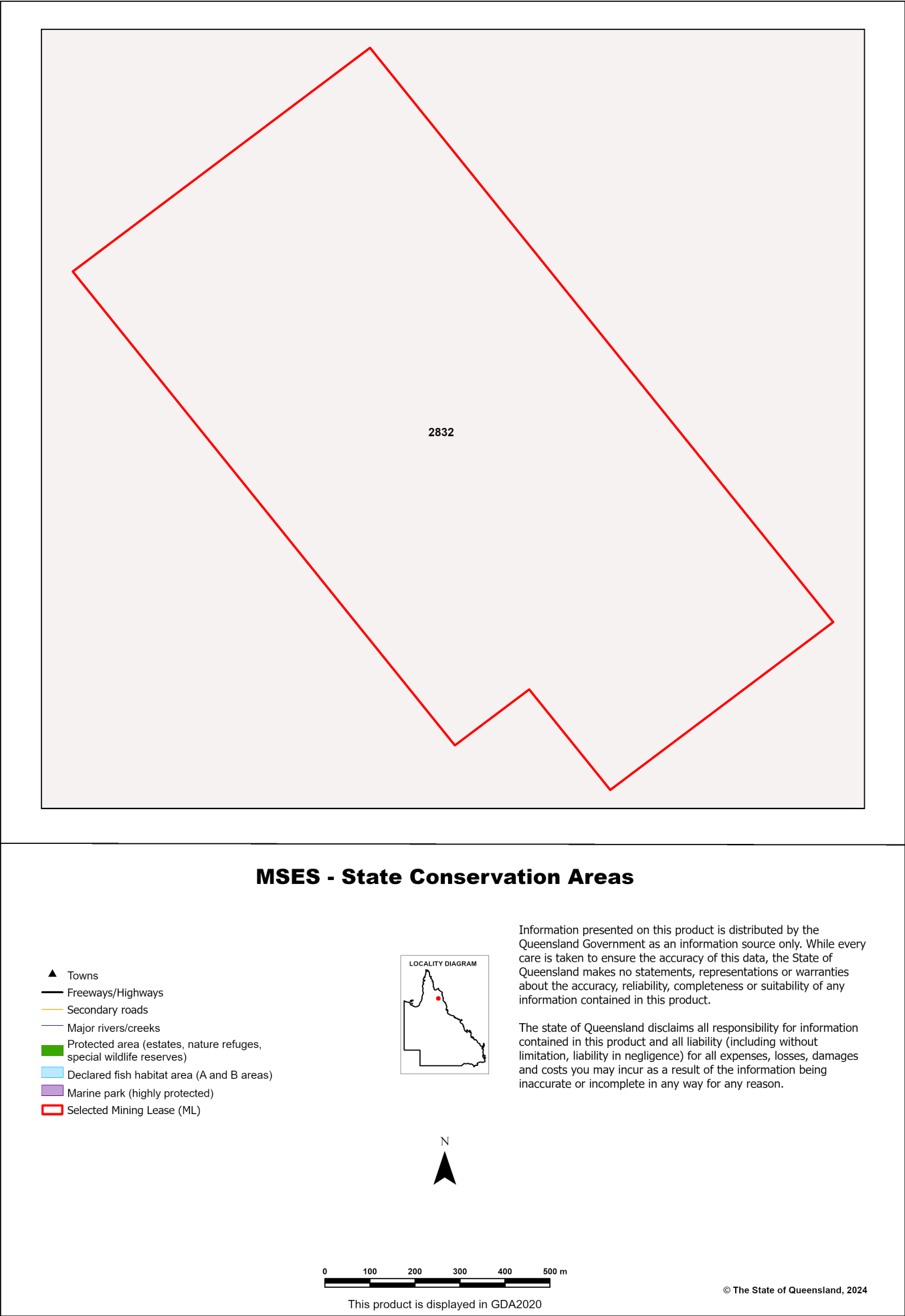
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

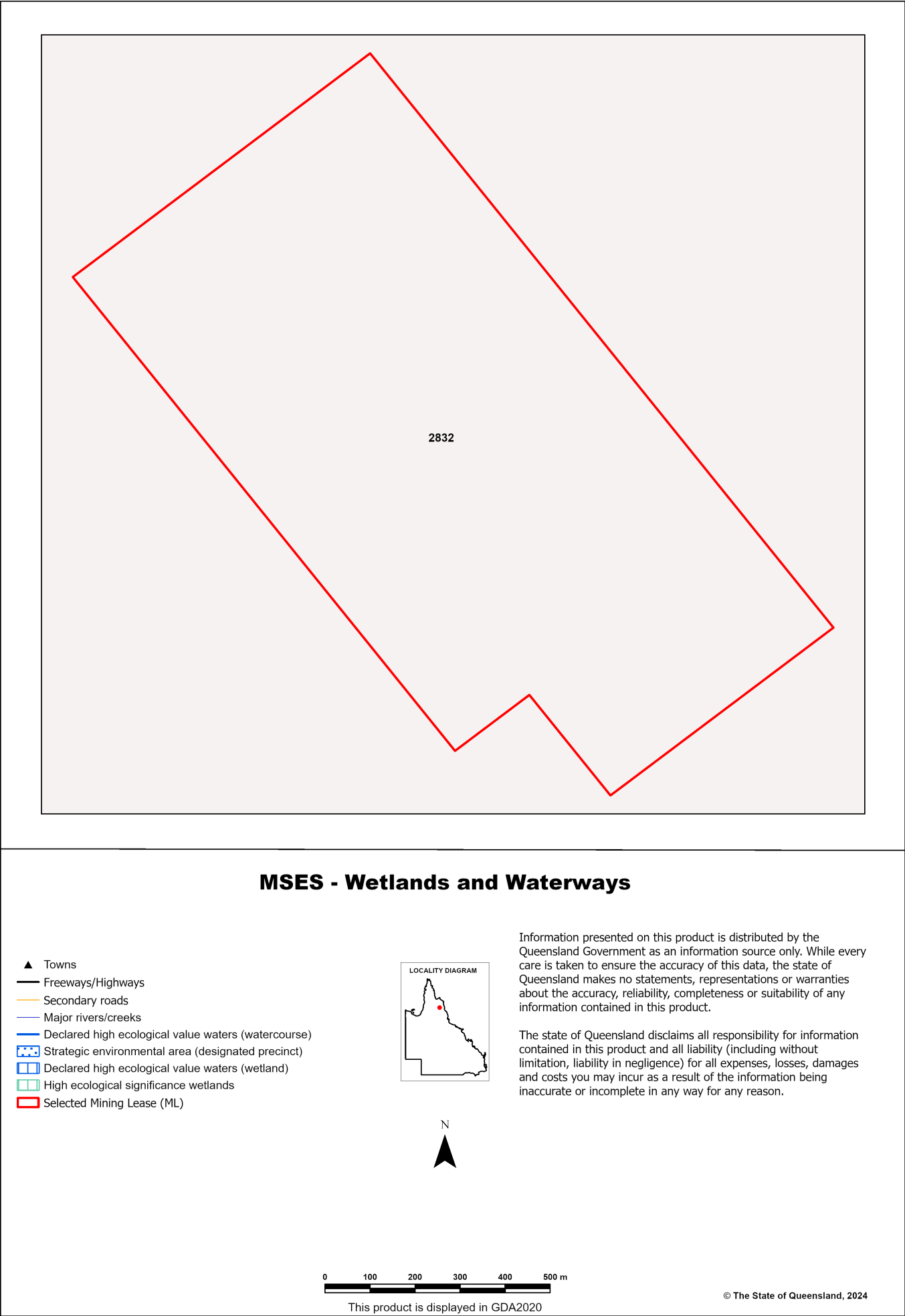
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

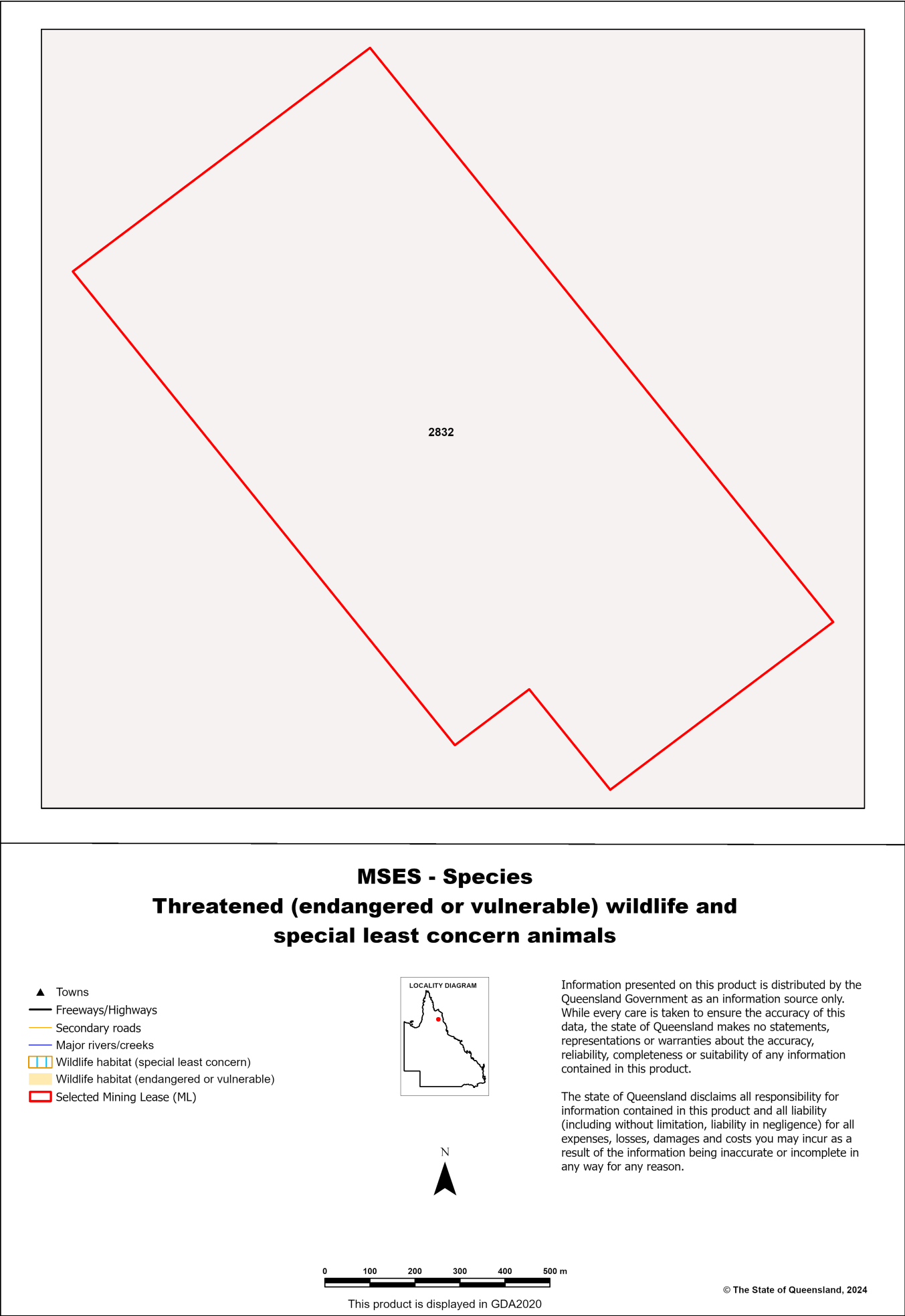
Map 1 - MSES - State Conservation Areas



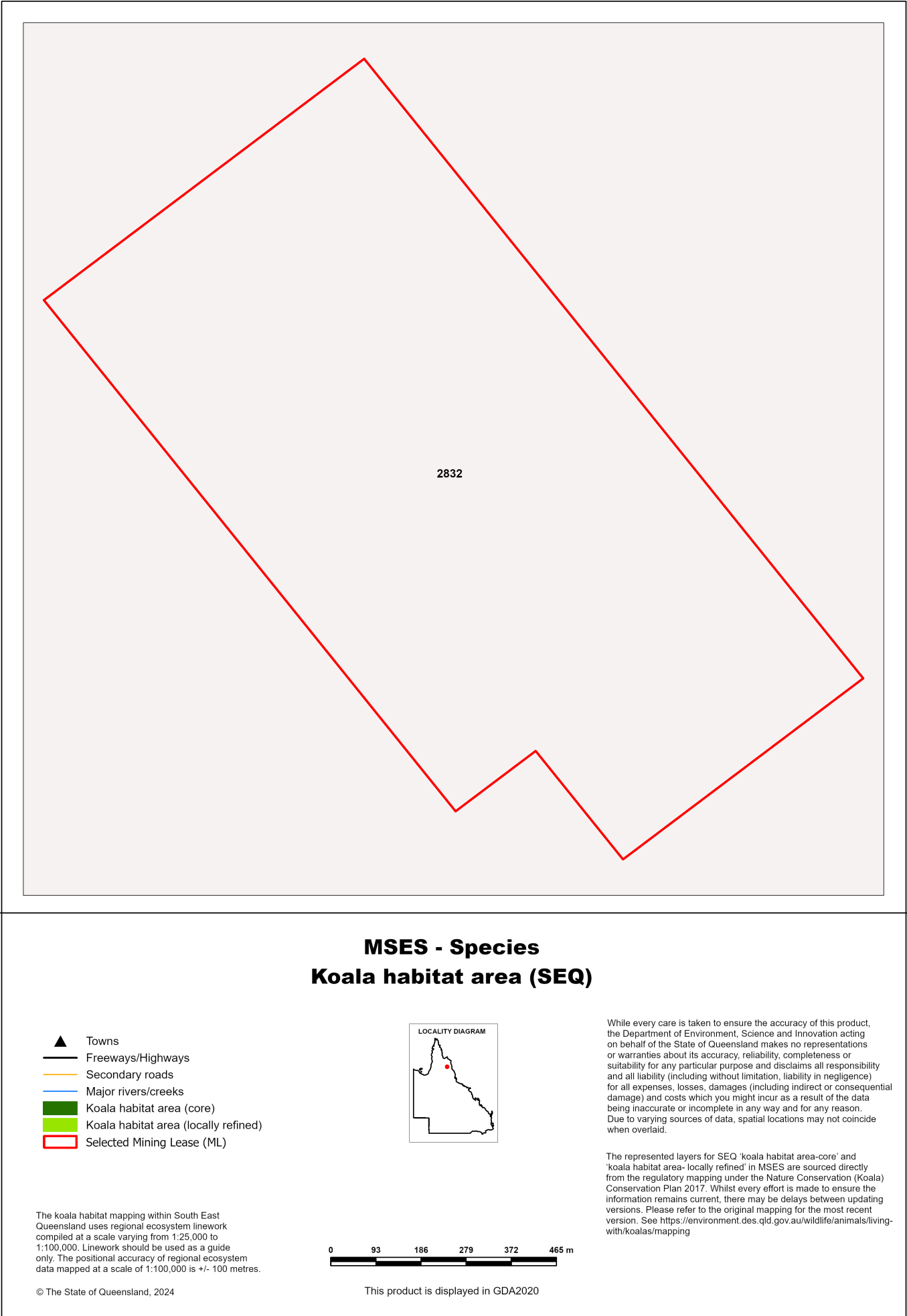
Map 2 - MSES - Wetlands and Waterways



Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals

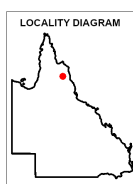


Map 3b - MSES - Species - Koala habitat area (SEQ)



A map showing a land parcel with a red boundary. The parcel is irregularly shaped, with a central label '2832'. The parcel is surrounded by a light gray area, and the entire map is enclosed in a black border.

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)
- Selected Mining Lease (ML)

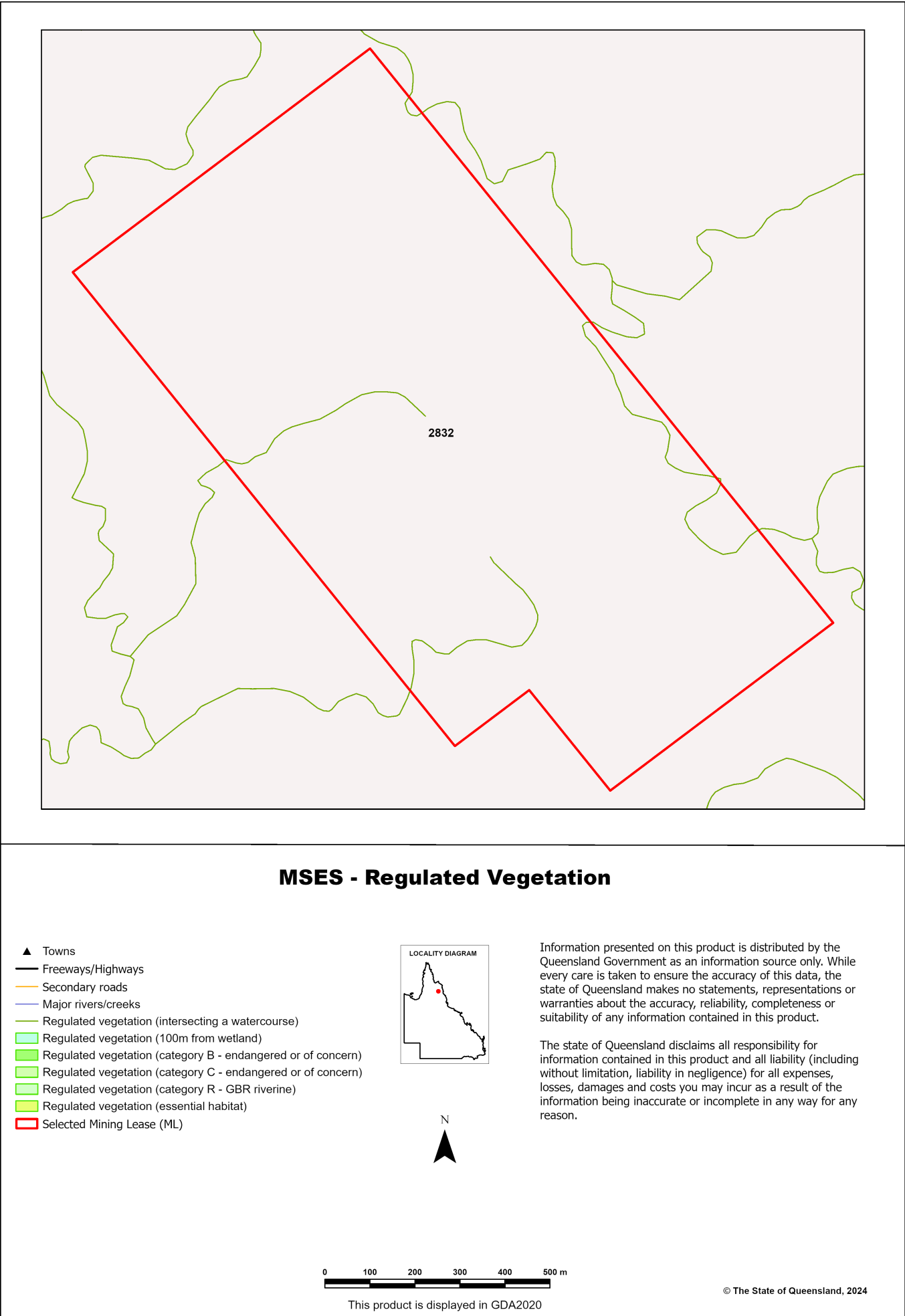


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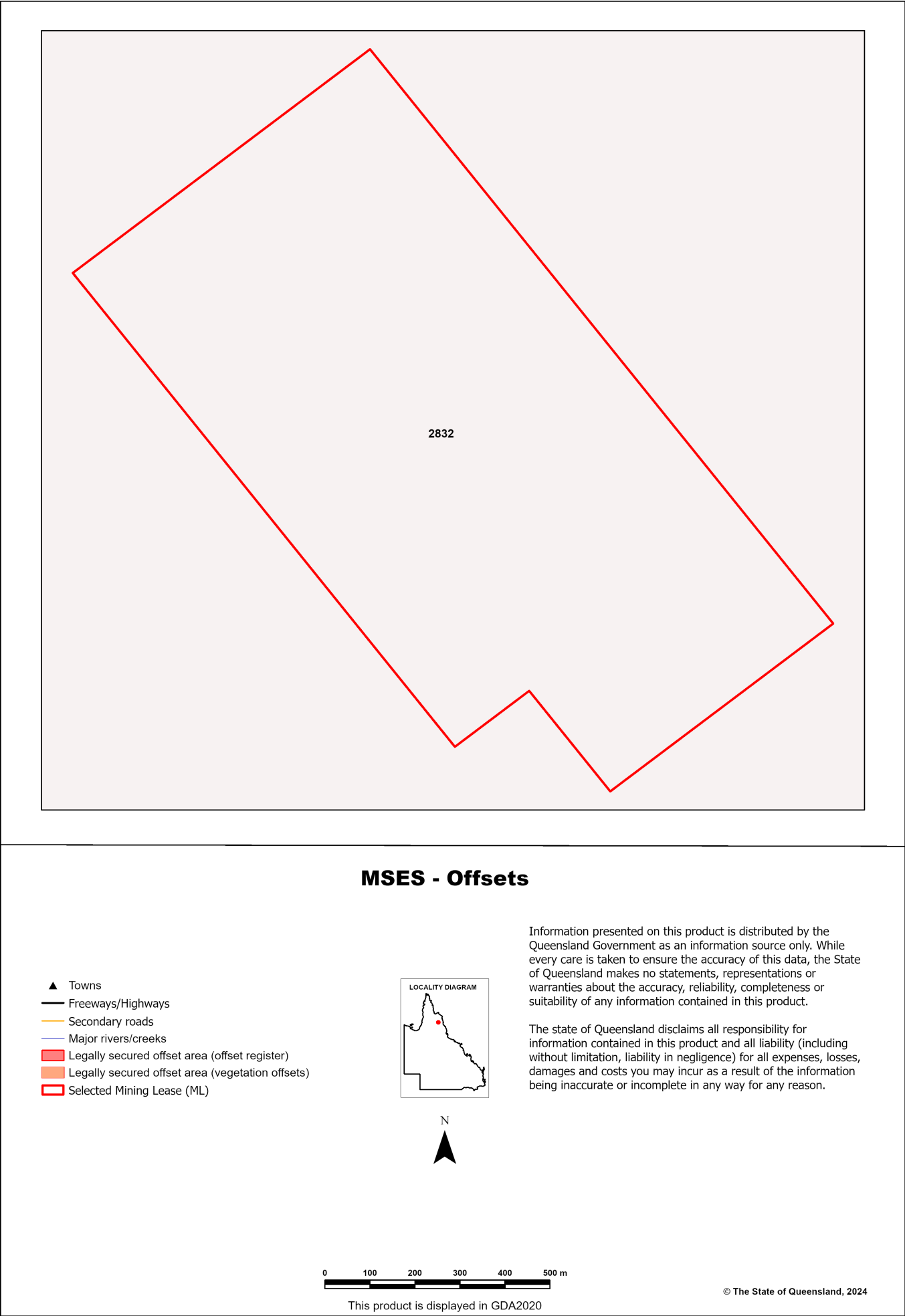
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

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SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

ML: 2831

Environmental Reports - General Information

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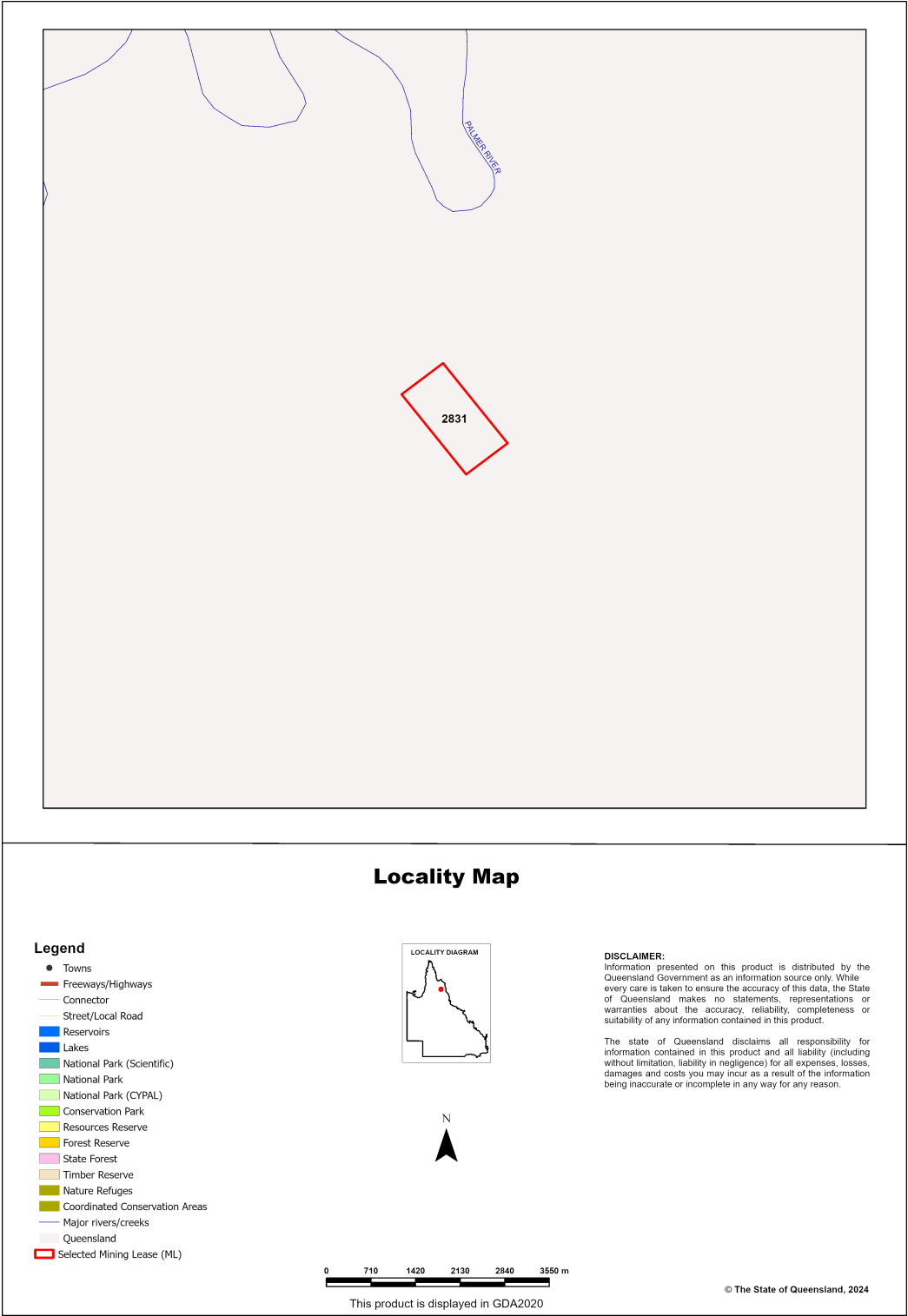
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: ML: 2831, with area 129.38 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Cook Shire	Mitchell	Einasleigh Uplands	Hodgkinson Basin



Matters of State Environmental Significance (MSES)

MSES Categories

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- *Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008*;
- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	3.9 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways**4. Strategic Environmental Areas (SEA)**

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species**7a. Threatened (endangered or vulnerable) wildlife**

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>	Keys boronia	V	None
<i>Calyptrorhynchus lathamii</i>	Glossy black cockatoo	V	None
<i>Casuarius casuarius johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Euastacus bindal</i>	Mount Elliot crayfish	CR	None
<i>Euastacus binzayedii</i>		CR	None
<i>Euastacus eungella</i>		E	None
<i>Euastacus hystricosus</i>		E	None
<i>Euastacus jagara</i>	Jagara hairy crayfish	CR	None
<i>Euastacus maidae</i>		CR	None
<i>Euastacus monteithorum</i>		E	None
<i>Euastacus robertsi</i>		E	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Melaleuca irbyana</i>	swamp tea-tree	E	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>	bopple nut	V	None
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	None
<i>Petrogale coenensis</i>	Cape York rock-wallaby	V	None
<i>Petrogale purpureicollis</i>	purple-necked rock-wallaby	V	None
<i>Petrogale sharmani</i>	Sharmans rock-wallaby	V	None
<i>Petrogale xanthopus celeris</i>	yellow-footed rock-wallaby (Qld subspecies)	V	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets**9a. Legally secured offset areas - offset register areas**

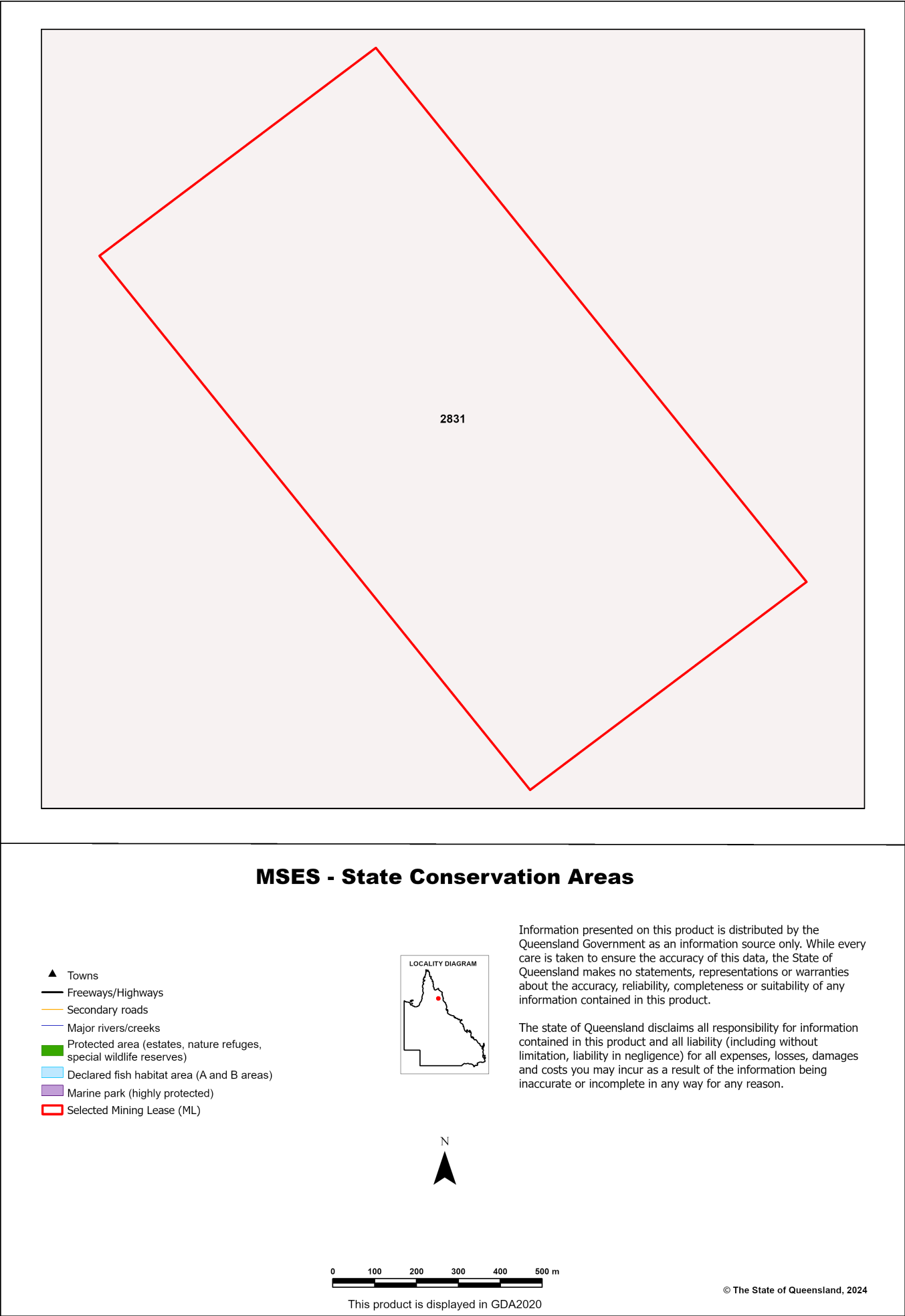
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

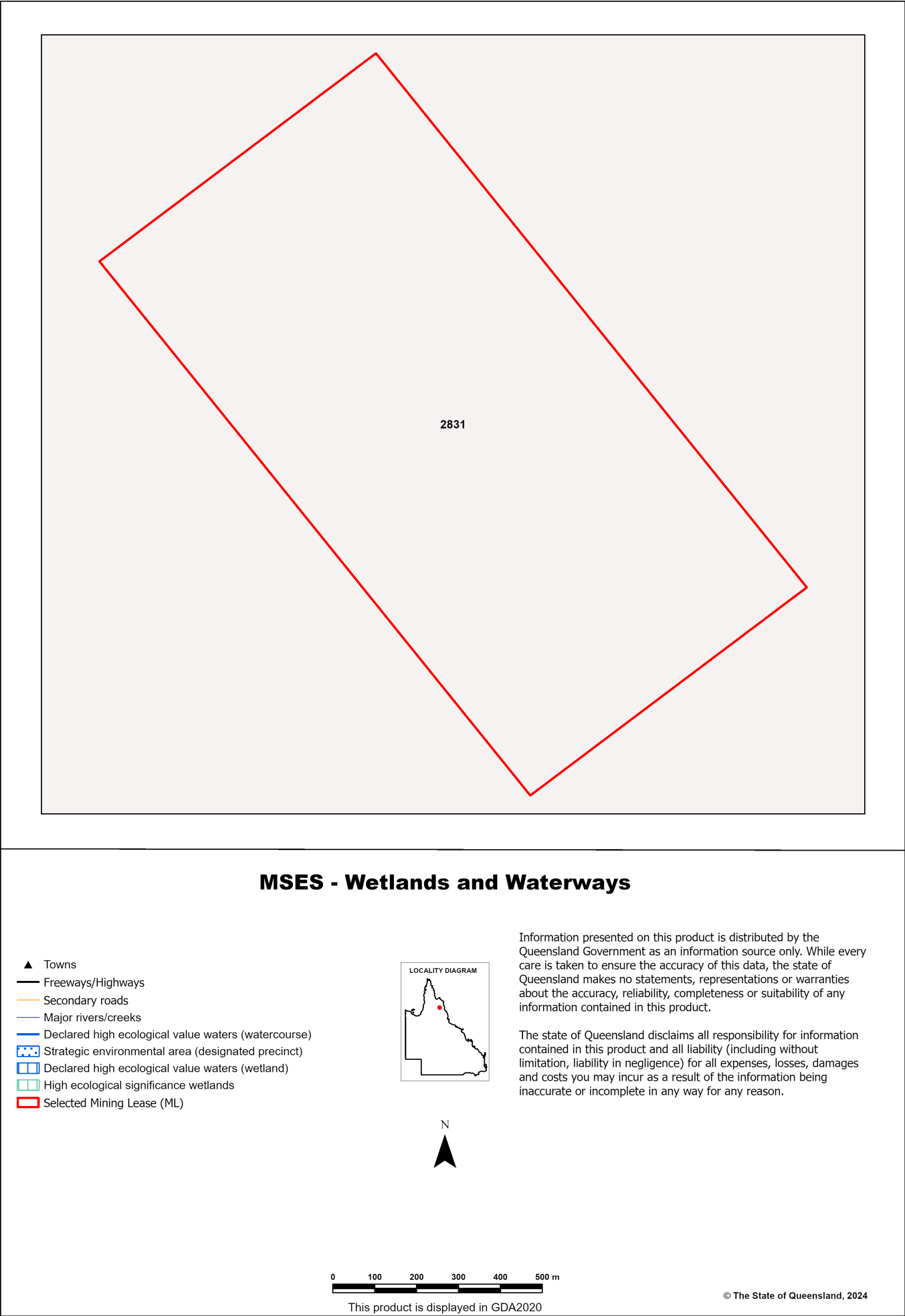
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

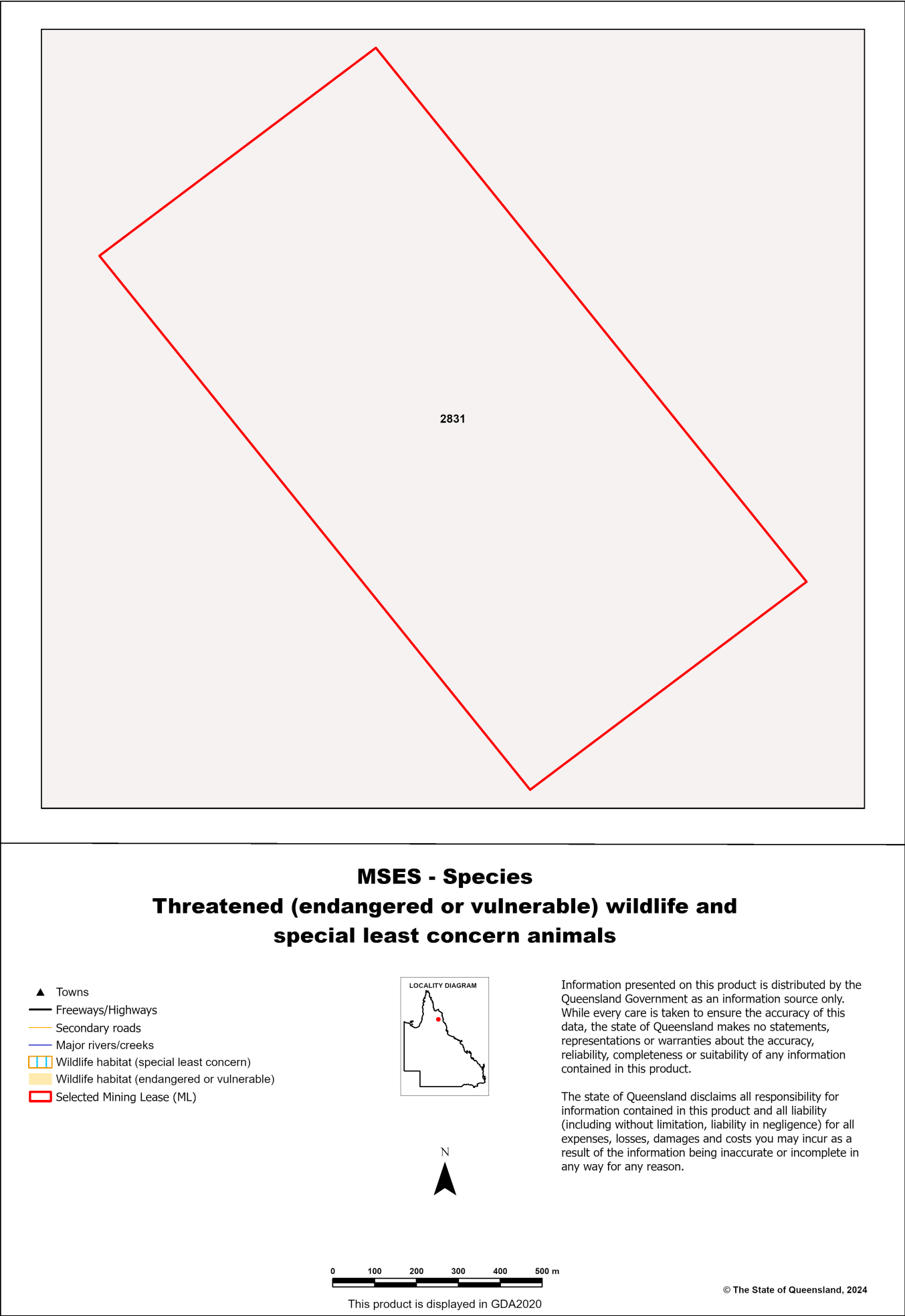
Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways



Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



MSES - Species Koala habitat area (SEQ)

-  Towns
-  Freeways/Highways
-  Secondary roads
-  Major rivers/creeks
-  Koala habitat area (core)
-  Koala habitat area (locally refined)
-  Selected Mining Lease (ML)

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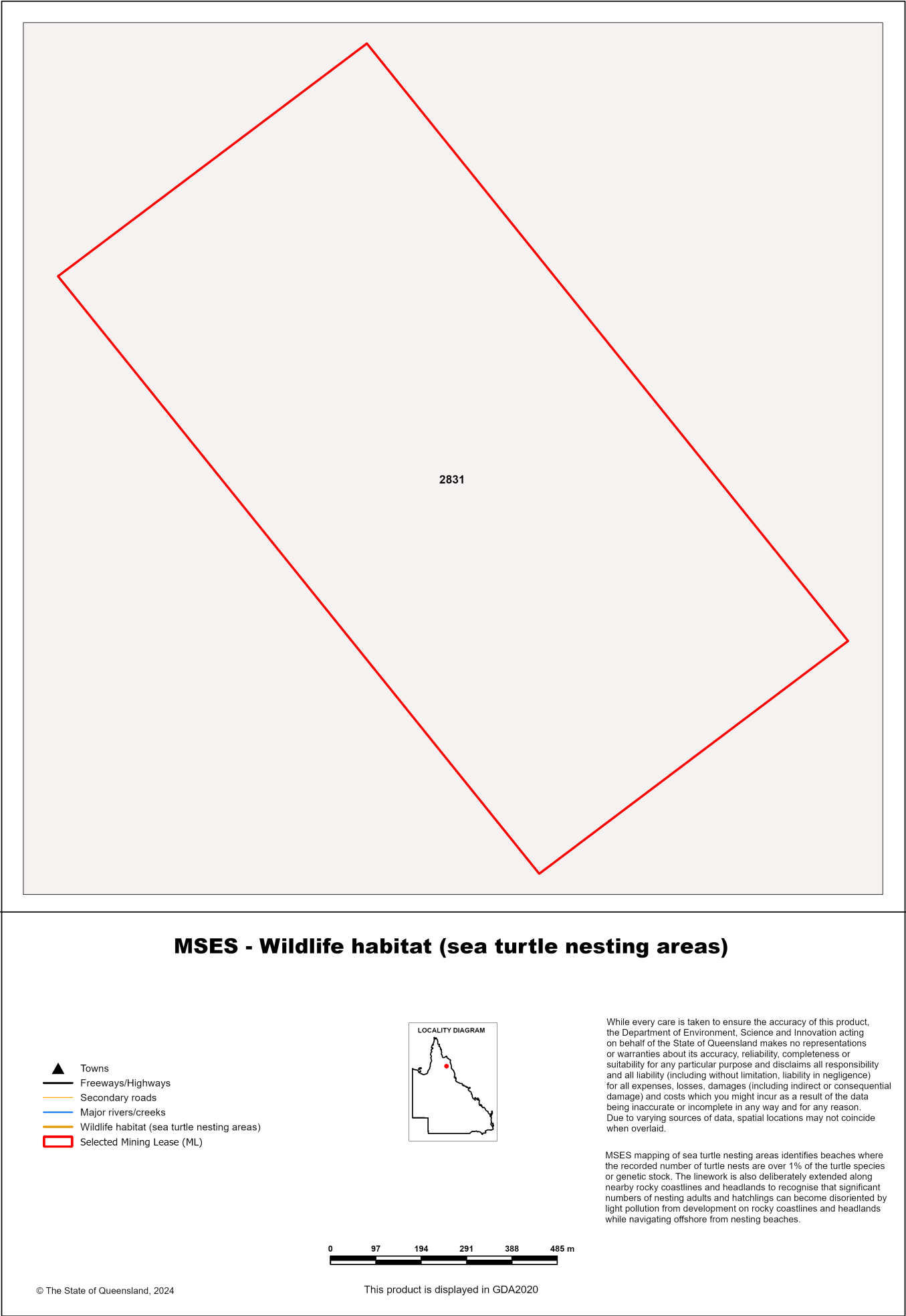
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

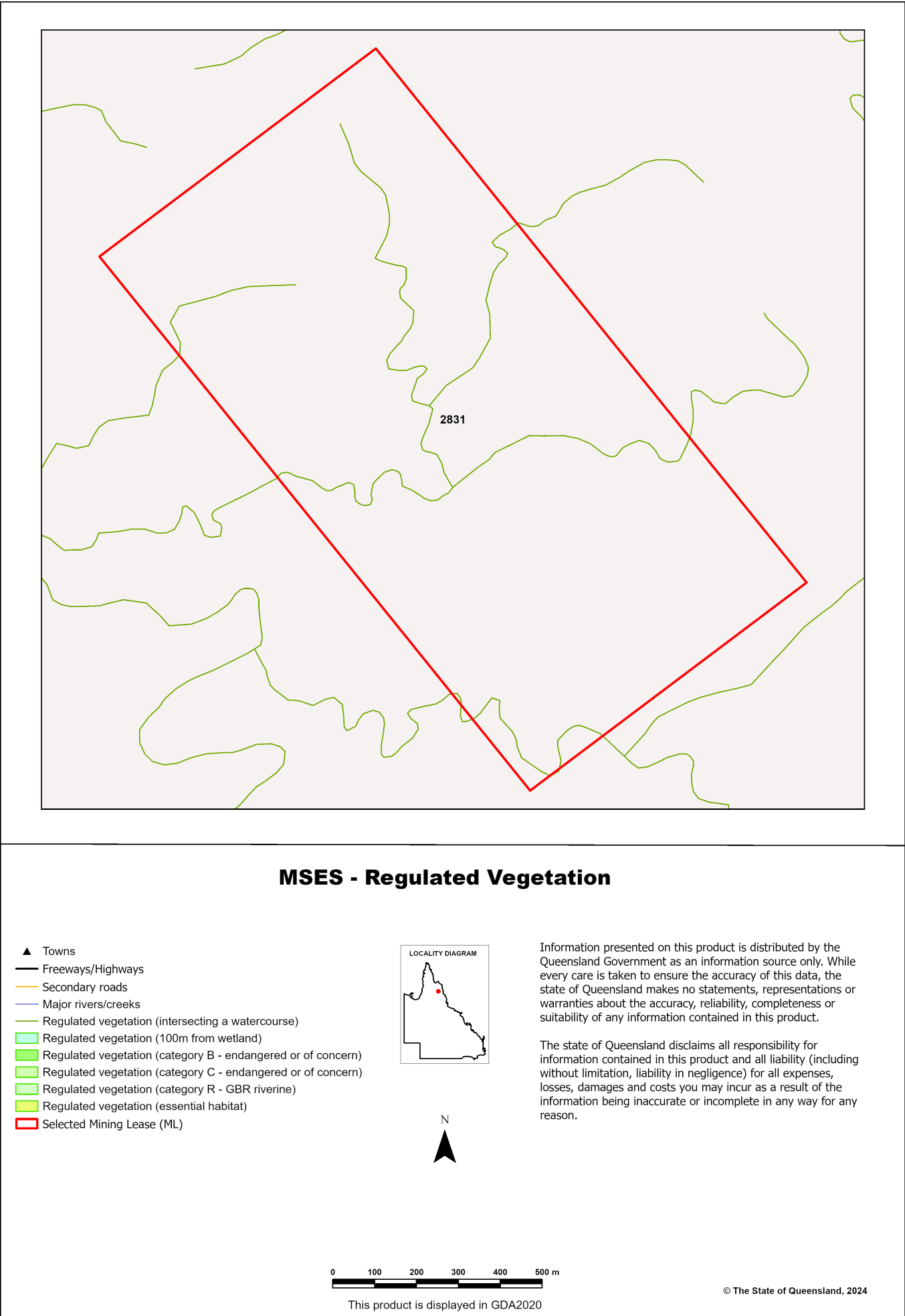
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This product is displayed in GDA2020

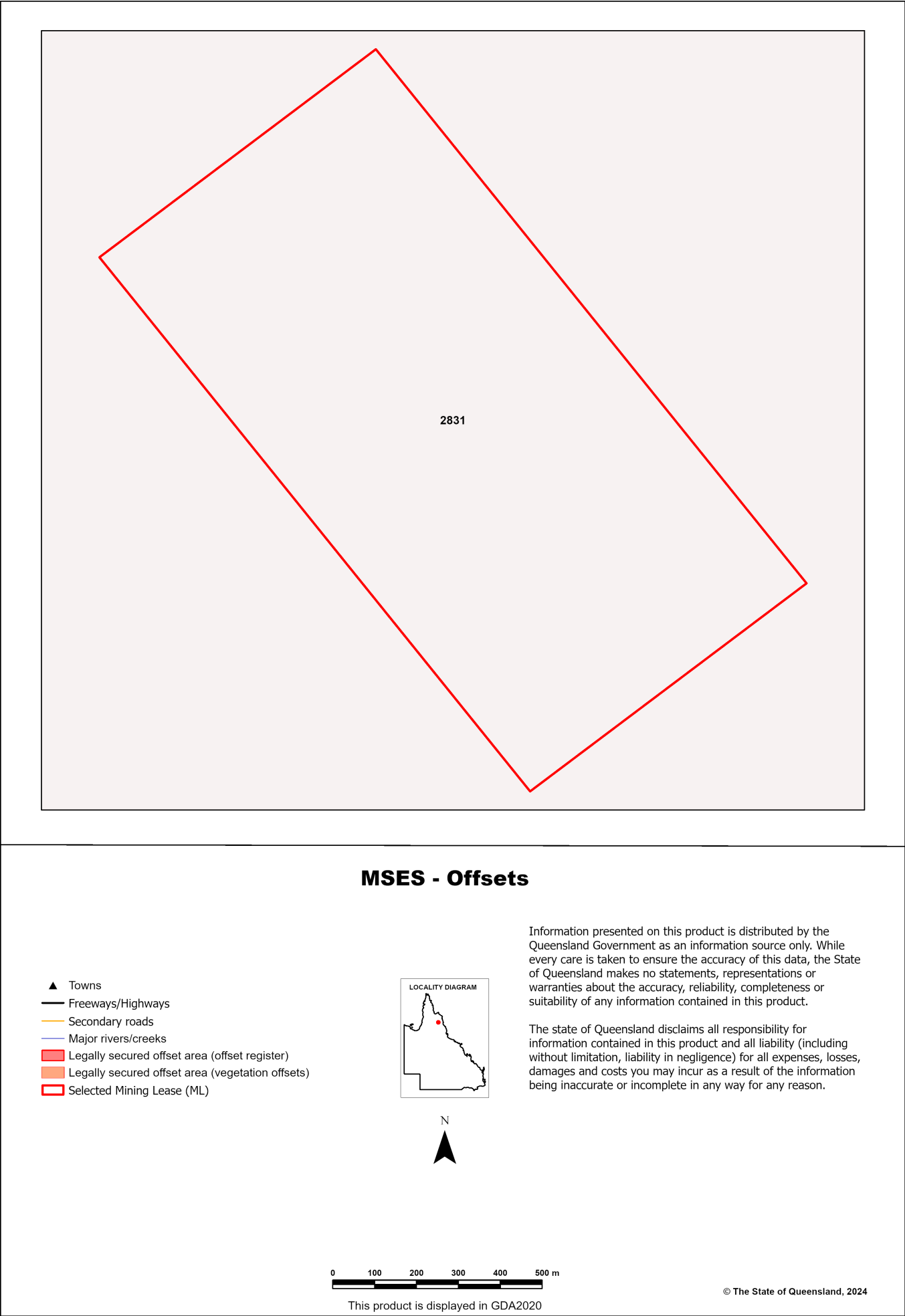
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

<http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html> .

Appendix 2 - Source Data

The datasets listed below are available on request from:

<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	current QSpatial data (http://qspatial.information.qld.gov.au)
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DESI	- Department of Environment, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

ML: 2831

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Details for area of interest: ML: 2831, with area 129.38 ha

Local Government(s)	
Cook Shire	
Bioregion(s)	Subregion(s)
Einasleigh Uplands	Hodgkinson Basin
Catchment(s)	
Mitchell	

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Einasleigh Uplands v1.1	Eastern Gulf of Carpentaria v1.1	Eastern Gulf of Carpentaria v.1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	128.39	99.23

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment, Science and Innovation's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	128.39	99.23

Table 5: Non-riverine wetlands intersecting the AOI

(No Records)

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(No Records)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment, Science and Innovation's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	129.38	100.00

Table 8: Summary table, aquatic conservation significance (non-riverine)

(No Records)

Biodiversity Planning Assessments

Introduction

The Department of Environment, Science and Innovation (DESI) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DESI. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	128.39	99.23

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar

sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	128.39	99.23

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	0.00	0.00	128.39	99.23
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	128.39	99.23	0.00	0.00
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	128.39	99.23	0.00	0.00
C: Tract Size	0.00	0.00	128.39	99.23	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	128.39	99.23	0.00	0.00	0.00	0.00	0.00	0.00
D2: Relative RE Size (Subregion)	128.39	99.23	0.00	0.00	0.00	0.00	0.00	0.00
F: Ecosystem Diversity	0.00	0.00	128.39	99.23	0.00	0.00	0.00	0.00
G: Context and Connection	128.39	99.23	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	128.39	99.23

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Id: Limits of Geographic Ranges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ie: High Species Richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;

- Include and maximise connectivity between large tracts/patches of remnant vegetation;
 - Include and maximise connectivity between remnant vegetation in good condition; and
- Riparian
- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
	128.39	99.23

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

(No Records)

Expert panel decision descriptions:

(No Records)

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland Info:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	129.38	100.00

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	129.38	100.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	129.38	100.00	0.00	0.00
3. Diversity and richness	0.00	0.00	129.38	100.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	129.38	100.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	2.85	2.20	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

(No Records)

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Diversity and richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DESI internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.*

***I - wetland indicator species; D - wetland dependent species.*

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. Furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

Species	Common name	Identified flora/fauna
Melaleuca fluviatilis		FL

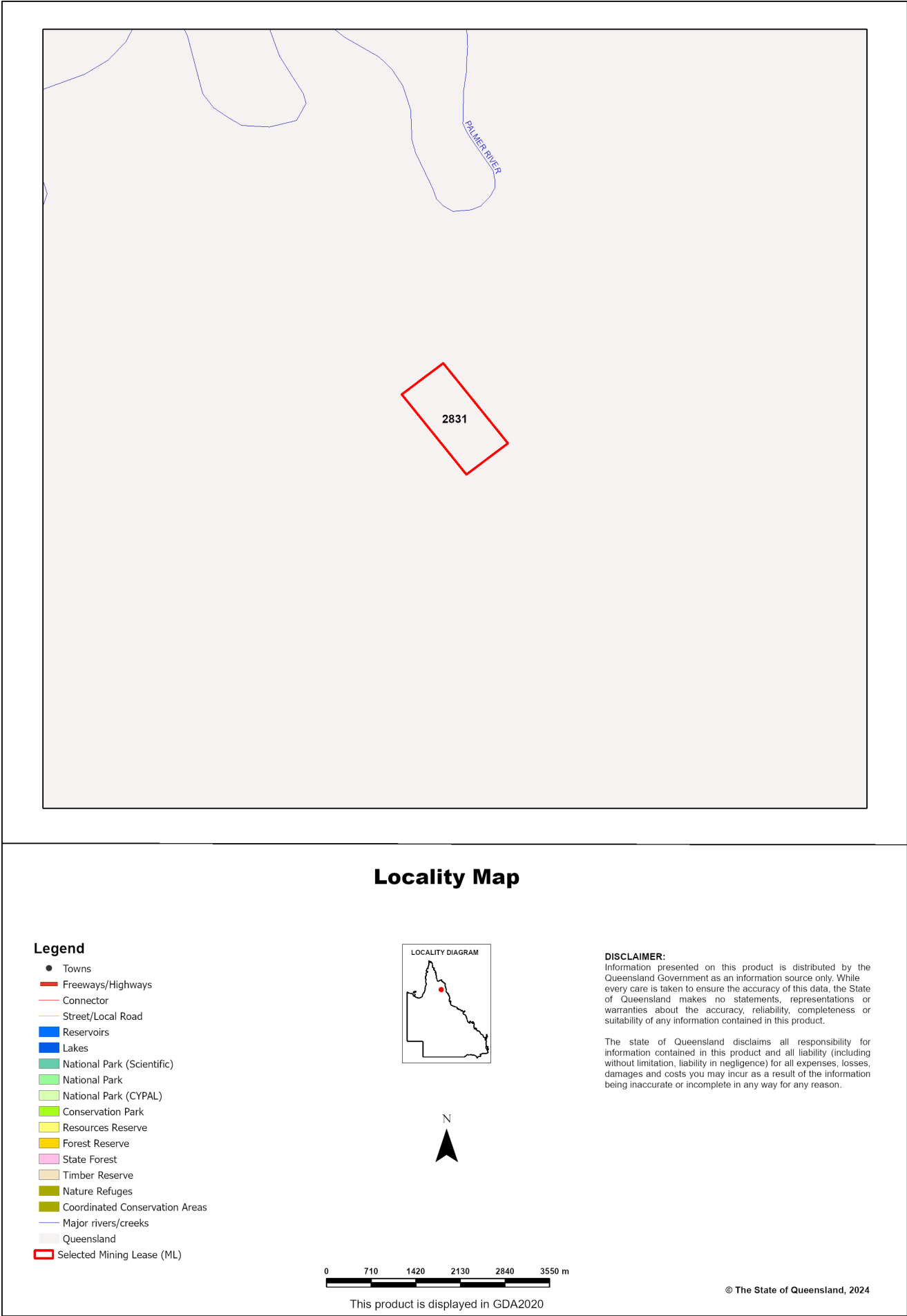
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

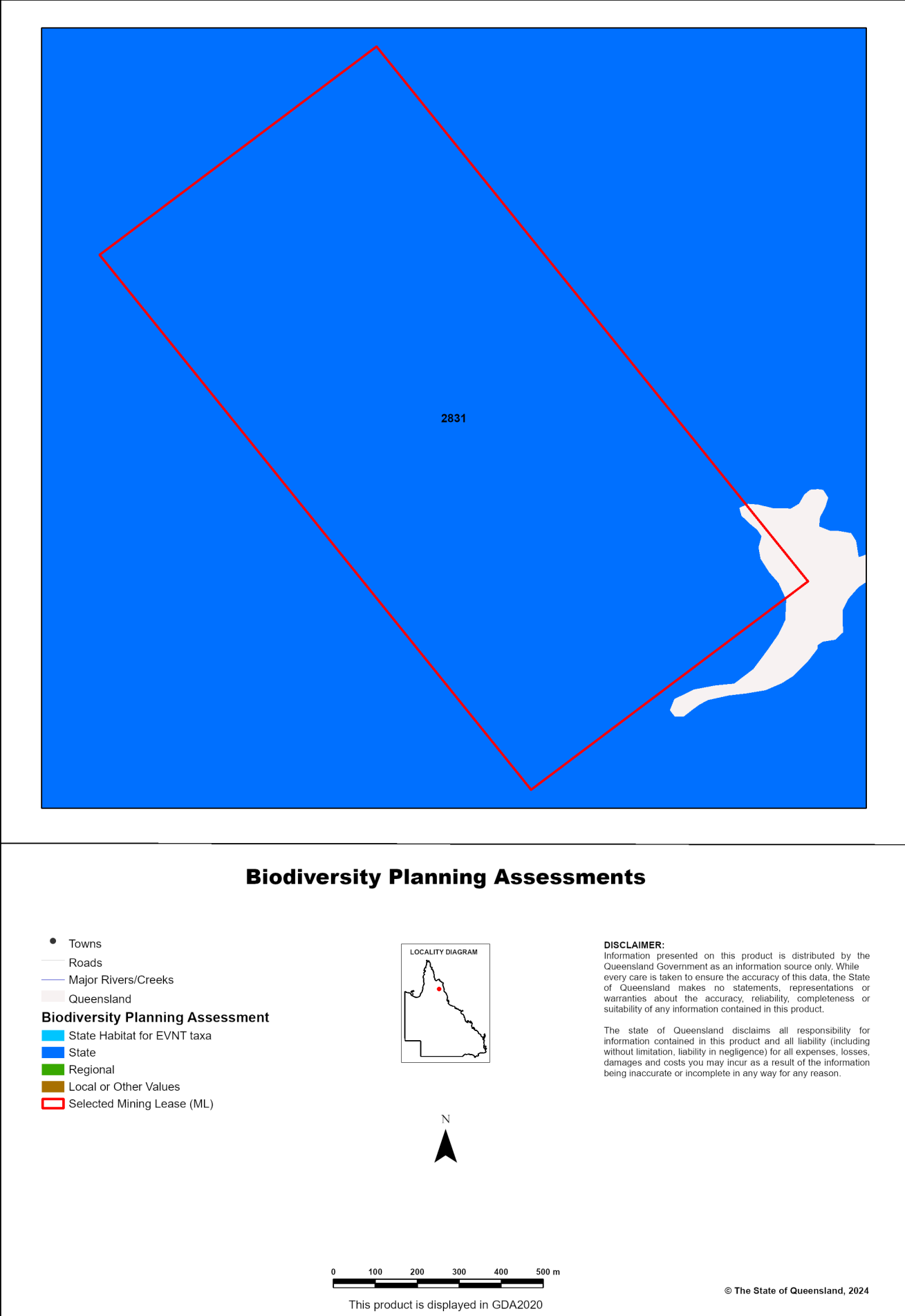
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

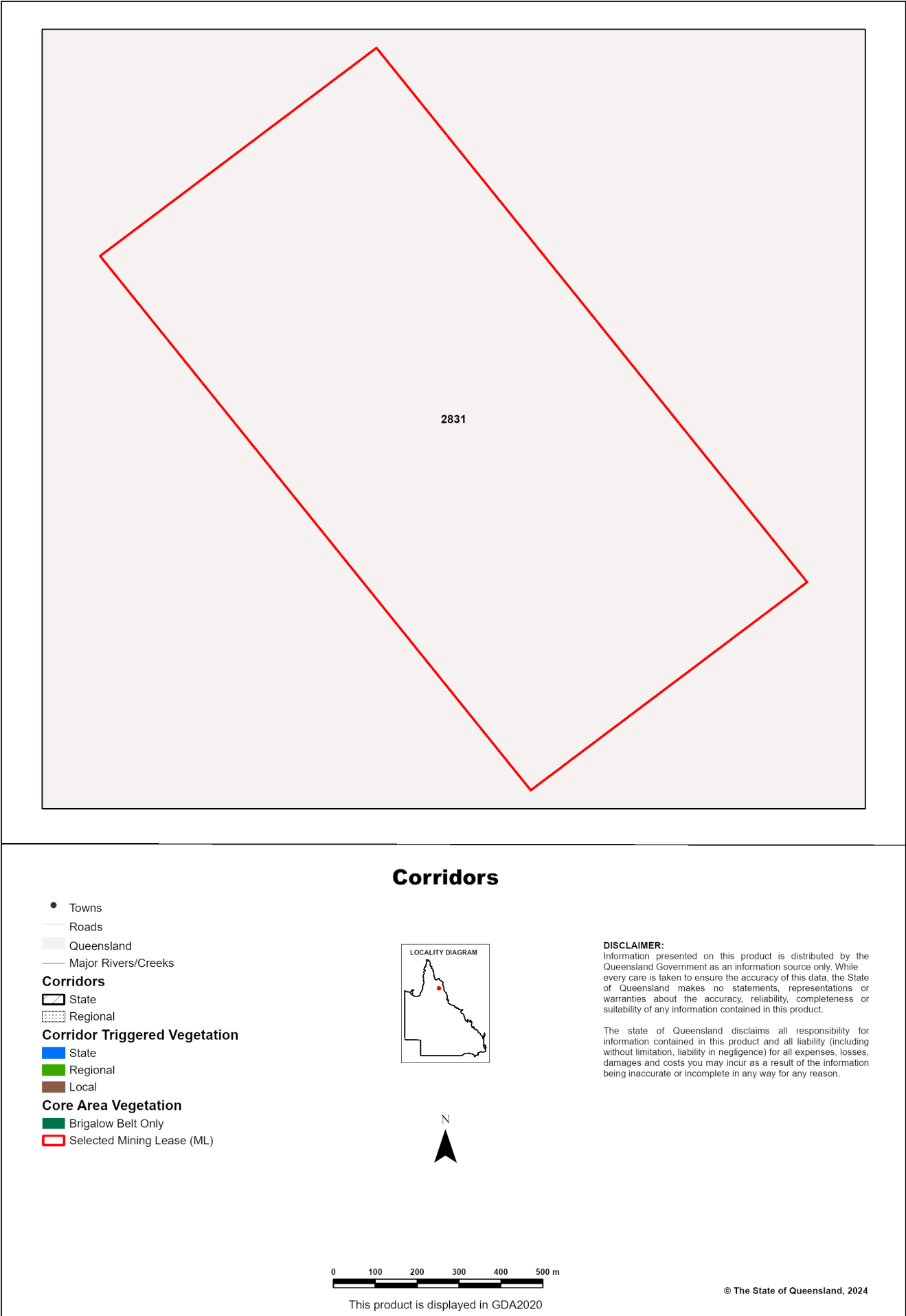
Map 1 - Locality Map



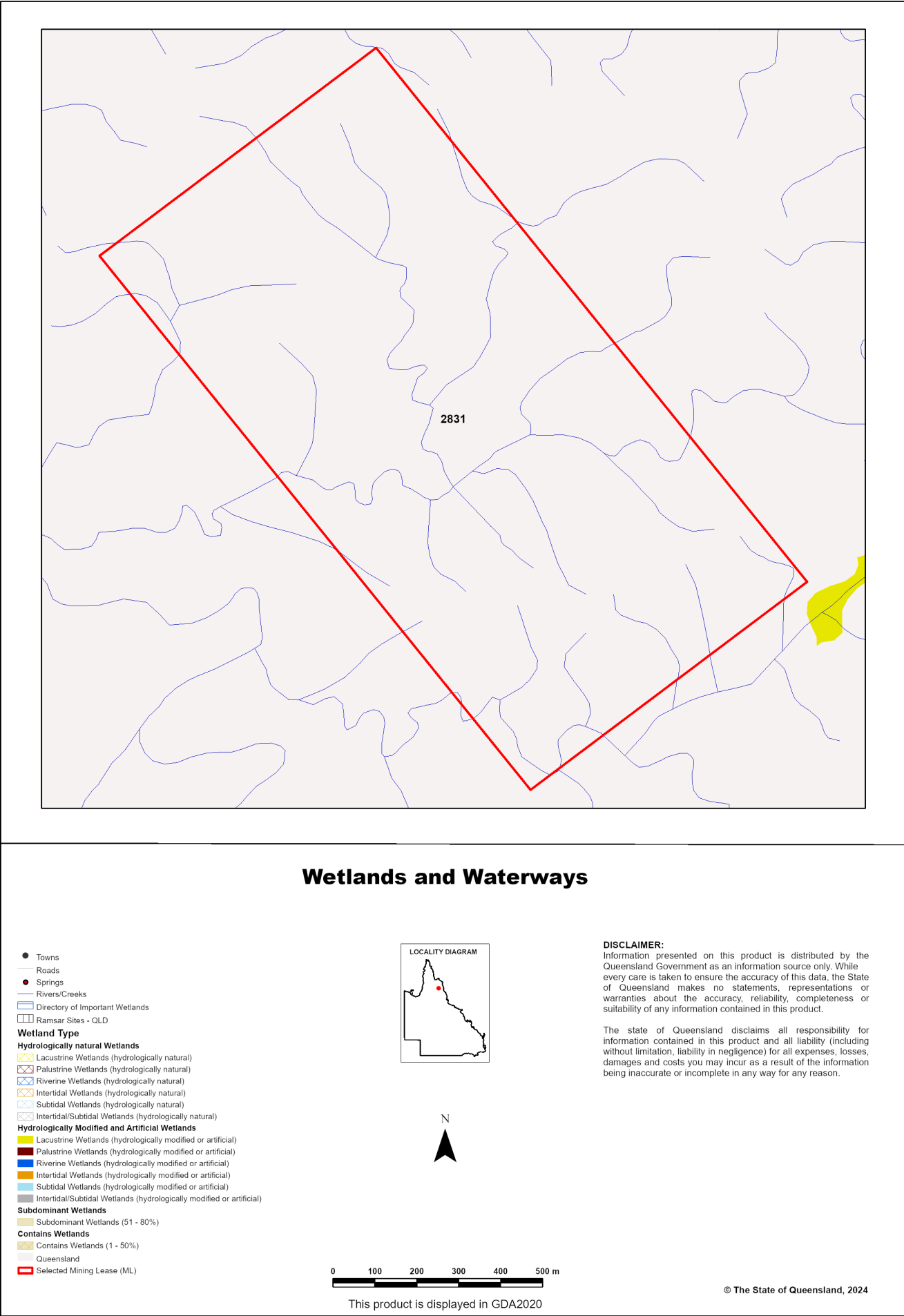
Map 2 - Biodiversity Planning Assessment (BPA)



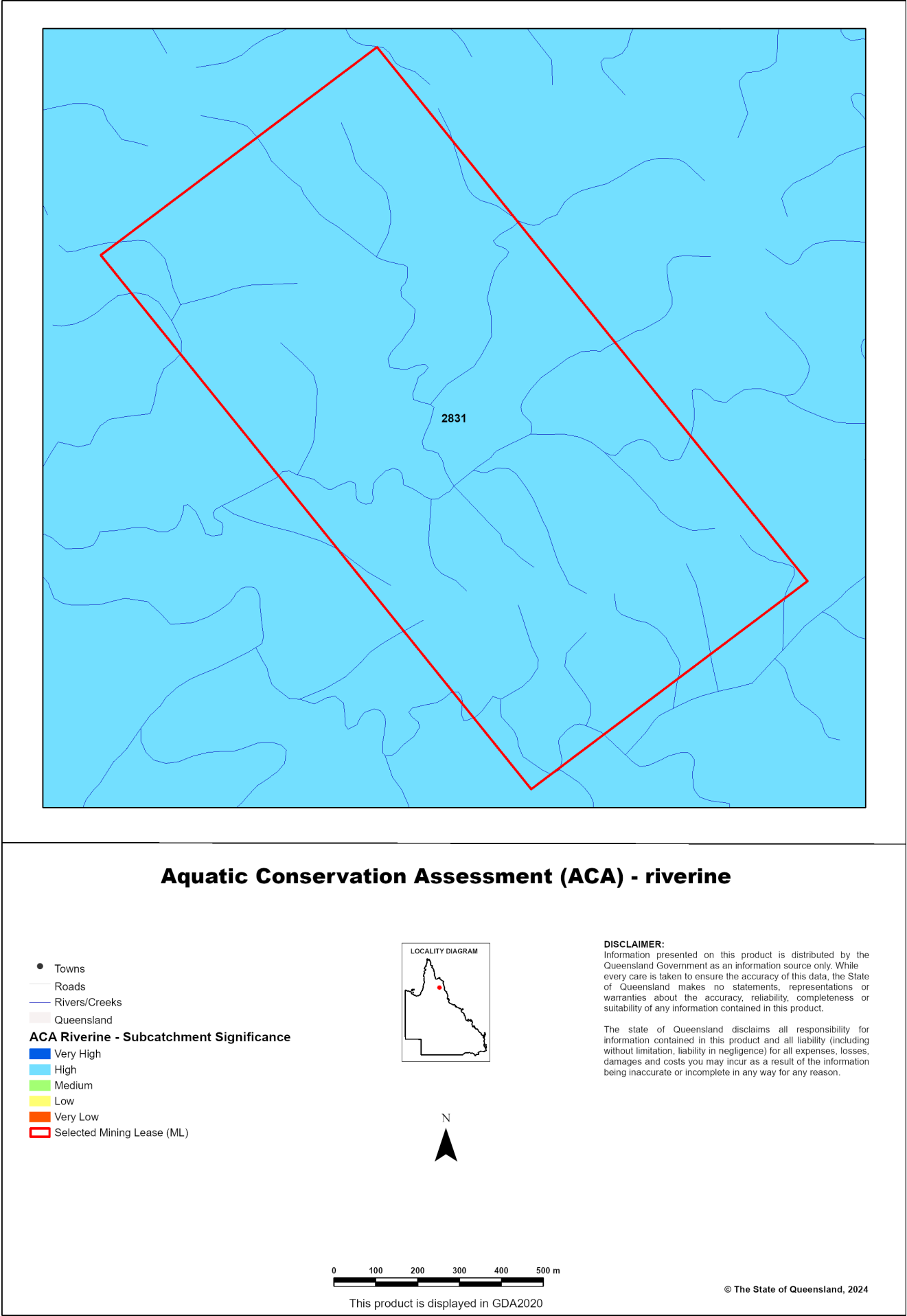
Map 3 - Corridors



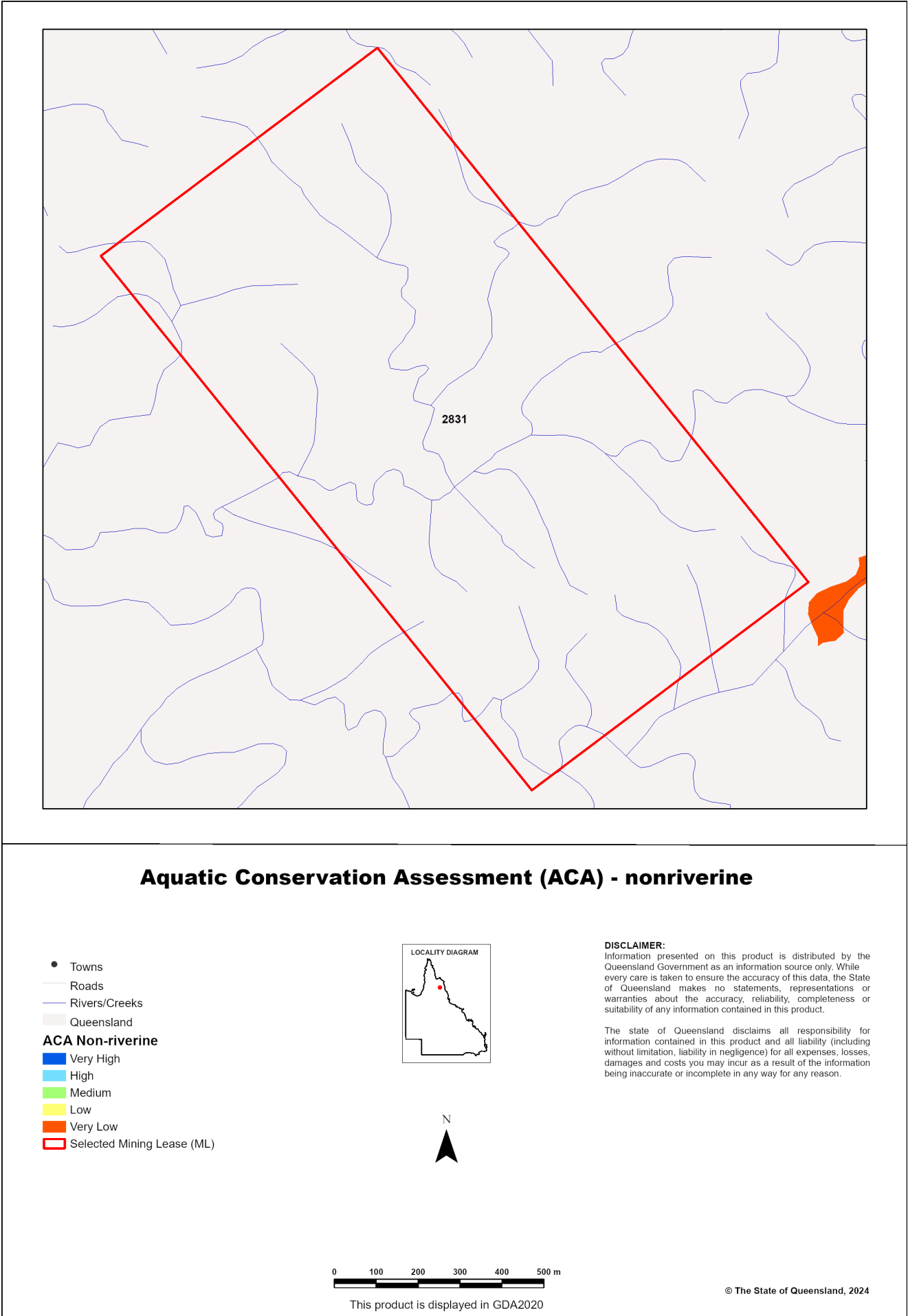
Map 4 - Wetlands and waterways



Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environment and Heritage Protection 2014, *Biodiversity Assessment and Mapping Methodology*. Version 2.2. Department of Environment and Heritage Protection, Brisbane.

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDBB Non-riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1 WBBGBRCC Non-riverine ACA v2.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDBB Riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1 WBBGBRCC Riverine ACA v2.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einiasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DESI	- Department of Environment, Science and Innovation
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA2020	- Geocentric Datum of Australia 2020
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

ML: 2834

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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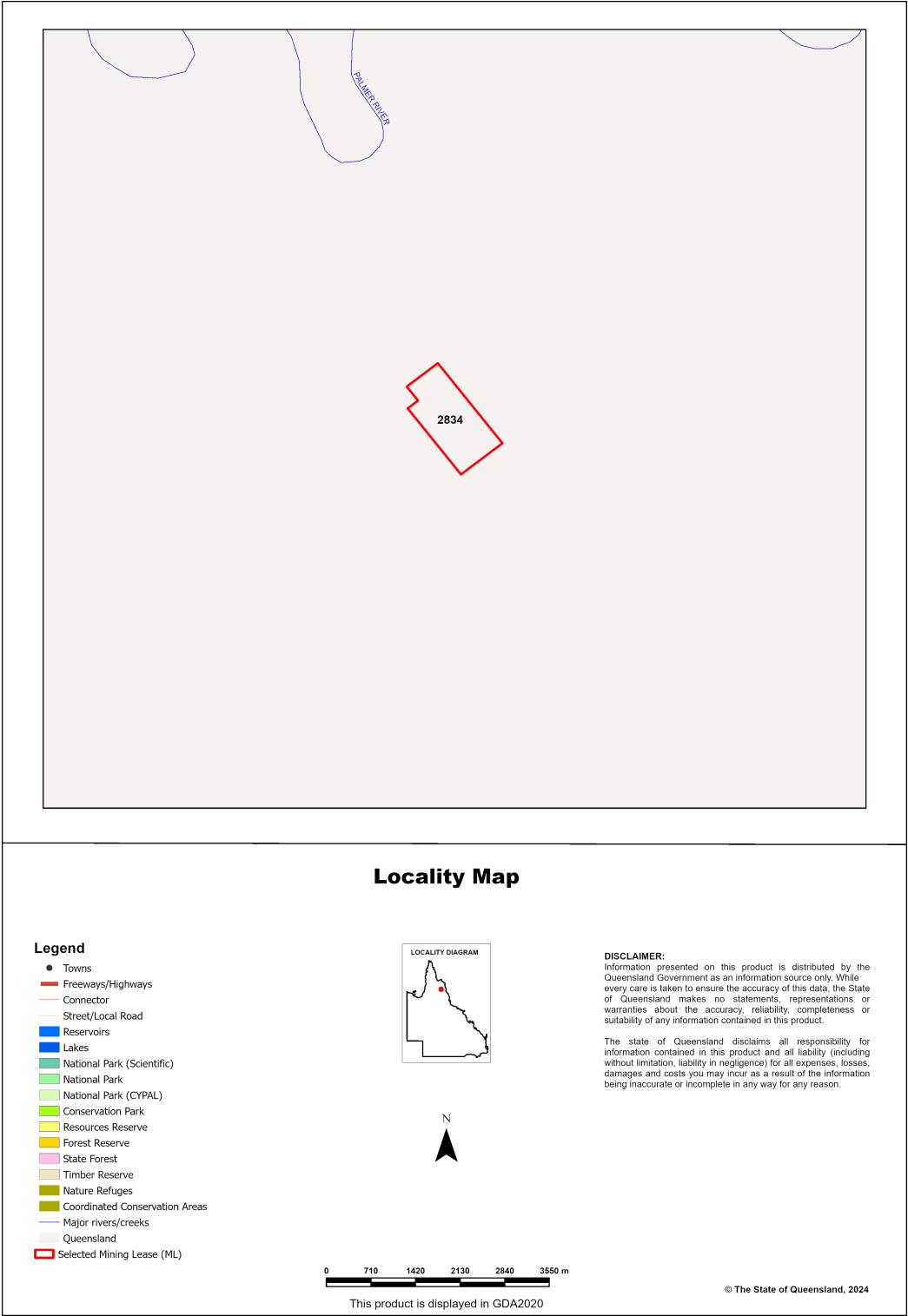
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: ML: 2834, with area 123.72 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Cook Shire	Mitchell	Einasleigh Uplands	Hodgkinson Basin



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;
- *Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004* ;
- *Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008*;
- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	2.1 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways**4. Strategic Environmental Areas (SEA)**

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species**7a. Threatened (endangered or vulnerable) wildlife**

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>	Keys boronia	V	None
<i>Calyptorhynchus lathamii</i>	Glossy black cockatoo	V	None
<i>Casuarius casuarius johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Euastacus bindal</i>	Mount Elliot crayfish	CR	None
<i>Euastacus binzayedii</i>		CR	None
<i>Euastacus eungella</i>		E	None
<i>Euastacus hystricosus</i>		E	None
<i>Euastacus jagara</i>	Jagara hairy crayfish	CR	None
<i>Euastacus maidae</i>		CR	None
<i>Euastacus monteithorum</i>		E	None
<i>Euastacus robertsi</i>		E	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Melaleuca irbyana</i>	swamp tea-tree	E	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>	bopple nut	V	None
<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	None
<i>Petrogale coenensis</i>	Cape York rock-wallaby	V	None
<i>Petrogale purpureicollis</i>	purple-necked rock-wallaby	V	None
<i>Petrogale sharmani</i>	Sharmans rock-wallaby	V	None
<i>Petrogale xanthopus celeris</i>	yellow-footed rock-wallaby (Qld subspecies)	V	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets**9a. Legally secured offset areas - offset register areas**

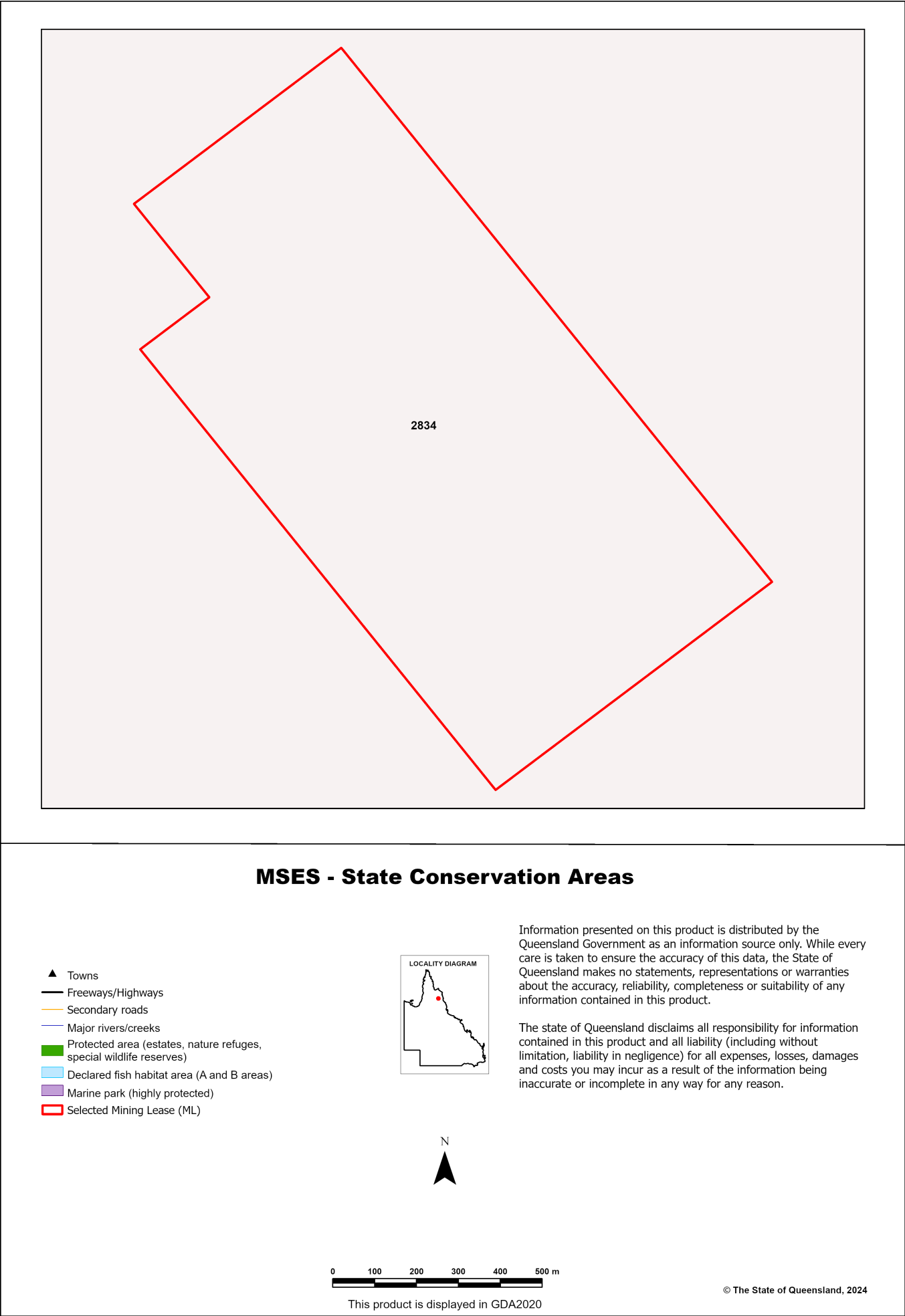
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

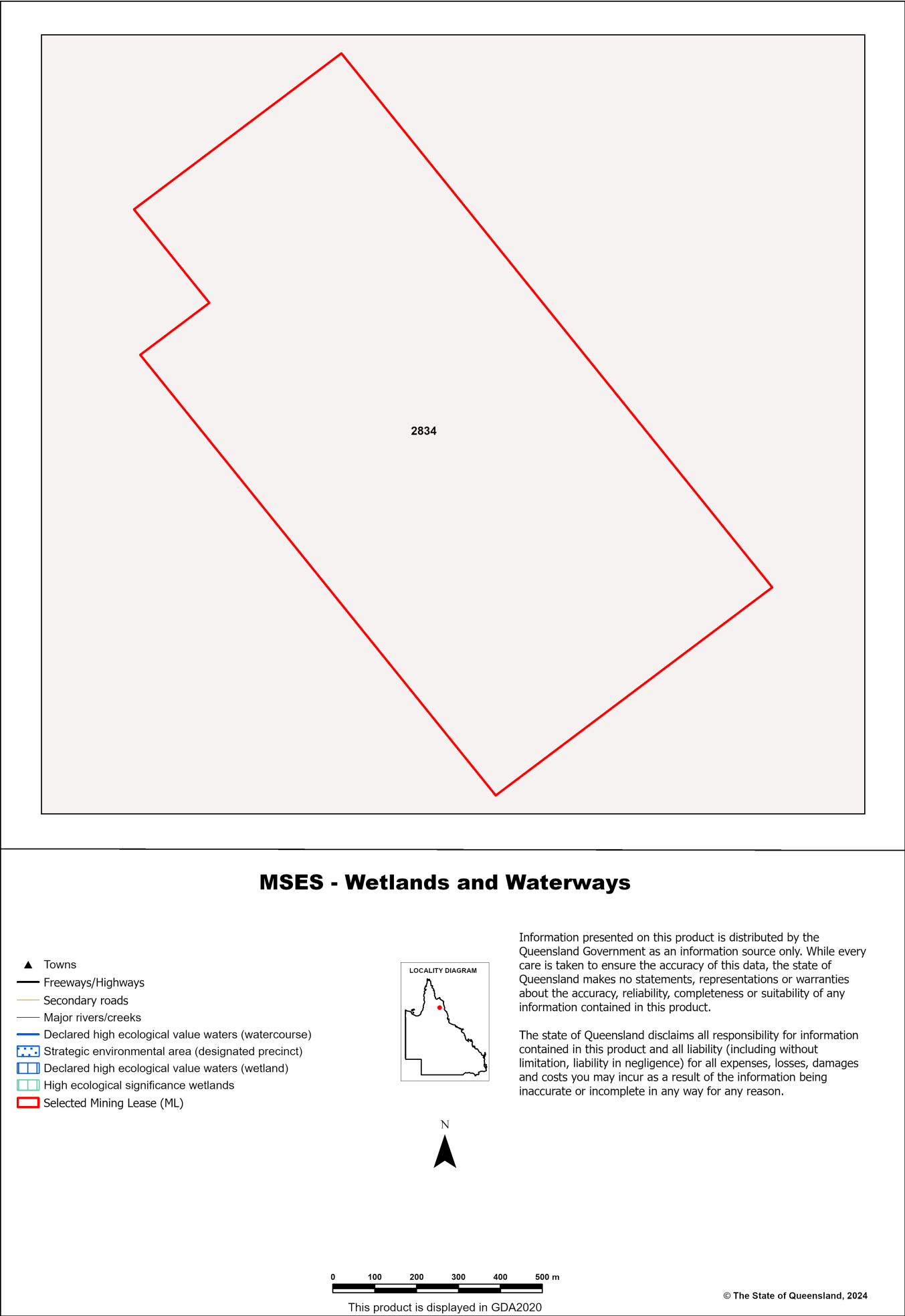
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

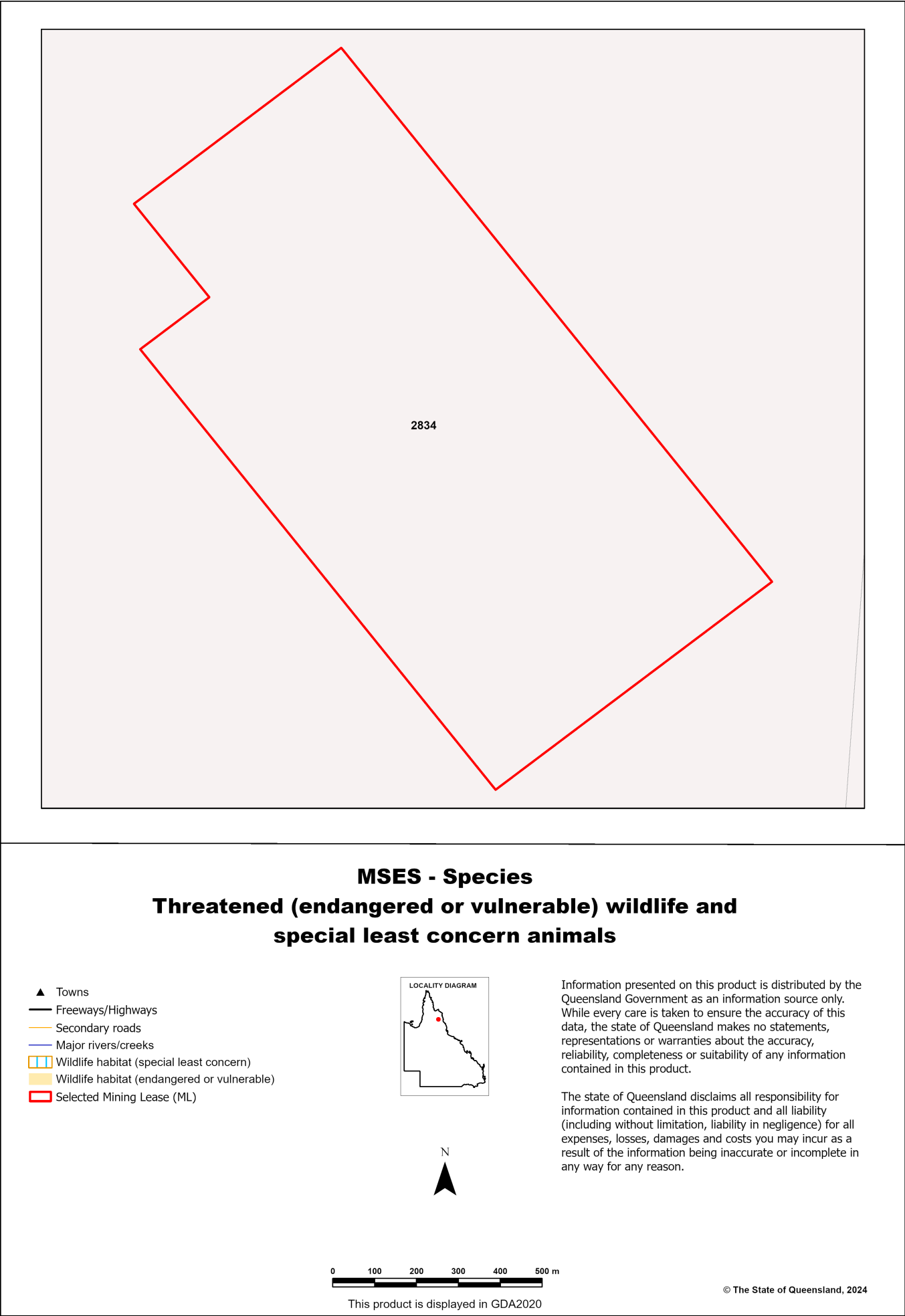
Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways



Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



MSES - Species Koala habitat area (SEQ)

-  Towns
-  Freeways/Highways
-  Secondary roads
-  Major rivers/creeks
-  Koala habitat area (core)
-  Koala habitat area (locally refined)
-  Selected Mining Lease (ML)

While every care is taken to ensure the accuracy of this product, the Department of Environment, Science and Innovation acting on behalf of the State of Queensland makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the data being inaccurate or incomplete in any way and for any reason. Due to varying sources of data, spatial locations may not coincide when overlaid.

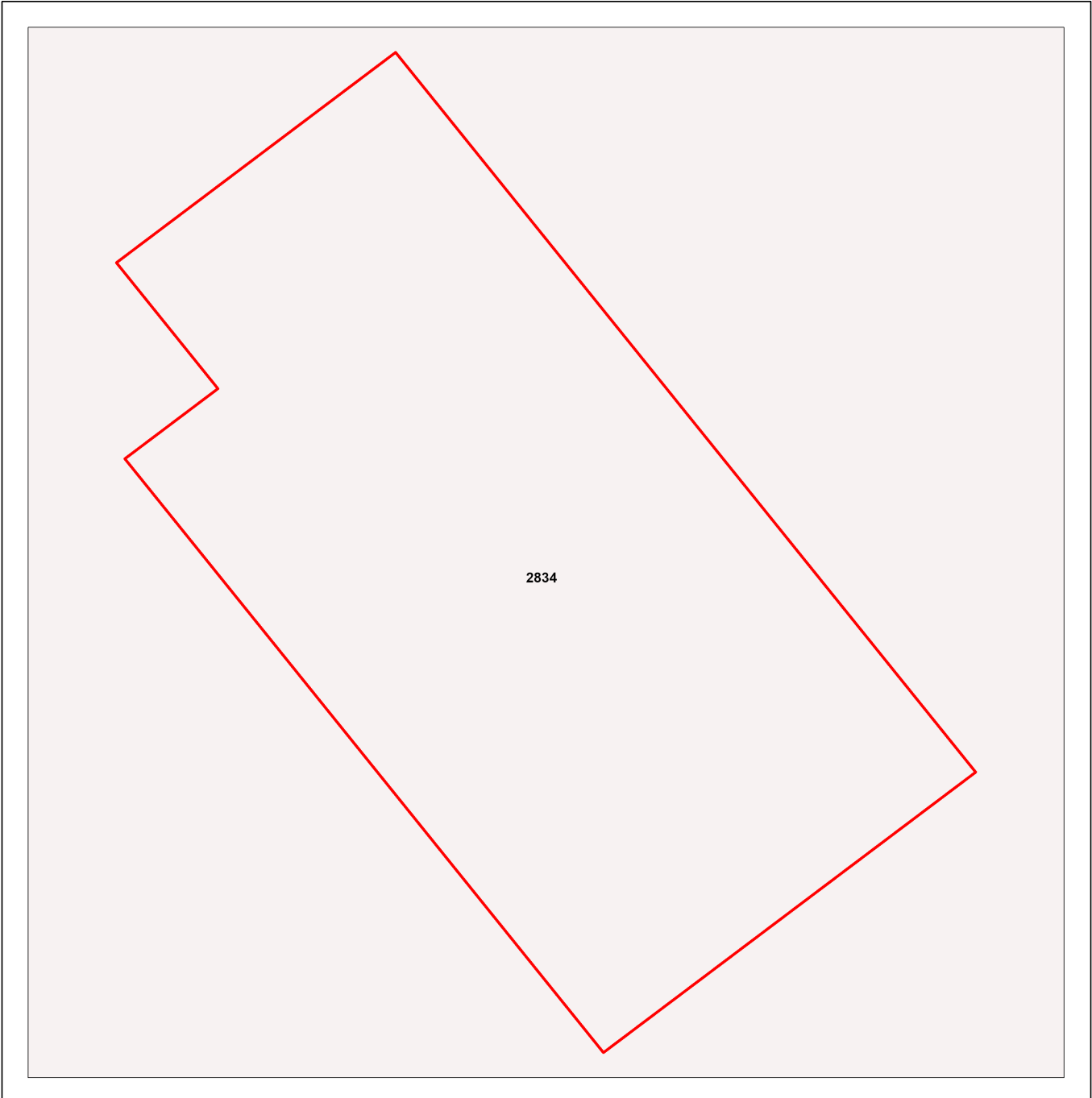
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

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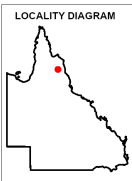
This product is displayed in GDA2020

Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)
- ▭ Selected Mining Lease (ML)

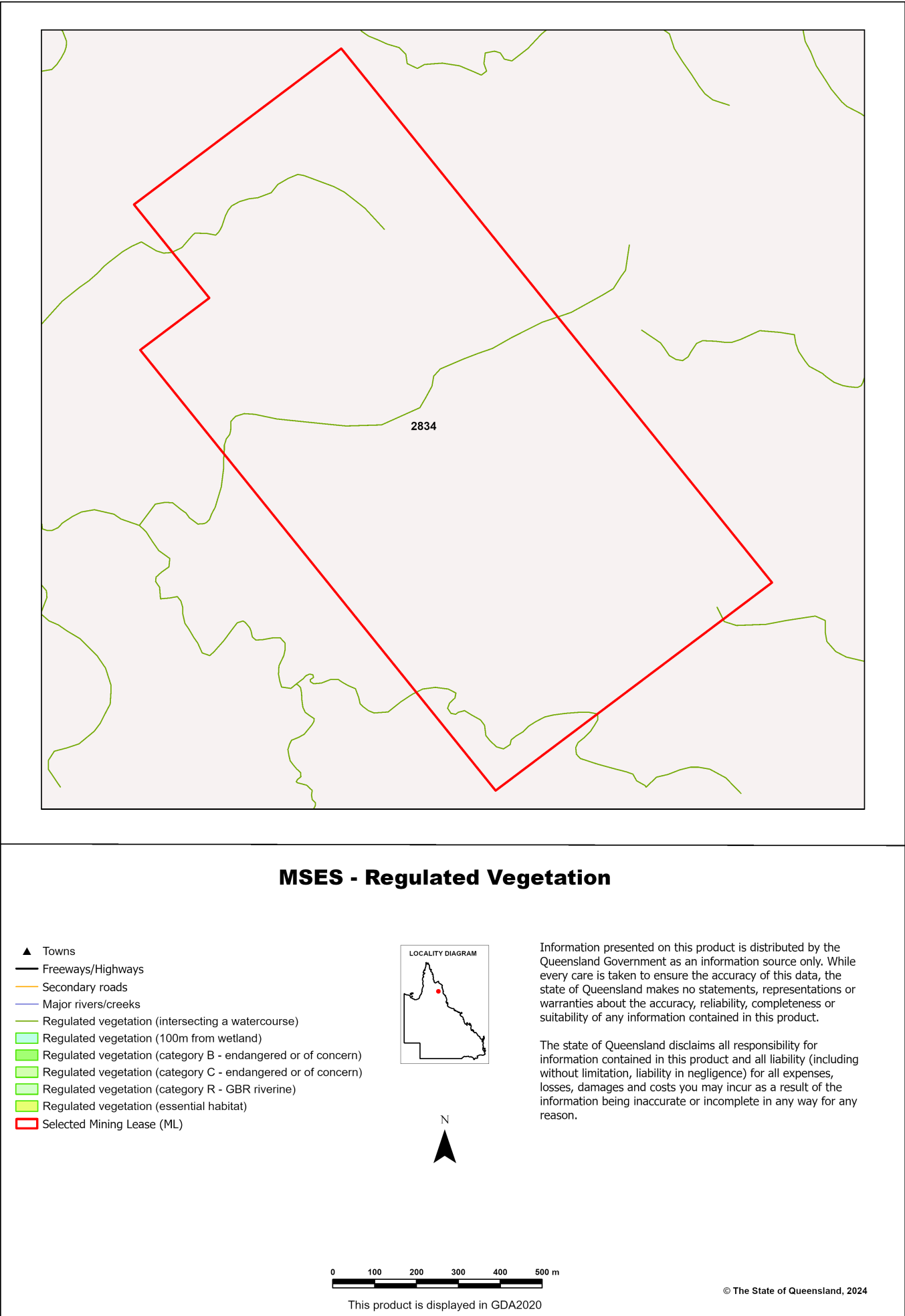


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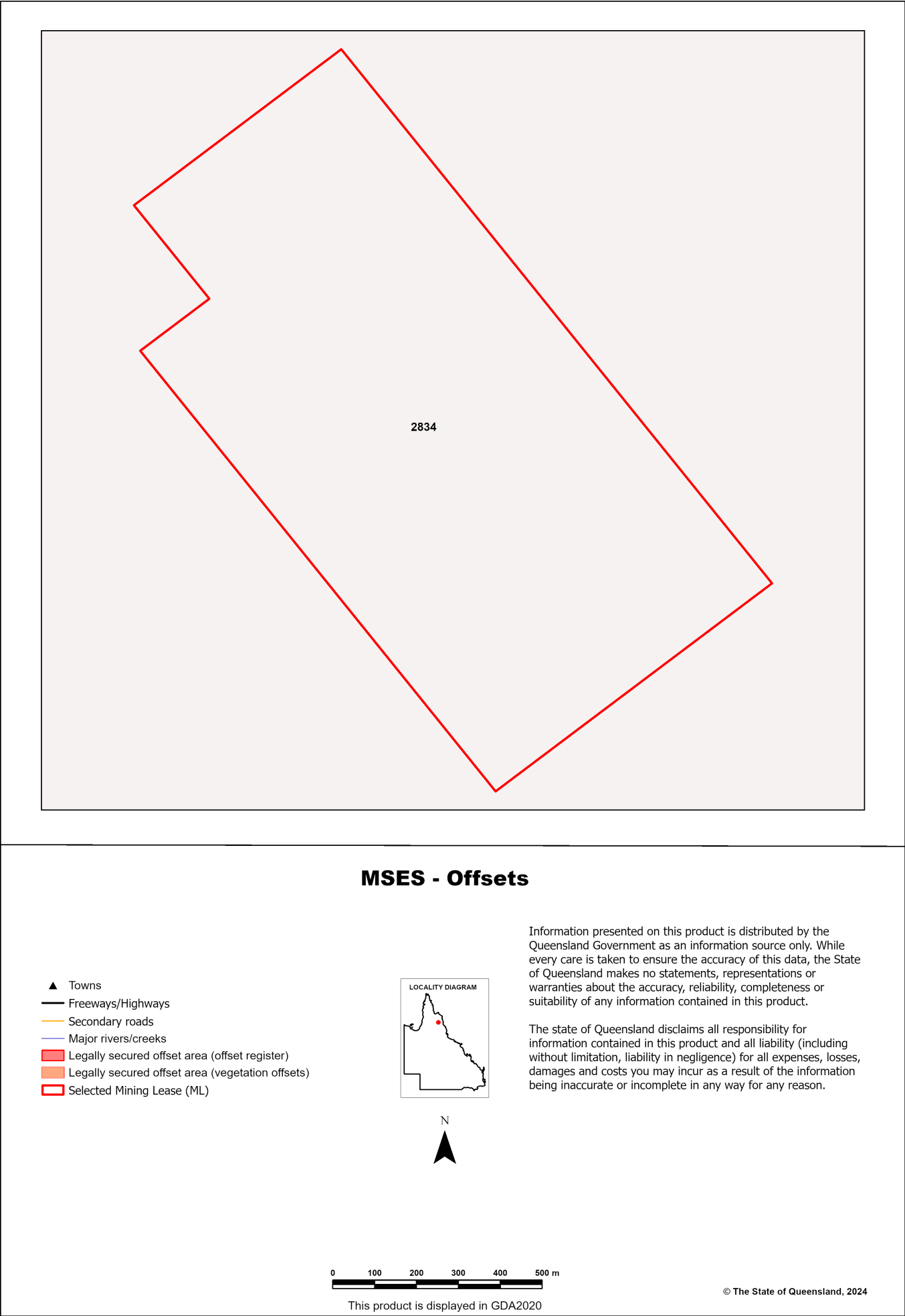
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

<http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html> .

Appendix 2 - Source Data

The datasets listed below are available on request from:

<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	current QSpatial data (http://qspatial.information.qld.gov.au)
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DESI	- Department of Environment, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

ML: 2833

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Details for area of interest: ML: 2833, with area 129.38 ha

Local Government(s)	
Cook Shire	
Bioregion(s)	Subregion(s)
Einasleigh Uplands	Hodgkinson Basin
Catchment(s)	
Mitchell	

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Einasleigh Uplands v1.1	Eastern Gulf of Carpentaria v1.1	Eastern Gulf of Carpentaria v.1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	126.13	97.49

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment, Science and Innovation's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	126.13	97.49

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Lacustrine wetlands	1
Total number of non-riverine wetlands	1

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(No Records)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment, Science and Innovation's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	129.38	100.00

Table 8: Summary table, aquatic conservation significance (non-riverine)

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very Low	0.59	0.46

Biodiversity Planning Assessments

Introduction

The Department of Environment, Science and Innovation (DESI) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DESI. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	126.13	97.49

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar

sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	126.13	97.49

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	0.00	0.00	126.13	97.49
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	126.13	97.49	0.00	0.00
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	126.13	97.49	0.00	0.00
C: Tract Size	0.00	0.00	126.13	97.49	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	126.13	97.49	0.00	0.00	0.00	0.00	0.00	0.00
D2: Relative RE Size (Subregion)	126.13	97.49	0.00	0.00	0.00	0.00	0.00	0.00
F: Ecosystem Diversity	0.00	0.00	126.13	97.49	0.00	0.00	0.00	0.00
G: Context and Connection	126.13	97.49	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	126.13	97.49

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Id: Limits of Geographic Ranges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ie: High Species Richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;

- Include and maximise connectivity between large tracts/patches of remnant vegetation;
 - Include and maximise connectivity between remnant vegetation in good condition; and
- Riparian
- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
	126.13	97.49

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

(No Records)

Expert panel decision descriptions:

(No Records)

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland Info:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	129.38	100.00

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	129.38	100.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	129.38	100.00	0.00	0.00
3. Diversity and richness	0.00	0.00	129.38	100.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	129.38	100.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very Low	0.59	0.46

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.46
2. Naturalness catchment	0.00	0.00	0.00	0.00	0.59	0.46	0.00	0.00
3. Diversity and richness	0.00	0.00	0.00	0.00	0.59	0.46	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.46
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DESI internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.*

***I - wetland indicator species; D - wetland dependent species.*

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

(No Records)

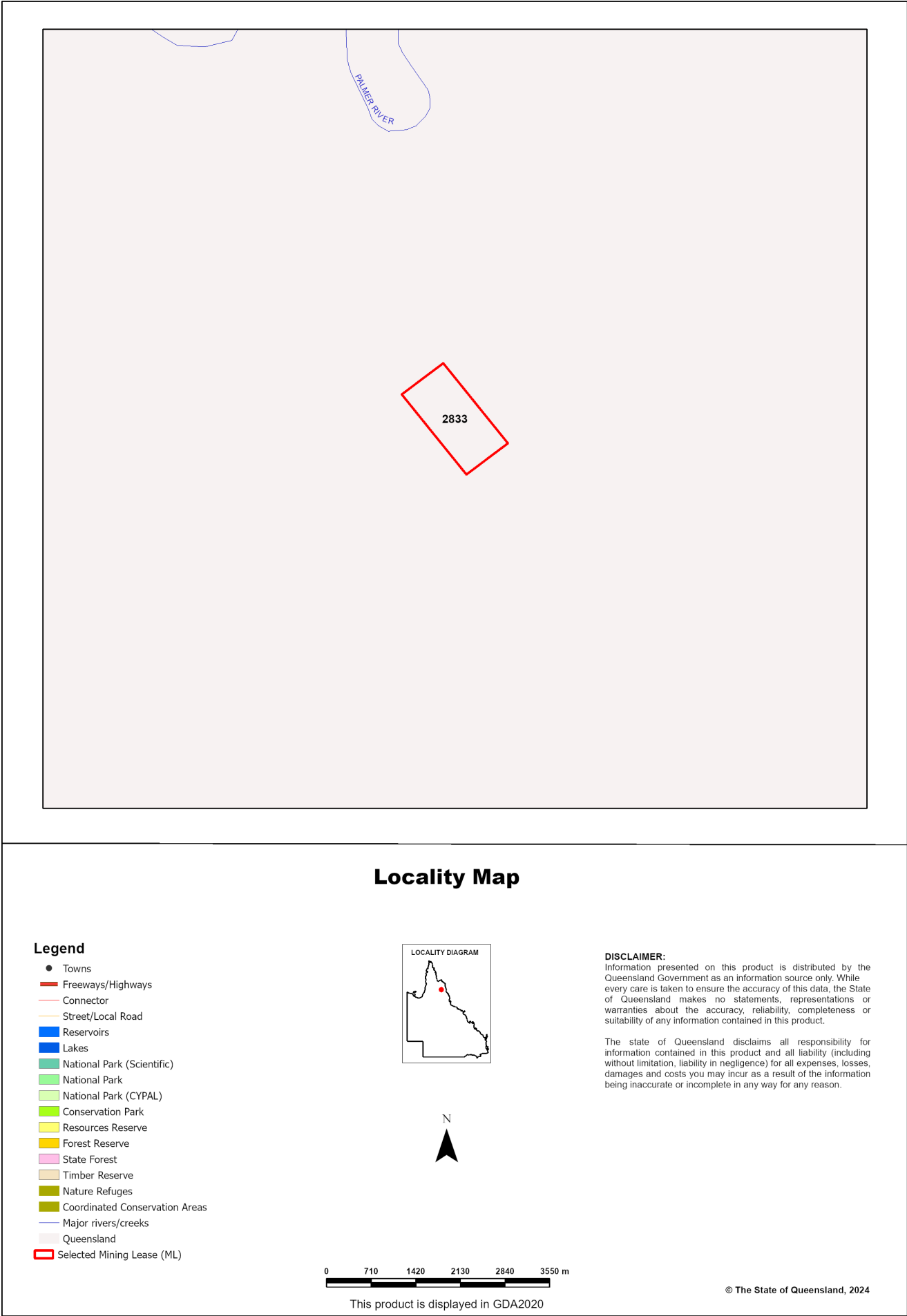
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

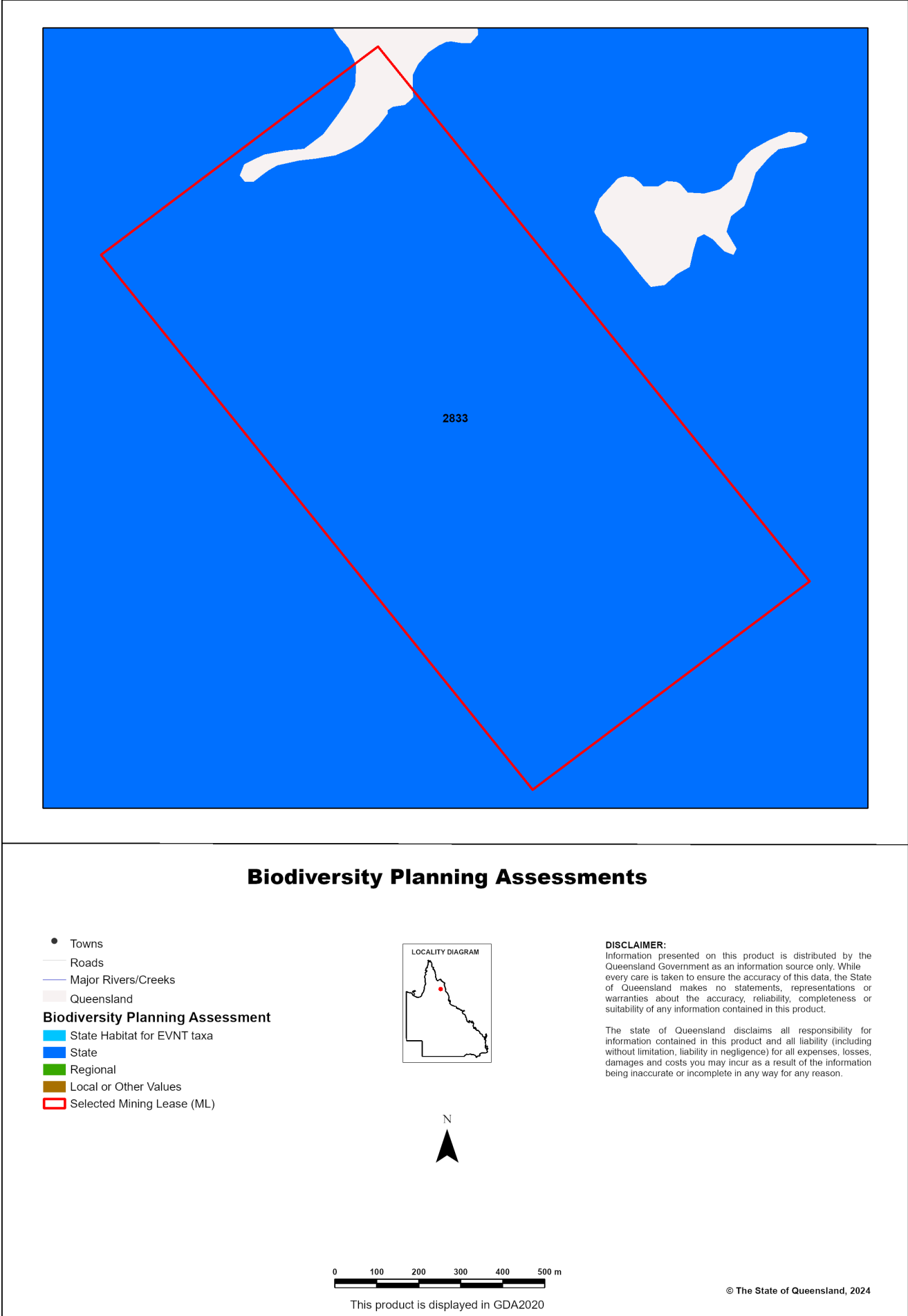
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

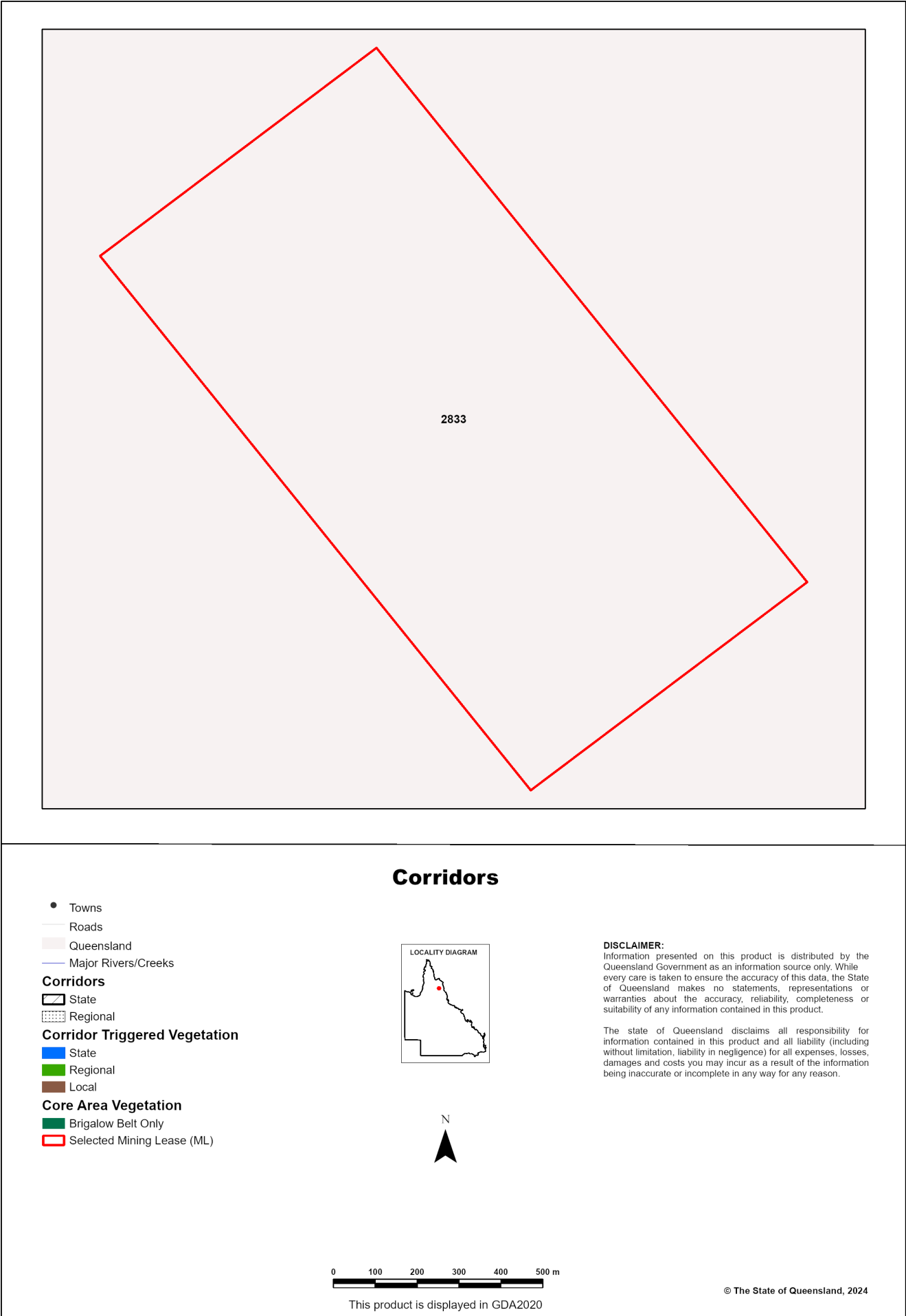
Map 1 - Locality Map



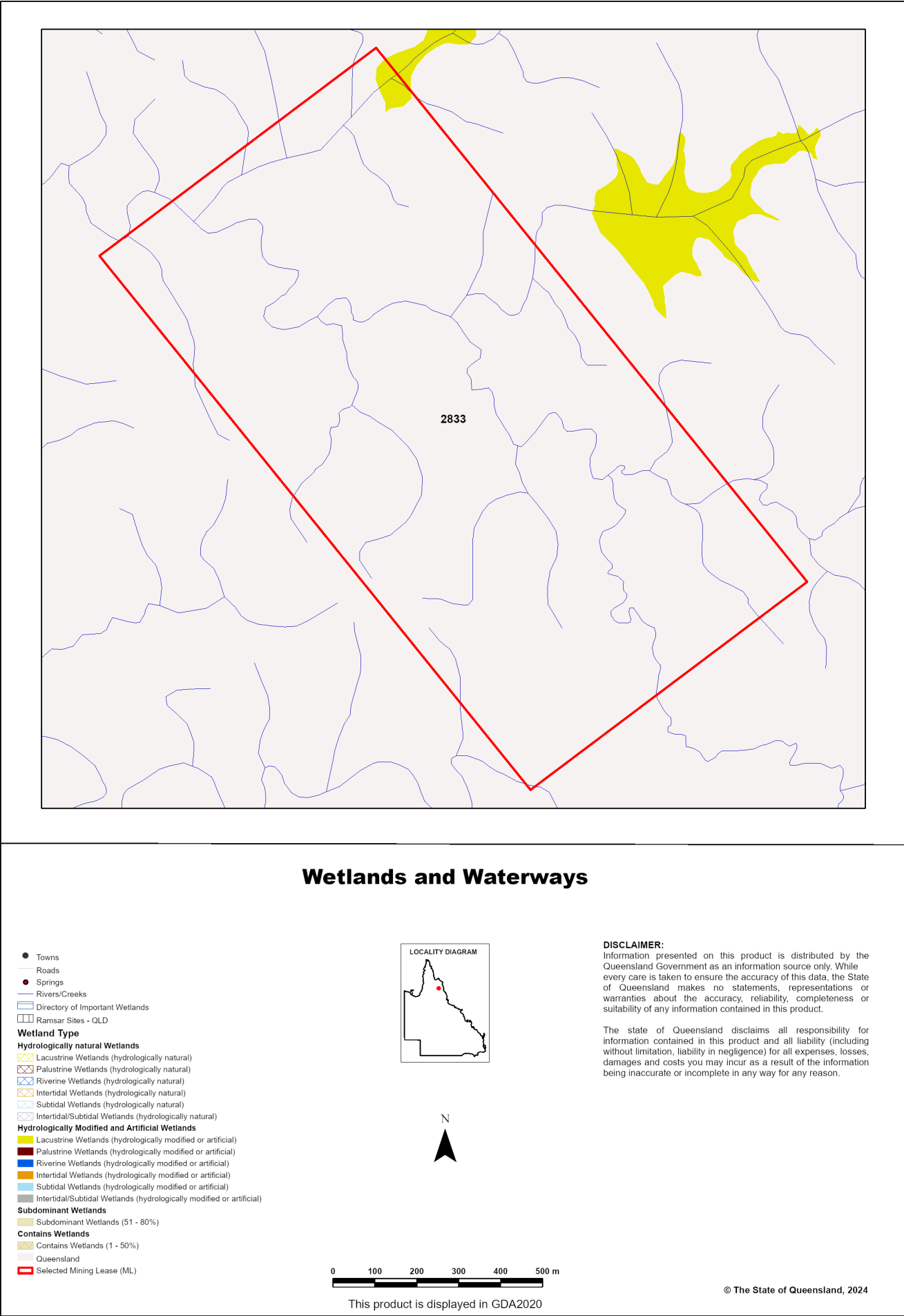
Map 2 - Biodiversity Planning Assessment (BPA)



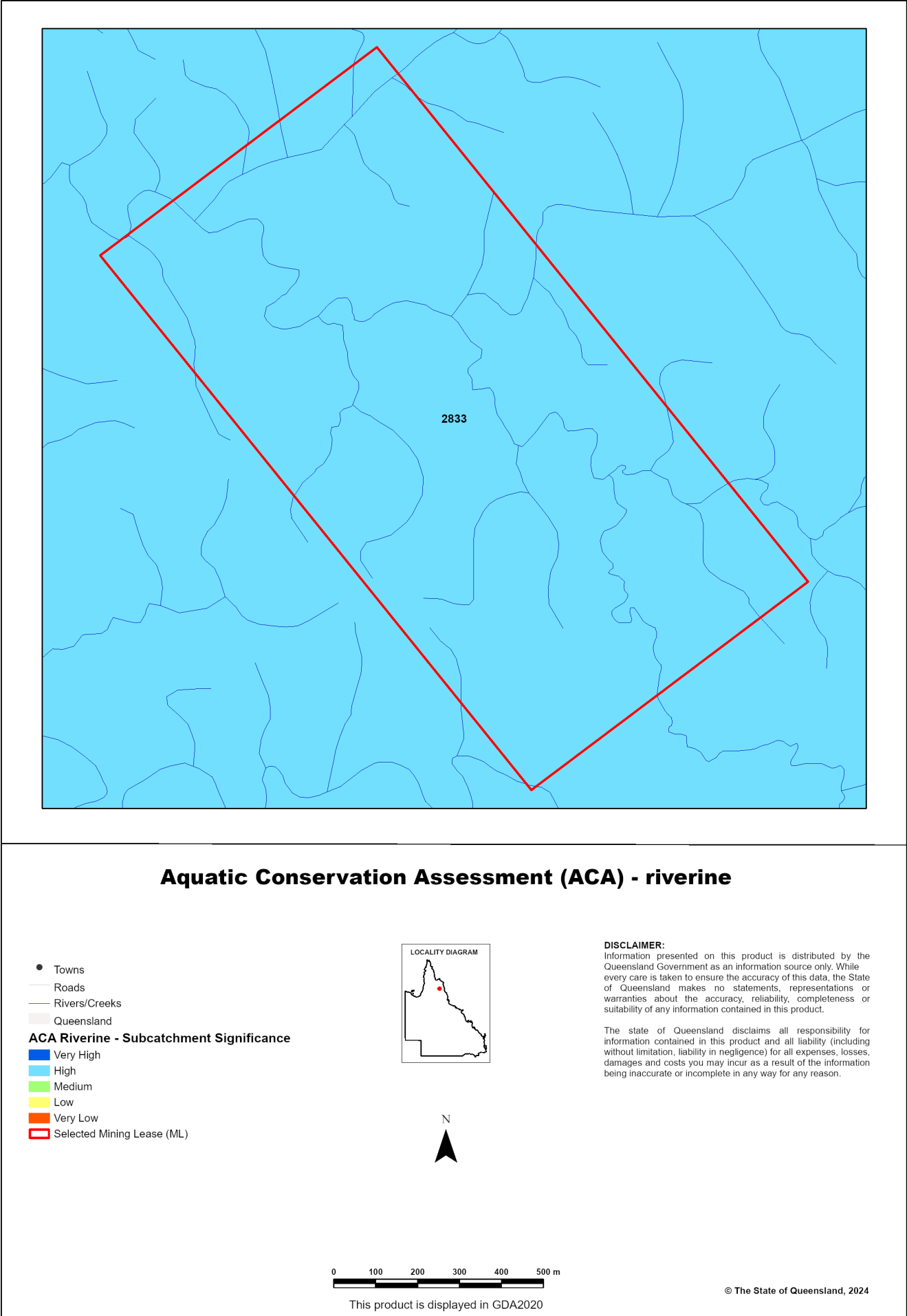
Map 3 - Corridors



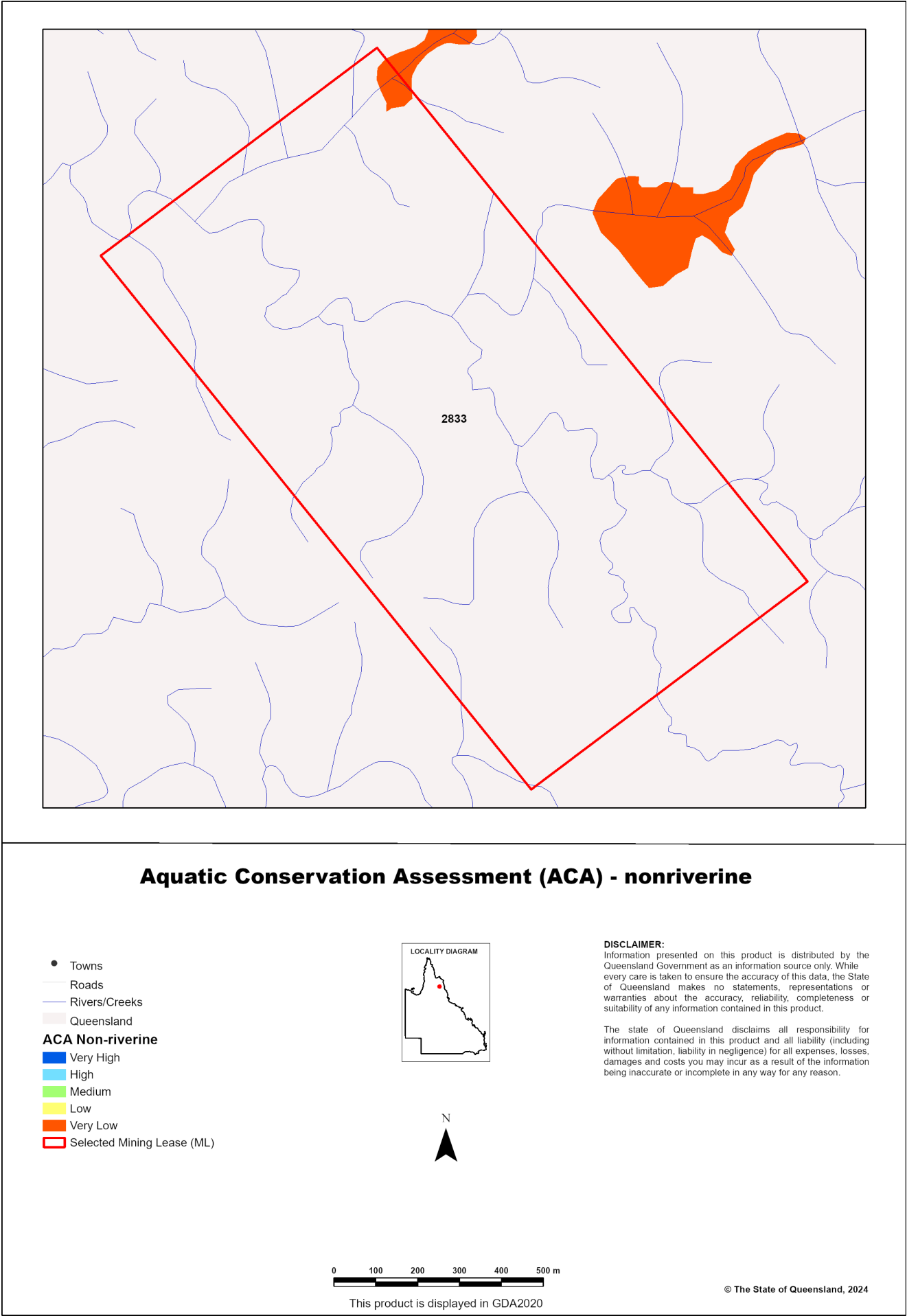
Map 4 - Wetlands and waterways



Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environment and Heritage Protection 2014, *Biodiversity Assessment and Mapping Methodology*. Version 2.2. Department of Environment and Heritage Protection, Brisbane.

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDBB Non-riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1 WBBGBRCC Non-riverine ACA v2.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDBB Riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1 WBBGBRCC Riverine ACA v2.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einiasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DESI	- Department of Environment, Science and Innovation
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA2020	- Geocentric Datum of Australia 2020
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement



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Biodiversity Planning Assessments and Aquatic Conservation Assessments

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ML: 2832

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Details for area of interest: ML: 2832, with area 123.72 ha

Local Government(s)	
Cook Shire	
Bioregion(s)	Subregion(s)
Einasleigh Uplands	Hodgkinson Basin
Catchment(s)	
Mitchell	

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Einasleigh Uplands v1.1	Eastern Gulf of Carpentaria v1.1	Eastern Gulf of Carpentaria v.1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	123.72	100.00

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment, Science and Innovation's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	123.72	100.00

Table 5: Non-riverine wetlands intersecting the AOI

(No Records)

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(No Records)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment, Science and Innovation's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	123.72	100.00

Table 8: Summary table, aquatic conservation significance (non-riverine)

(No Records)

Biodiversity Planning Assessments

Introduction

The Department of Environment, Science and Innovation (DESI) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DESI. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	123.72	100.00

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar

sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	123.72	100.00

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	0.00	0.00	123.72	100.00
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	123.72	100.00	0.00	0.00
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	123.72	100.00	0.00	0.00
C: Tract Size	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	123.72	100.00	0.00	0.00	0.00	0.00	0.00	0.00
D2: Relative RE Size (Subregion)	123.72	100.00	0.00	0.00	0.00	0.00	0.00	0.00
F: Ecosystem Diversity	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
G: Context and Connection	123.72	100.00	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	123.72	100.00

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Id: Limits of Geographic Ranges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ie: High Species Richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;

- Include and maximise connectivity between large tracts/patches of remnant vegetation;
 - Include and maximise connectivity between remnant vegetation in good condition; and
- Riparian
- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
	123.72	100.00

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

(No Records)

Expert panel decision descriptions:

(No Records)

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland Info:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	123.72	100.00

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	123.72	100.00	0.00	0.00
3. Diversity and richness	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	81.90	66.20	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

(No Records)

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Diversity and richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DESI internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.*

***I - wetland indicator species; D - wetland dependent species.*

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

Species	Common name	Identified flora/fauna
Melaleuca fluviatilis		FL

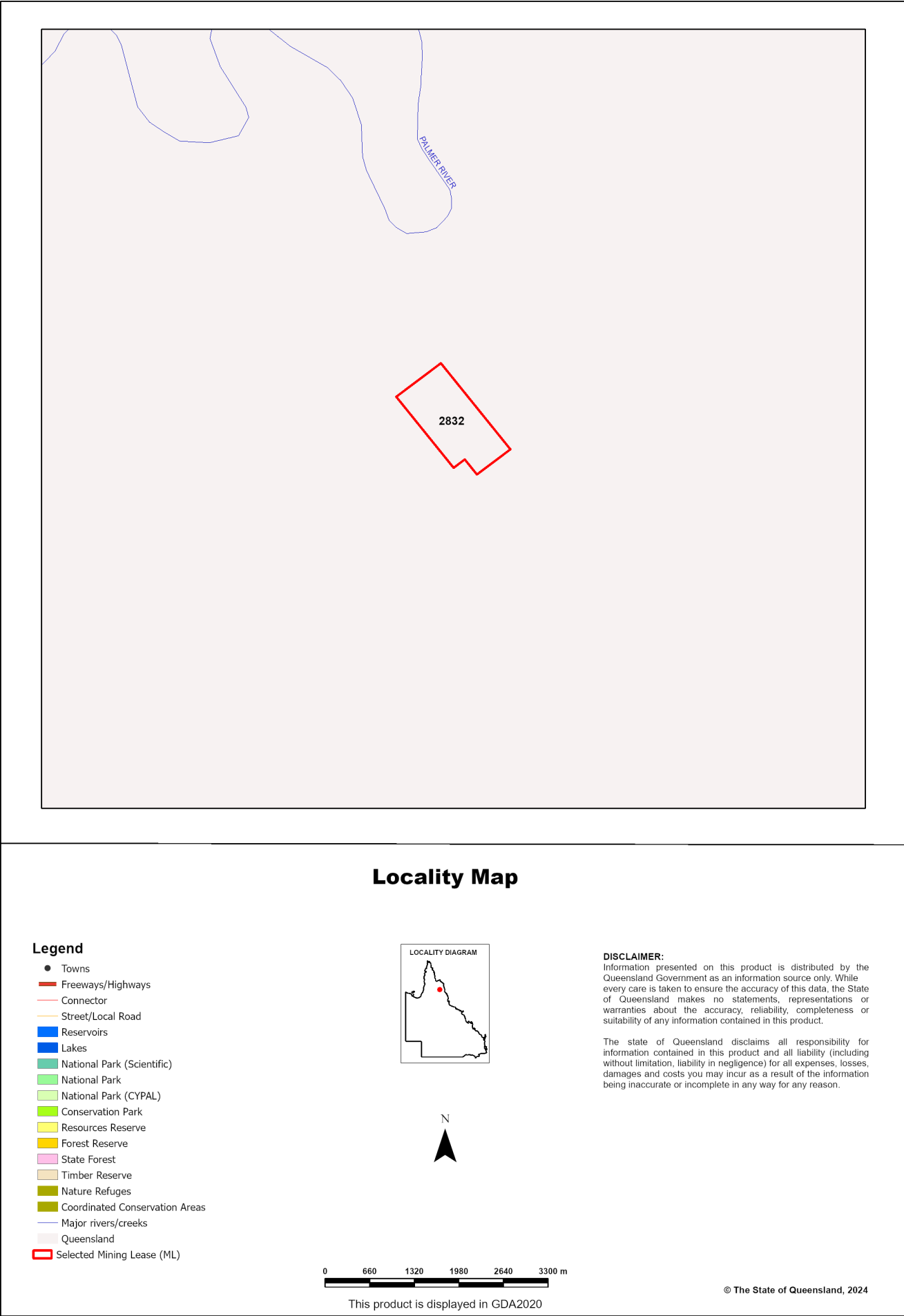
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

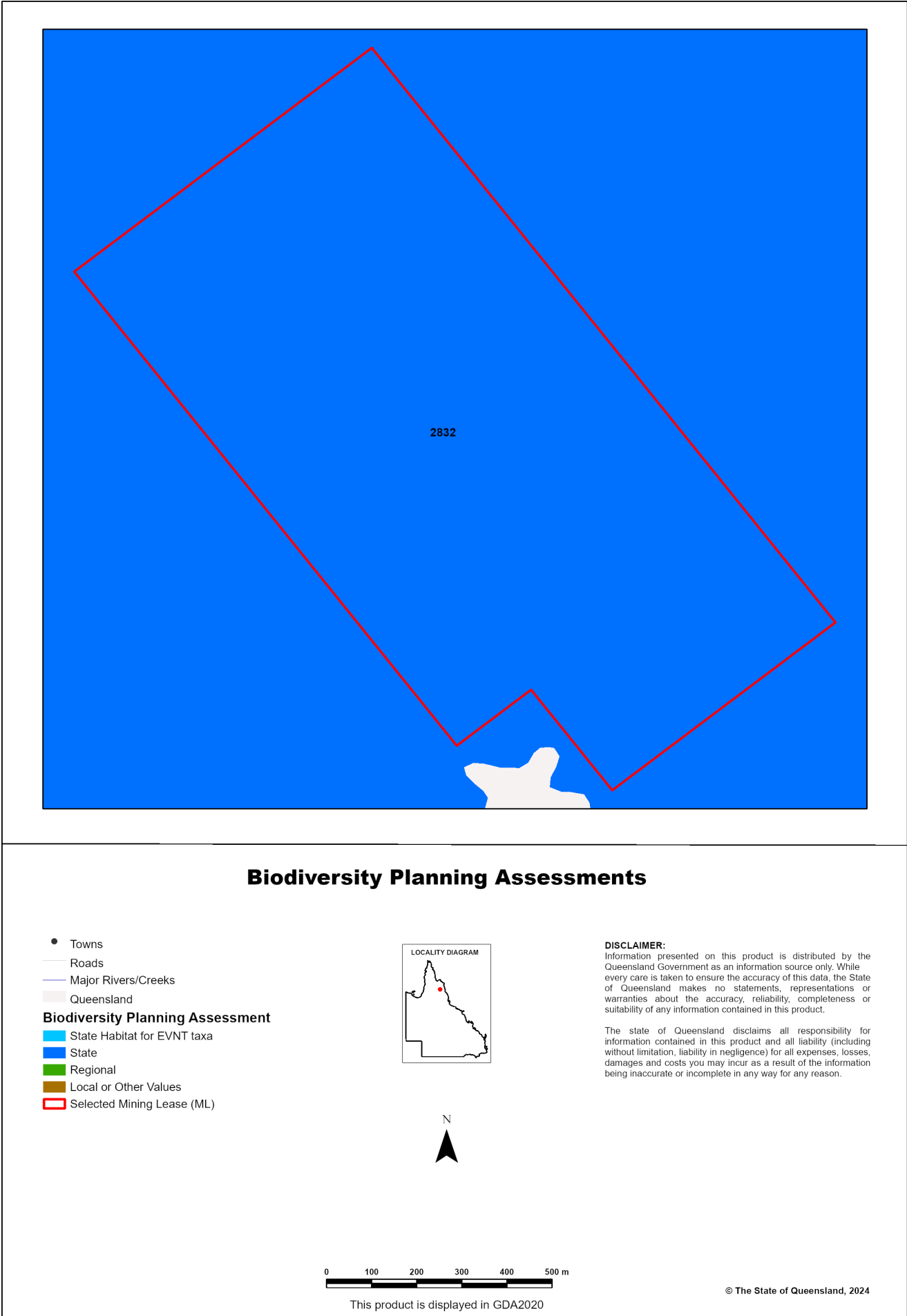
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

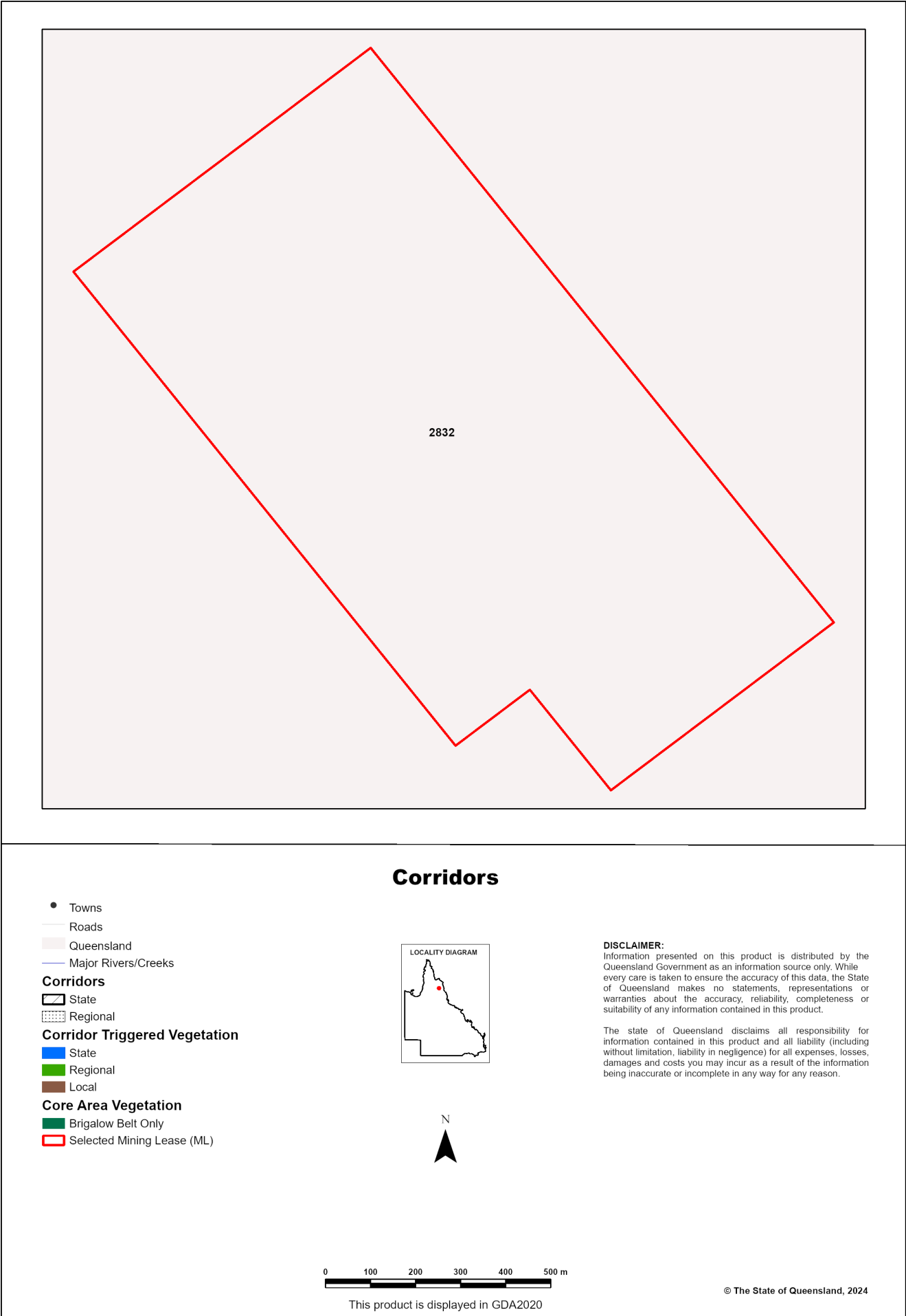
Map 1 - Locality Map



Map 2 - Biodiversity Planning Assessment (BPA)



Map 3 - Corridors



Wetlands and Waterways

● Towns
 — Roads
 ● Springs
 — Rivers/Creeks
 □ Directory of Important Wetlands
 □ Ramsar Sites - QLD

Wetland Type

Hydrologically natural Wetlands

- Lacustrine Wetlands (hydrologically natural)
- Palustrine Wetlands (hydrologically natural)
- Riverine Wetlands (hydrologically natural)
- Intertidal Wetlands (hydrologically natural)
- Subtidal Wetlands (hydrologically natural)
- Intertidal/Subtidal Wetlands (hydrologically natural)

Hydrologically Modified and Artificial Wetlands

- Lacustrine Wetlands (hydrologically modified or artificial)
- Palustrine Wetlands (hydrologically modified or artificial)
- Riverine Wetlands (hydrologically modified or artificial)
- Intertidal Wetlands (hydrologically modified or artificial)
- Subtidal Wetlands (hydrologically modified or artificial)
- Intertidal/Subtidal Wetlands (hydrologically modified or artificial)

Subdominant Wetlands

- Subdominant Wetlands (51 - 80%)

Contains Wetlands

- Contains Wetlands (1 - 50%)

□ Queensland
 □ Selected Mining Lease (ML)

LOCALITY DIAGRAM

N

0 100 200 300 400 500 m

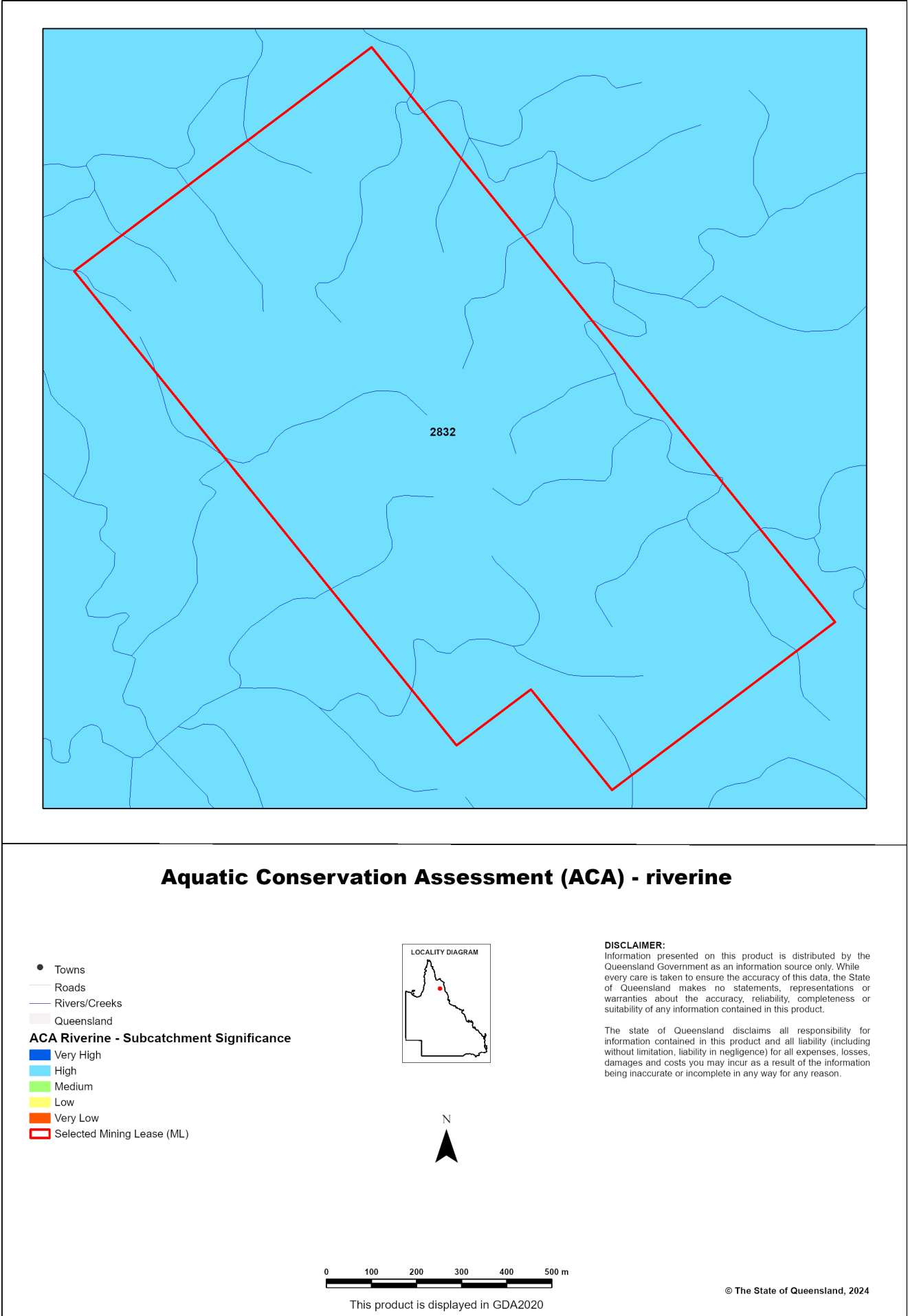
This product is displayed in GDA2020

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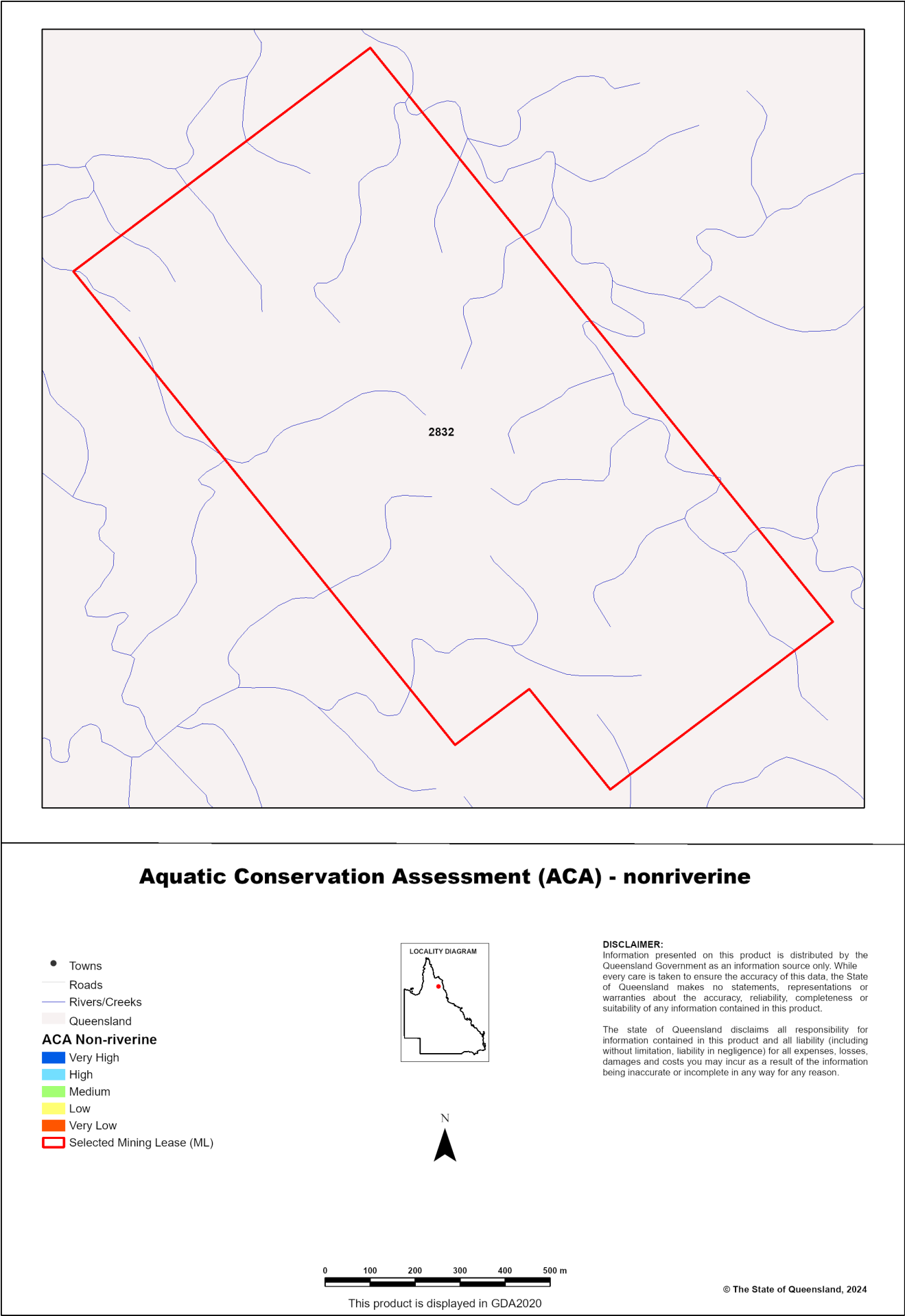
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Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environment and Heritage Protection 2014, *Biodiversity Assessment and Mapping Methodology*. Version 2.2. Department of Environment and Heritage Protection, Brisbane.

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDBB Non-riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1 WBBGBRCC Non-riverine ACA v2.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDBB Riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1 WBBGBRCC Riverine ACA v2.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einiasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DESI	- Department of Environment, Science and Innovation
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA2020	- Geocentric Datum of Australia 2020
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement



Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

ML: 2834

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 2020). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Details for area of interest: ML: 2834, with area 123.72 ha

Local Government(s)	
Cook Shire	
Bioregion(s)	Subregion(s)
Einasleigh Uplands	Hodgkinson Basin
Catchment(s)	
Mitchell	

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Einasleigh Uplands v1.1	Eastern Gulf of Carpentaria v1.1	Eastern Gulf of Carpentaria v.1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	117.41	94.90

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment, Science and Innovation's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	117.41	94.90

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Lacustrine wetlands	2
Total number of non-riverine wetlands	2

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(No Records)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment, Science and Innovation's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	123.72	100.00

Table 8: Summary table, aquatic conservation significance (non-riverine)

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very Low	6.36	5.14

Biodiversity Planning Assessments

Introduction

The Department of Environment, Science and Innovation (DESI) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DESI. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	117.41	94.90

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar

sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	117.41	94.90

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	0.00	0.00	117.41	94.90
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	117.41	94.90	0.00	0.00
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	117.41	94.90	0.00	0.00
C: Tract Size	0.00	0.00	117.41	94.90	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	117.41	94.90	0.00	0.00	0.00	0.00	0.00	0.00
D2: Relative RE Size (Subregion)	117.41	94.90	0.00	0.00	0.00	0.00	0.00	0.00
F: Ecosystem Diversity	0.00	0.00	117.41	94.90	0.00	0.00	0.00	0.00
G: Context and Connection	117.41	94.90	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	117.41	94.90

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Id: Limits of Geographic Ranges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ie: High Species Richness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;

- Include and maximise connectivity between large tracts/patches of remnant vegetation;
 - Include and maximise connectivity between remnant vegetation in good condition; and
- Riparian
- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
	117.41	94.90

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

(No Records)

Expert panel decision descriptions:

(No Records)

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland Info:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<https://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	123.72	100.00

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
2. Naturalness catchment	0.00	0.00	0.00	0.00	123.72	100.00	0.00	0.00
3. Diversity and richness	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	123.72	100.00	0.00	0.00	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	6.18	4.99	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very Low	6.36	5.14

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	0.00	0.00	0.00	0.00	0.00	0.00	6.36	5.14
2. Naturalness catchment	0.00	0.00	0.00	0.00	6.36	5.14	0.00	0.00
3. Diversity and richness	0.00	0.00	0.00	0.00	6.36	5.14	0.00	0.00
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	6.36	5.14
5. Priority species and ecosystems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
(No Records)				

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
(No Records)	

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DESI internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.*

***I - wetland indicator species; D - wetland dependent species.*

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(No Records)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

(No Records)

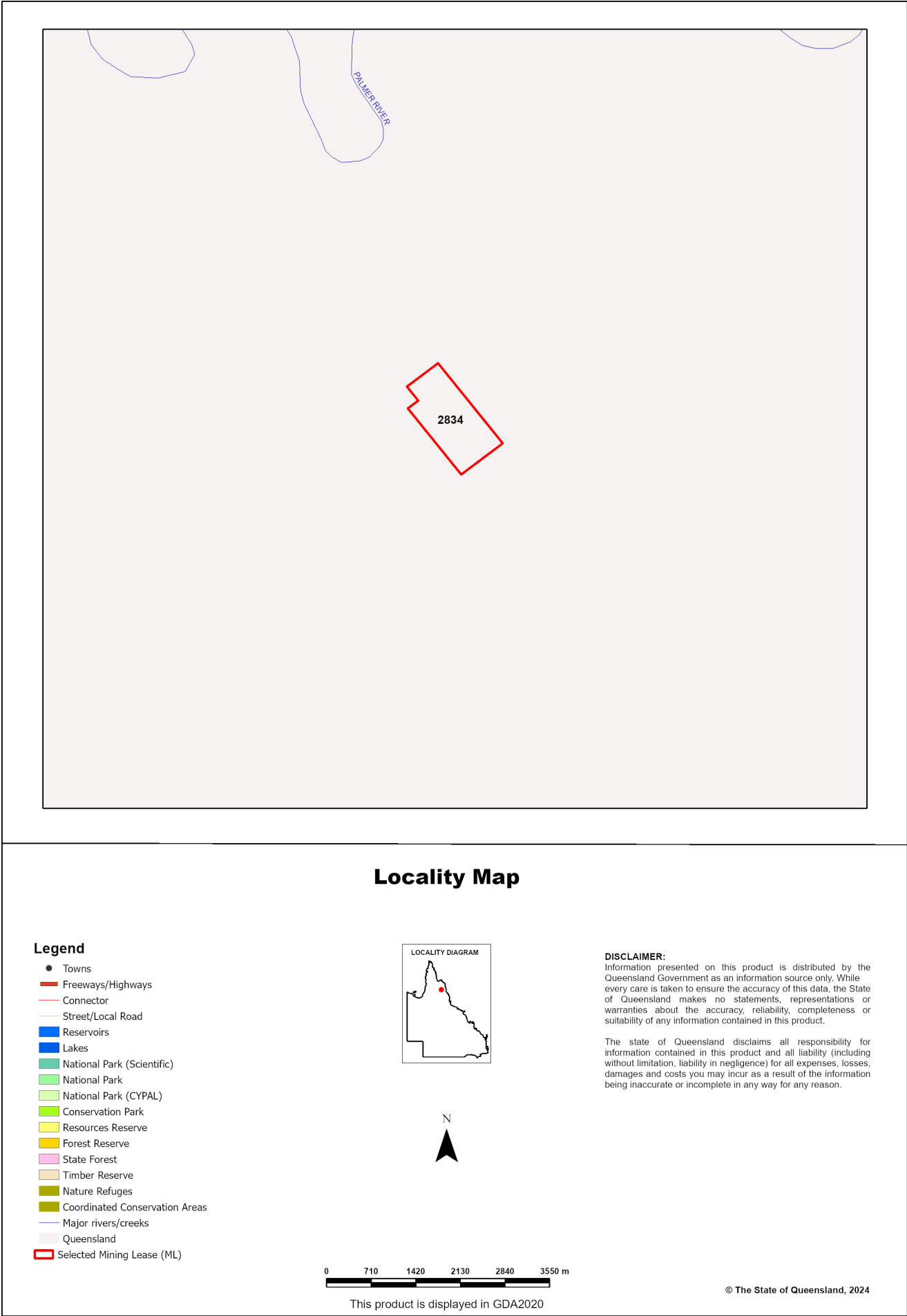
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

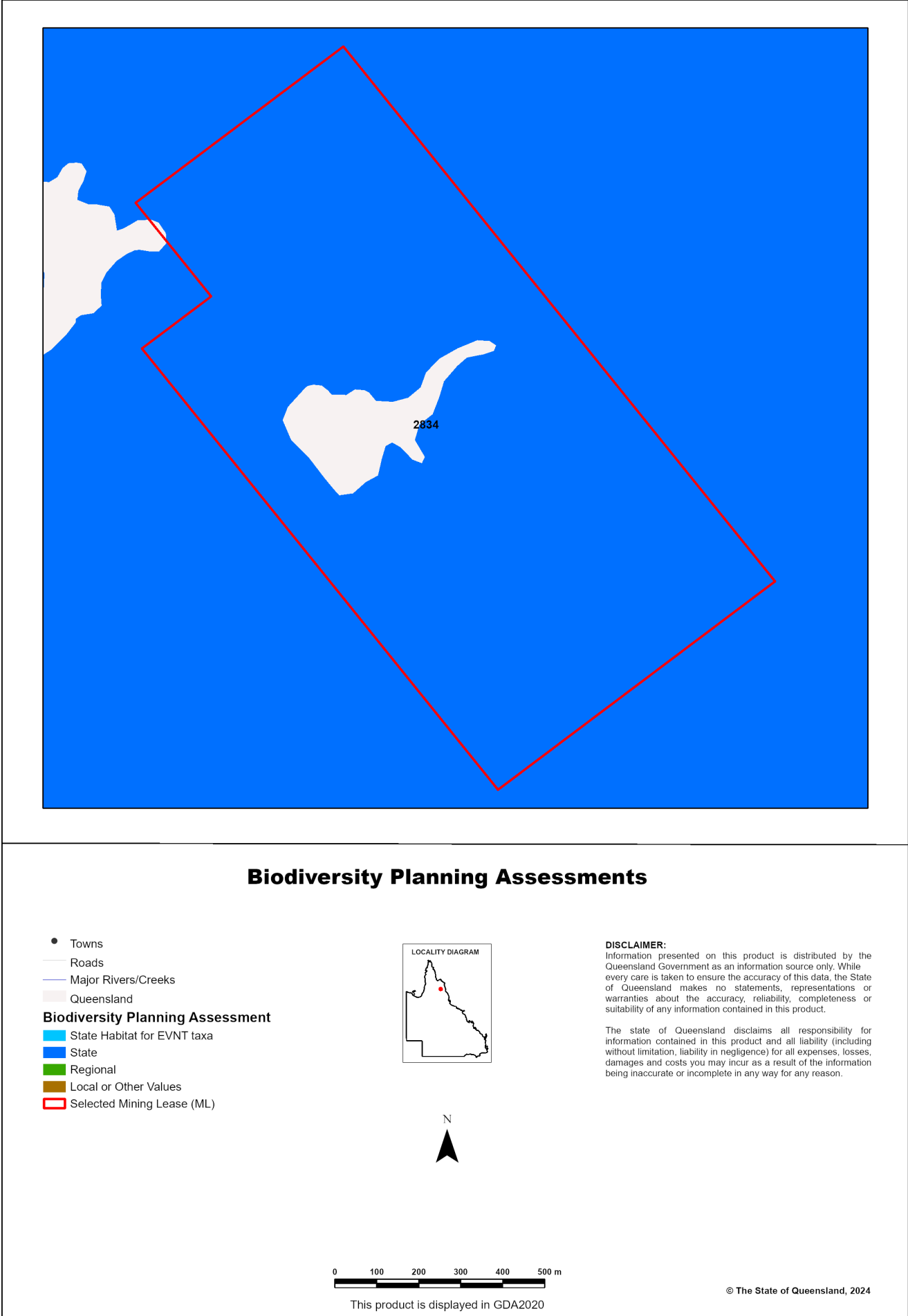
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

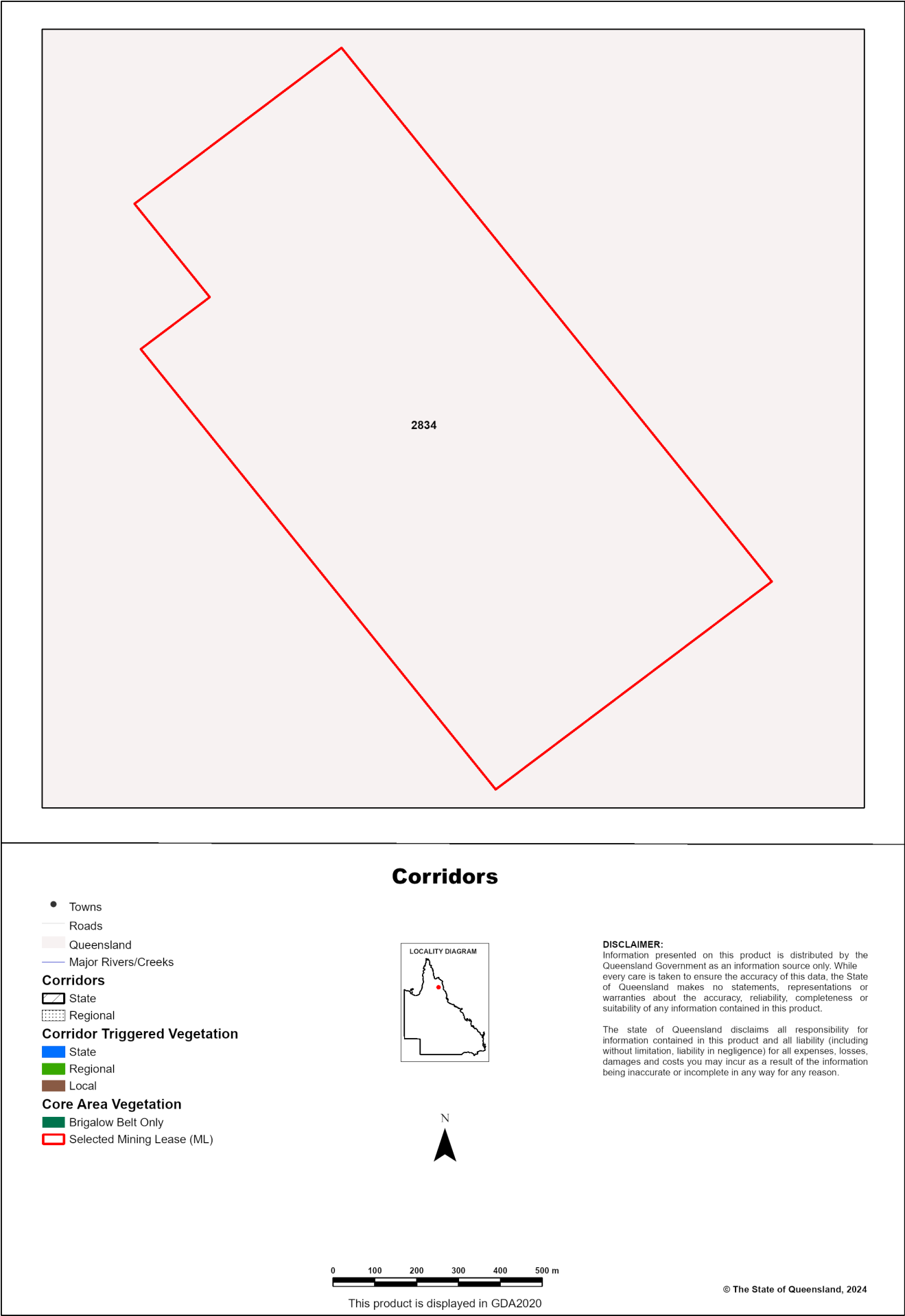
Map 1 - Locality Map



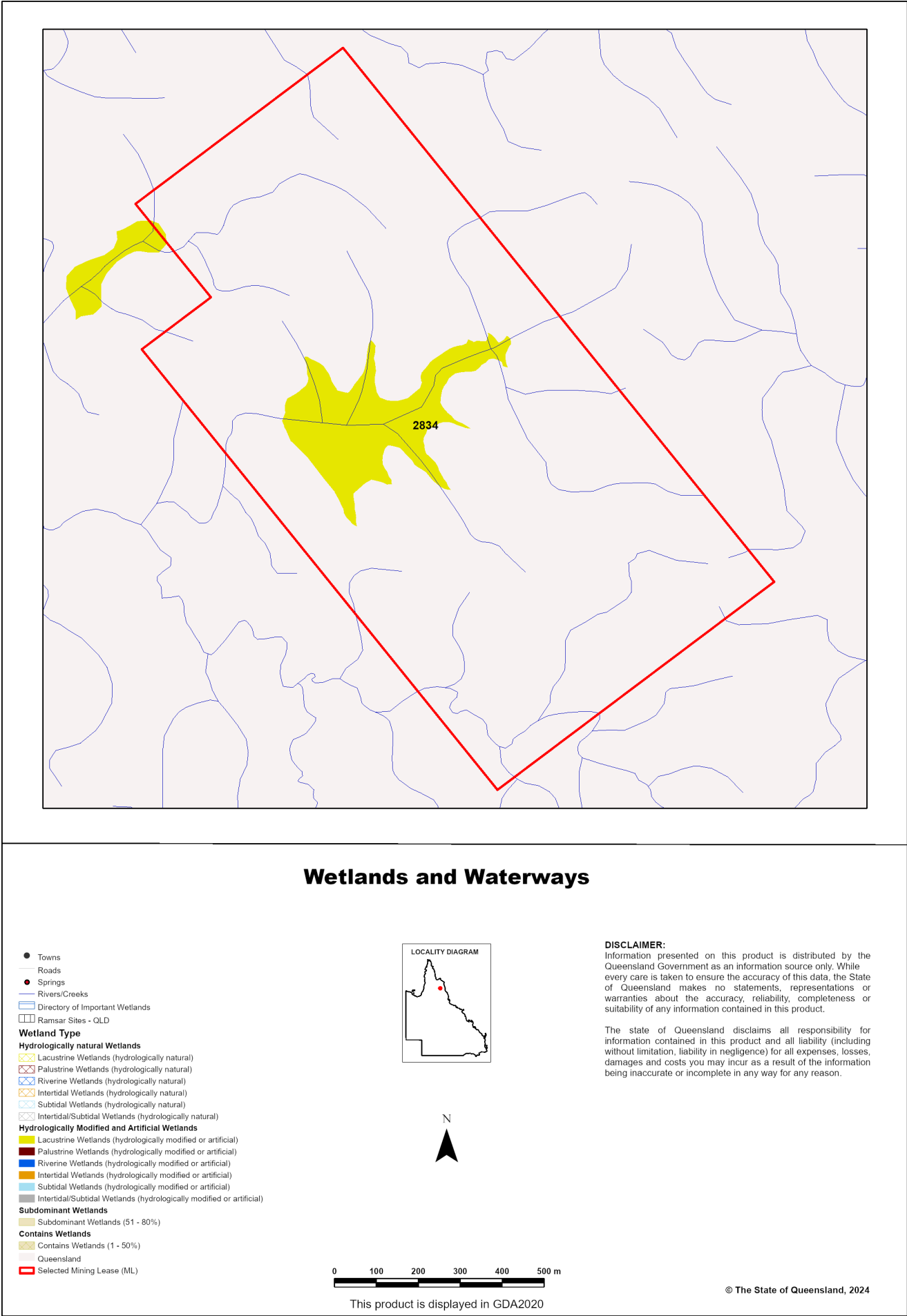
Map 2 - Biodiversity Planning Assessment (BPA)



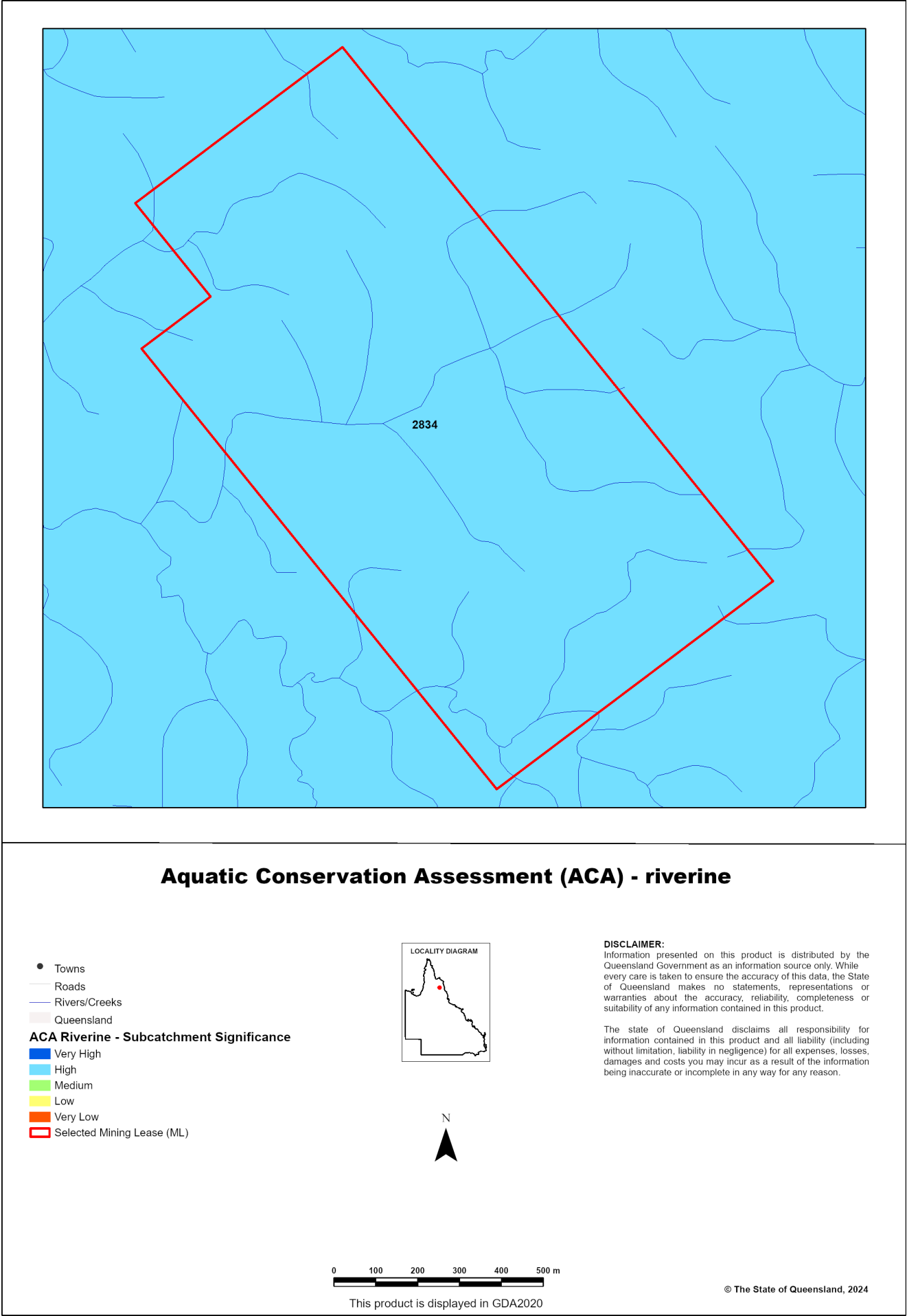
Map 3 - Corridors



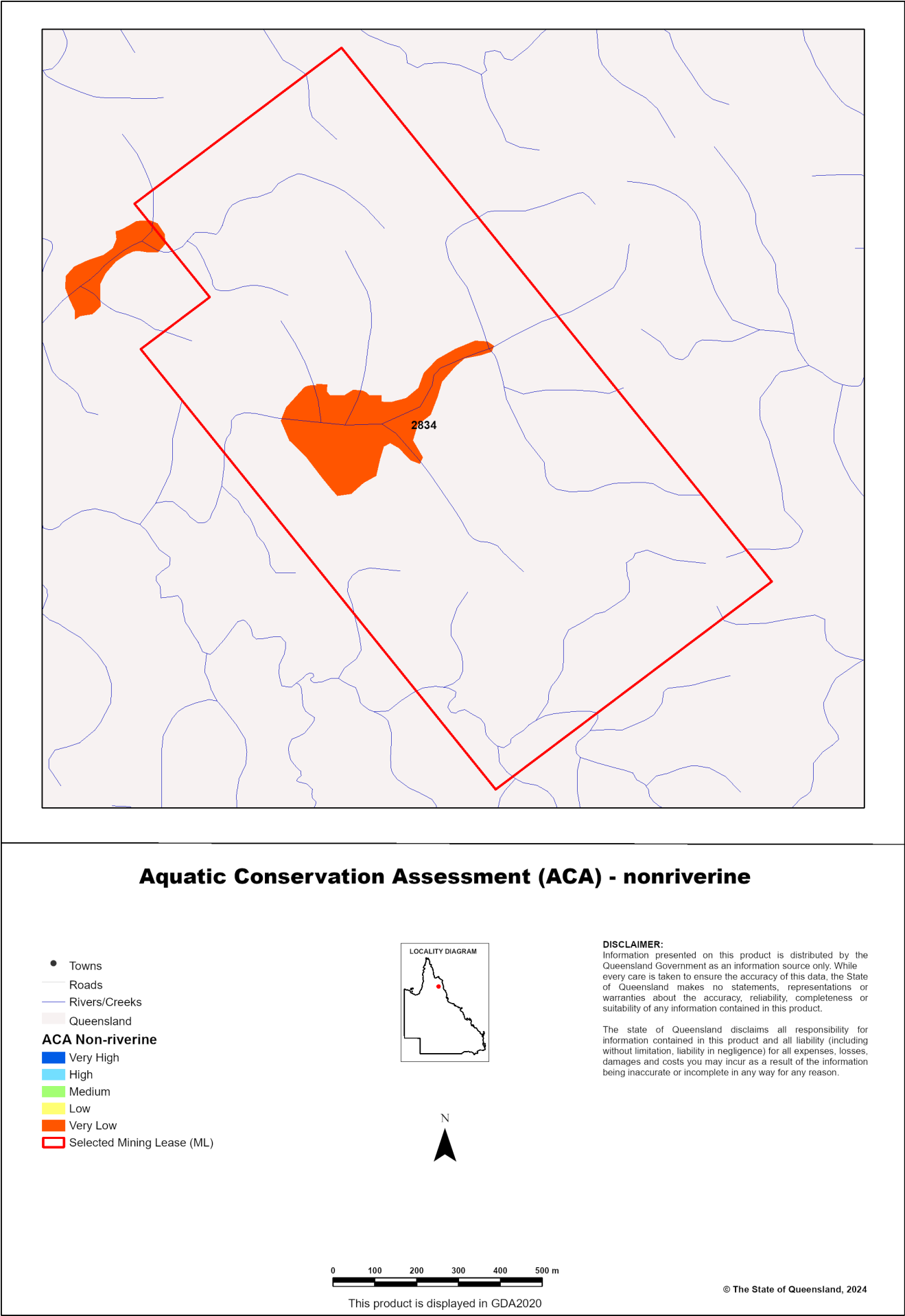
Map 4 - Wetlands and waterways



Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environment and Heritage Protection 2014, *Biodiversity Assessment and Mapping Methodology*. Version 2.2. Department of Environment and Heritage Protection, Brisbane.

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia*. Biodiversity Series, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDBB Non-riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1 WBBGBRCC Non-riverine ACA v2.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDBB Riverine ACA v2.1 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1 WBBGBRCC Riverine ACA v2.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einiasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DESI database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DESI	- Department of Environment, Science and Innovation
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA2020	- Geocentric Datum of Australia 2020
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 01-Aug-2024

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	31
Listed Migratory Species:	20

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	25
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places			[Resource Information]
Name	State	Legal Status	Buffer Status
Indigenous			
Quinkan Country	QLD	Listed place	In buffer area only

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythroriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In feature area
Turnix olivii Buff-breasted Button-quail [59293]	Endangered	Species or species habitat may occur within area	In buffer area only
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
Hipposideros semoni Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Vulnerable	Species or species habitat may occur within area	In feature area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Mesembriomys gouldii rattoides Black-footed Tree-rat (north Queensland), Shaggy Rabbit-rat [87620]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides minor Greater Glider (northern), Greater Glider (north-eastern Queensland) [92008]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Pteropus conspicillatus Spectacled Flying-fox [185]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhinolophus robertsi Large-eared Horseshoe Bat, Greater Large-eared Horseshoe Bat [87639]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare- rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dendrobium carronii listed as Cepobaculum carronii an orchid [10822]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dendrobium johannis Chocolate Tea Tree Orchid [13585]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Macropteranthes montana [9003]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area	In feature area
Tomophyllum walleri [83507]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Vappodes phalaenopsis Cooktown Orchid [78894]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Varanus mertensi Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat known to occur within area	In feature area
SHARK			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area	In feature area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area	In feature area
Monarcha frater Black-winged Monarch [607]		Species or species habitat may occur within area	In buffer area only
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In buffer area only
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]		
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha frater Black-winged Monarch [607]		Species or species habitat may occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In buffer area only
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat likely to occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Reptile			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Palmer Goldfield	Resources Reserve	QLD	In buffer area only

EPBC Act Referrals					[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status	
Arnhem Space Centre Operations (Down Range Recovery)	2023/09657		Assessment	In buffer area only	

Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact us](#) page.

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Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point

Species: All

Type: All

Queensland status: All

Records: All

Date: All

Latitude: -16.0983

Longitude: 144.5176

Distance: 20

Email: jasminek@candrconsulting.com.au

Date submitted: Monday 10 Jun 2024 14:42:09

Date extracted: Monday 10 Jun 2024 14:50:02

The number of records retrieved = 269

Disclaimer

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Information about your Species lists request is logged for quality assurance, user support and product enhancement purposes only.

The information provided should be appropriately acknowledged as being derived from WildNet database when it is used. As the WildNet Program is still in a process of collating and vetting data, it is possible the information given is not complete. Go to the WildNet database webpage (<https://www.qld.gov.au/environment/plants-animals/species-information/wildnet>) to find out more about WildNet and where to access other WildNet information products approved for publication. Feedback about WildNet species lists should be emailed to wildlife.online@des.qld.gov.au.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	<i>Litoria inermis</i>	bumpy rocketfrog		C		1/1
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		1
animals	birds	Acanthizidae	<i>Gerygone olivacea</i>	white-throated gerygone		C		7
animals	birds	Acanthizidae	<i>Gerygone palpebrosa</i>	fairy gerygone		C		1
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		1
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		1
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		7
animals	birds	Accipitridae	<i>Milvus migrans</i>	black kite		C		1
animals	birds	Alcedinidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		8
animals	birds	Alcedinidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		6
animals	birds	Alcedinidae	<i>Todiramphus macleayi</i>	forest kingfisher		C		2
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		1
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		3
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead		C		3
animals	birds	Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck		C		1
animals	birds	Anatidae	<i>Malacorhynchus membranaceus</i>	pink-eared duck		C		1
animals	birds	Anatidae	<i>Nettapus coromandelianus</i>	cotton pygmy-goose		C		1
animals	birds	Anatidae	<i>Nettapus pulchellus</i>	green pygmy-goose		C		5
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		5
animals	birds	Ardeidae	<i>Ardea alba modesta</i>	eastern great egret		C		1
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		3
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		1
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		1
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	nankeen night-heron		C		3
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		1
animals	birds	Artamidae	<i>Artamus minor</i>	little woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus mentalis</i>	black-backed butcherbird		C		1
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	pied butcherbird		C		4
animals	birds	Artamidae	<i>Gymnorhina tibicen</i>	Australian magpie		C		9
animals	birds	Artamidae	<i>Strepera graculina</i>	pied currawong		C		4
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		3
animals	birds	Cacatuidae	<i>Calyptorhynchus banksii</i>	red-tailed black-cockatoo		C		2
animals	birds	Cacatuidae	<i>Eolophus roseicapilla</i>	galah		C		2
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		3
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		5
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		1
animals	birds	Climacteridae	<i>Climacteris picumnus</i>	brown treecreeper		C		1
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		4
animals	birds	Columbidae	<i>Geopelia placida</i>	peaceful dove		C		5
animals	birds	Columbidae	<i>Geophaps scripta peninsulae</i>	squatter pigeon (northern subspecies)		C		1
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		3
animals	birds	Corcoracidae	<i>Struthidea cinerea</i>	apostlebird		C		1
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		7
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		3
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		5
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		1
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		7
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		1
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		1
animals	birds	Jacanidae	<i>Irediparra gallinacea</i>	comb-crested jacana		C		3
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		1
animals	birds	Meliphagidae	<i>Cissomela pectoralis</i>	banded honeyeater		C		2
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		4
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		6
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		8
animals	birds	Meliphagidae	<i>Philemon argenticeps</i>	silver-crowned friarbird		C		2
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		8
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		3
animals	birds	Meliphagidae	<i>Ramsayornis modestus</i>	brown-backed honeyeater		C		1
animals	birds	Meliphagidae	<i>Stomiopera flava</i>	yellow honeyeater		C		4
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		8
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		4
animals	birds	Otididae	<i>Ardeotis australis</i>	Australian bustard		C		2
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		2
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		9
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		2
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		5
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		1
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		3
animals	birds	Phasianidae	<i>Synoicus ypsilophorus</i>	brown quail		C		2
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		4
animals	birds	Podicipedidae	<i>Podiceps cristatus</i>	great crested grebe		C		4
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		2
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		1
animals	birds	Psittaculidae	<i>Aprosmictus erythropterus</i>	red-winged parrot		C		2
animals	birds	Psittaculidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		6
animals	birds	Psittaculidae	<i>Psephotellus chrysopterygius</i>	golden-shouldered parrot		E	E	1
animals	birds	Psittaculidae	<i>Trichoglossus moluccanus</i>	rainbow lorikeet		C		8
animals	birds	Ptilonorhynchidae	<i>Chlamydera nuchalis</i>	great bowerbird		C		6
animals	birds	Rallidae	<i>Fulica atra</i>	Eurasian coot		C		2
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		3
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		4
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		3
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		1
animals	insects	Coenagrionidae	<i>Pseudagrion microcephalum</i>	blue riverdamsel				1
animals	insects	Isostictidae	<i>Austrosticta frater</i>	eastern pondsitter				1/1
animals	insects	Isostictidae	<i>Oristicta rosendaleorum</i>	elegant wiretail				1/1
animals	insects	Isostictidae	<i>Rhadinosticta banksi</i>	northern wiretail				1
animals	insects	Libellulidae	<i>Diplacodes haematodes</i>	scarlet percher				1
animals	insects	Libellulidae	<i>Nannodiplax rubra</i>	pygmy percher				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	insects	Libellulidae	<i>Neurothemis stigmatizans stigmatizans</i>	painted grasshawk				1
animals	insects	Libellulidae	<i>Rhyothemis princeps</i>	sapphire flutterer				1
animals	insects	Nymphalidae	<i>Hypolimnas bolina nerina</i>	varied eggfly				1
animals	insects	Nymphalidae	<i>Junonia orithya albicincta</i>	blue argus				1
animals	insects	Nymphalidae	<i>Melanitis leda bankia</i>	evening brown				1
animals	insects	Nymphalidae	<i>Pantoporia consimilis consimilis</i>	orange plane				1
animals	insects	Nymphalidae	<i>Ypthima arctous arctous</i>	dusky knight				1
animals	insects	Papilionidae	<i>Graphium macfarlanei macfarlanei</i>	green triangle				1
animals	insects	Platycnemididae	<i>Nososticta solida</i>	orange threadtail				1
animals	mammals	Felidae	<i>Felis catus</i>	cat	Y			1
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			1
animals	ray-finned fishes	Eleotridae	<i>Mogurnda adspersa</i>	southern purplespotted gudgeon				1
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>	dubious dtella			C	1/1
animals	reptiles	Scincidae	<i>Carlia rostralis</i>	black-throated rainbow-skink			C	1
animals	reptiles	Scincidae	<i>Carlia vivax</i>	tussock rainbow-skink			C	1
plants	land plants	Acanthaceae	<i>Rostellularia adscendens</i>				C	1/1
plants	land plants	Acanthaceae	<i>Staurogyne spatulata</i>				C	1/1
plants	land plants	Amaranthaceae	<i>Alternanthera denticulata</i>	lesser joyweed			C	1/1
plants	land plants	Anacardiaceae	<i>Buchanania arborescens</i>				C	1/1
plants	land plants	Apocynaceae	<i>Asclepias curassavica</i>	red-head cottonbush	Y			1/1
plants	land plants	Apocynaceae	<i>Cryptostegia grandiflora</i>	rubber vine	Y			1/1
plants	land plants	Apocynaceae	<i>Leichhardtia viridiflora subsp. tropica</i>				C	1/1
plants	land plants	Araliaceae	<i>Trachymene bivistita var. bivistita</i>				C	1/1
plants	land plants	Asteraceae	<i>Acanthospermum hispidum</i>	star burr	Y			1/1
plants	land plants	Asteraceae	<i>Ageratum conyzoides</i>	billygoat weed	Y			1/1
plants	land plants	Asteraceae	<i>Apowollastonia longipes</i>				C	1/1
plants	land plants	Asteraceae	<i>Coronidium</i>					1/1
plants	land plants	Asteraceae	<i>Cyanthillium cinereum</i>				C	1/1
plants	land plants	Asteraceae	<i>Phacellothrix cladochaeta</i>				C	1/1
plants	land plants	Asteraceae	<i>Pterocaulon ciliolum</i>				C	1/1
plants	land plants	Asteraceae	<i>Xanthium occidentale</i>		Y			2/2
plants	land plants	Boraginaceae	<i>Heliotropium collinum</i>				C	1/1
plants	land plants	Campanulaceae	<i>Isotoma petraea</i>	rock isotome			SL	1/1
plants	land plants	Campanulaceae	<i>Wahlenbergia caryophylloides</i>				SL	1/1
plants	land plants	Caryophyllaceae	<i>Polycarpaea spirostylis</i>				C	1/1
plants	land plants	Celastraceae	<i>Siphonodon pendulus</i>				C	2/2
plants	land plants	Colchicaceae	<i>Iphigenia indica</i>				C	1/1
plants	land plants	Combretaceae	<i>Terminalia subacroptera</i>				C	2/2
plants	land plants	Commelinaceae	<i>Cartonema spicatum var. humile</i>				C	1/1
plants	land plants	Commelinaceae	<i>Commelina</i>					1/1
plants	land plants	Convolvulaceae	<i>Ipomoea graminea</i>				C	2/2
plants	land plants	Cucurbitaceae	<i>Luffa aegyptiaca</i>				C	2/2
plants	land plants	Cyperaceae	<i>Cyperus cristulatus</i>				C	1/1
plants	land plants	Cyperaceae	<i>Cyperus cuspidatus</i>				C	1/1
plants	land plants	Cyperaceae	<i>Cyperus javanicus</i>				C	1/1
plants	land plants	Cyperaceae	<i>Cyperus pulchellus</i>				C	1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Cyperaceae	<i>Cyperus squarrosus</i>	bearded flatsedge		C		1/1
plants	land plants	Cyperaceae	<i>Cyperus trinervis</i>			C		3/3
plants	land plants	Cyperaceae	<i>Fimbristylis recta</i>			C		1/1
plants	land plants	Cyperaceae	<i>Rhynchospora pterochaeta</i>			C		1/1
plants	land plants	Dilleniaceae	<i>Hibbertia longifolia</i>			C		1/1
plants	land plants	Droseraceae	<i>Drosera spatulata</i> var. <i>spatulata</i>			SL		1/1
plants	land plants	Eriocaulaceae	<i>Eriocaulon</i>					2/2
plants	land plants	Eriocaulaceae	<i>Eriocaulon pygmaeum</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Euphorbia hirta</i>		Y			1/1
plants	land plants	Euphorbiaceae	<i>Ricinoscarpos verrucosus</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Ricinus communis</i>	castor oil bush	Y			1/1
plants	land plants	Hemerocallidaceae	<i>Tricoryne elatior</i>	yellow autumn lily		C		1/1
plants	land plants	Hypoxidaceae	<i>Curculigo ensifolia</i> var. <i>ensifolia</i>			C		1/1
plants	land plants	Hypoxidaceae	<i>Hypoxis pratensis</i> var. <i>pratensis</i>			C		1/1
plants	land plants	Lauraceae	<i>Cassytha filiformis</i>	dodder laurel		C		2/2
plants	land plants	Lauraceae	<i>Litsea glutinosa</i>			C		1/1
plants	land plants	Leguminosae	<i>Acacia</i>					1/1
plants	land plants	Leguminosae	<i>Acacia auriculiformis</i>	black wattle		C		1/1
plants	land plants	Leguminosae	<i>Acacia guyeri</i>			NT		4/4
plants	land plants	Leguminosae	<i>Acacia holosericea</i>			C		1/1
plants	land plants	Leguminosae	<i>Acacia humifusa</i>			C		3/3
plants	land plants	Leguminosae	<i>Acacia simsii</i>			C		1/1
plants	land plants	Leguminosae	<i>Acacia webbii</i>			C		3/3
plants	land plants	Leguminosae	<i>Aeschynomene indica</i>	budda pea		C		1/1
plants	land plants	Leguminosae	<i>Alysicarpus schomburgkii</i>			C		1/1
plants	land plants	Leguminosae	<i>Austrodolichos errabundus</i>			C		1/1
plants	land plants	Leguminosae	<i>Chamaecrista concinna</i>			C		1/1
plants	land plants	Leguminosae	<i>Chamaecrista mimosoides</i>	dwarf cassia		C		2/2
plants	land plants	Leguminosae	<i>Crotalaria aridicola</i> subsp. <i>aridicola</i>			C		1/1
plants	land plants	Leguminosae	<i>Crotalaria goreensis</i>	gambia pea	Y			1/1
plants	land plants	Leguminosae	<i>Crotalaria medicaginea</i> var. <i>neglecta</i>			C		1/1
plants	land plants	Leguminosae	<i>Crotalaria montana</i> var. <i>angustifolia</i>			C		1/1
plants	land plants	Leguminosae	<i>Galactia tenuiflora</i> forma <i>sericea</i>			C		1/1
plants	land plants	Leguminosae	<i>Glycine cyrtoloba</i>			C		1/1
plants	land plants	Leguminosae	<i>Indigofera hirsuta</i>	hairy indigo		C		1/1
plants	land plants	Leguminosae	<i>Indigofera pratensis</i>			C		1/1
plants	land plants	Leguminosae	<i>Phyllodium hackeri</i>			C		2/2
plants	land plants	Leguminosae	<i>Pycnospora lutescens</i>	pycnospora		C		1/1
plants	land plants	Leguminosae	<i>Senna obtusifolia</i>		Y			1/1
plants	land plants	Leguminosae	<i>Senna occidentalis</i>	coffee senna	Y			1/1
plants	land plants	Leguminosae	<i>Stylosanthes scabra</i>		Y			1/1
plants	land plants	Leguminosae	<i>Tephrosia leptoclada</i>			C		1/1
plants	land plants	Leguminosae	<i>Tephrosia varians</i>			C		1/1
plants	land plants	Leguminosae	<i>Zornia dyctiocarpa</i> var. <i>filifolia</i>			C		1/1
plants	land plants	Lentibulariaceae	<i>Utricularia</i>					4/4
plants	land plants	Linderniaceae	<i>Lindernia alsinoides</i>			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Loranthaceae	<i>Dendrophthoe glabrescens</i>			C		1/1
plants	land plants	Lygodiaceae	<i>Lygodium flexuosum</i>			C		1/1
plants	land plants	Lythraceae	<i>Ammannia multiflora</i>	jerry-jerry		C		1/1
plants	land plants	Lythraceae	<i>Lagerstroemia archeriana subsp. archeriana</i>	native crepe myrtle		C		1/1
plants	land plants	Lythraceae	<i>Rotala mexicana</i>			C		1/1
plants	land plants	Malvaceae	<i>Helicteres</i>					1/1
plants	land plants	Malvaceae	<i>Helicteres sp. (Normanby River J.R.Clarkson+ 7697)</i>			C		1/1
plants	land plants	Malvaceae	<i>Hibiscus graniticus</i>			C		1/1
plants	land plants	Malvaceae	<i>Hibiscus meraukensis</i>	Merauke hibiscus		C		2/2
plants	land plants	Malvaceae	<i>Sida acuta</i>	spinyhead sida	Y			1/1
plants	land plants	Malvaceae	<i>Sida cordifolia</i>		Y			1/1
plants	land plants	Malvaceae	<i>Urena lobata</i>	urena weed	Y			2/2
plants	land plants	Marsileaceae	<i>Marsilea drummondii</i>	common nardoo		C		1/1
plants	land plants	Moraceae	<i>Ficus obliqua</i>			C		1/1
plants	land plants	Moraceae	<i>Ficus virens var. virens</i>			C		1/1
plants	land plants	Myrtaceae	<i>Corymbia erythrophloia</i>	variable-barked bloodwood		C		2/2
plants	land plants	Myrtaceae	<i>Corymbia hylandii</i>			C		2/2
plants	land plants	Myrtaceae	<i>Eucalyptus camaldulensis subsp. simulata</i>			C		1/1
plants	land plants	Myrtaceae	<i>Eucalyptus megasepala</i>			C		2/2
plants	land plants	Myrtaceae	<i>Eucalyptus portuensis</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca fluviatilis</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca leucadendra</i>	broad-leaved tea-tree		C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca monantha</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca trichostachya</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca viridiflora</i>			C		1/1
plants	land plants	Onagraceae	<i>Ludwigia octovalvis</i>	willow primrose		C		2/2
plants	land plants	Ophioglossaceae	<i>Ophioglossum lusitanicum</i>	adder's tongue		C		1/1
plants	land plants	Orchidaceae	<i>Dipodium elegantulum</i>			SL		1/1
plants	land plants	Orobanchaceae	<i>Buchnera gracilis</i>			C		1/1
plants	land plants	Orobanchaceae	<i>Buchnera linearis</i>			C		2/2
plants	land plants	Orobanchaceae	<i>Buchnera tetragona</i>			C		1/1
plants	land plants	Orobanchaceae	<i>Centranthera cochinchinensis</i>			C		1/1
plants	land plants	Orobanchaceae	<i>Rhamphicarpa australiensis</i>			C		2/2
plants	land plants	Orobanchaceae	<i>Striga curviflora</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Cleistanthus xerophilus</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Glochidion disparipes</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Margaritaria dubium-traceyi</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Phyllanthus dallachyanus subsp. (Irvinebank P.I.Forster PIF14675)</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Phyllanthus debilis</i>		Y			1/1
plants	land plants	Phyllanthaceae	<i>Phyllanthus virgatus</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Poranthera microphylla</i>	small poranthera		C		1/1
plants	land plants	Poaceae	<i>Aristida calycina var. praealta</i>			C		1/1
plants	land plants	Poaceae	<i>Aristida utilis var. utilis</i>			C		1/1
plants	land plants	Poaceae	<i>Bothriochloa bladhii subsp. bladhii</i>			C		1/1
plants	land plants	Poaceae	<i>Cymbopogon bombycinus</i>	silky oilgrass		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	<i>Echinochloa colona</i>	awnless barnyard grass	Y			1/1
plants	land plants	Poaceae	<i>Eragrostis schultzei</i>			C		1/1
plants	land plants	Poaceae	<i>Ischaemum rugosum</i> var. <i>segetum</i>			C		1/1
plants	land plants	Poaceae	<i>Melinis repens</i>	red natal grass	Y			2/2
plants	land plants	Poaceae	<i>Mnesithea formosa</i>			C		1/1
plants	land plants	Poaceae	<i>Panicum mindanaense</i>			C		1/1
plants	land plants	Poaceae	<i>Paspalidium distans</i>	shotgrass		C		1/1
plants	land plants	Poaceae	<i>Paspalum scrobiculatum</i>	ditch millet		C		1/1
plants	land plants	Poaceae	<i>Sarga plumosum</i>			C		1/1
plants	land plants	Poaceae	<i>Schizachyrium fragile</i>	firegrass		C		2/2
plants	land plants	Poaceae	<i>Themeda quadrivalvis</i>	grader grass	Y			1/1
plants	land plants	Poaceae	<i>Urochloa holosericea</i>			C		1/1
plants	land plants	Poaceae	<i>Urochloa mosambicensis</i>	sabi grass	Y			1/1
plants	land plants	Polygalaceae	<i>Polygala longifolia</i>			C		1/1
plants	land plants	Proteaceae	<i>Grevillea dryandri</i> subsp. <i>dryandri</i>			C		1/1
plants	land plants	Proteaceae	<i>Persoonia falcata</i>			C		1/1
plants	land plants	Pteridaceae	<i>Adiantum atroviride</i>			SL		1/1
plants	land plants	Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			C		1/1
plants	land plants	Rhamnaceae	<i>Cryptandra filiformis</i>			C		1/1
plants	land plants	Rubiaceae	<i>Atractocarpus sessilis</i>			C		3/3
plants	land plants	Rubiaceae	<i>Larsenaikia ochreatea</i>			C		2/2
plants	land plants	Salicaceae	<i>Homalium brachybotrys</i>			C		1/1
plants	land plants	Santalaceae	<i>Santalum lanceolatum</i>			SL		1/1
plants	land plants	Santalaceae	<i>Santalum lanceolatum</i> var. <i>venosum</i>			C		1/1
plants	land plants	Sapindaceae	<i>Atalaya angustifolia</i>			C		3/3
plants	land plants	Sapotaceae	<i>Sersalisia sericea</i>			C		1/1
plants	land plants	Smilacaceae	<i>Smilax australis</i>	barbed-wire vine		C		1/1
plants	land plants	Solanaceae	<i>Solanum americanum</i>		Y			1/1
plants	land plants	Solanaceae	<i>Solanum multiglochidiatum</i>			C		2/2
plants	land plants	Sparrmanniaceae	<i>Grewia mesomischa</i>			C		1/1
plants	land plants	Sparrmanniaceae	<i>Triumfetta pentandra</i>		Y			1/1
plants	land plants	Sterculiaceae	<i>Brachychiton muellerianus</i>			SL		1/1
plants	land plants	Stylidiaceae	<i>Stylidium confertum</i>			SL		1/1
plants	land plants	Stylidiaceae	<i>Stylidium leiophyllum</i>			SL		1/1
plants	land plants	Thymelaeaceae	<i>Pimelea</i>					1/1
plants	land plants	Thymelaeaceae	<i>Pimelea cornucopiae</i>			C		1/1
plants	land plants	Thymelaeaceae	<i>Pimelea sericostachya</i>			C		1/1
plants	land plants	Vitaceae	<i>Ampelocissus gardineri</i>			C		1/1
plants	land plants	Xyridaceae	<i>Xyris</i>					1/1
plants	land plants	Xyridaceae	<i>Xyris indica</i>			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*.

The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*.

The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).

This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.

Appendix B – Certificate of analyses for sediment samples



CERTIFICATE OF ANALYSIS

Work Order : **EB2335574**
Client : **C & R CONSULTING PTY LTD**
Contact : MR MATT KNOTT
Address : 188 ROSS RIVER ROAD
AITKENVALE QUEENSLAND 4812
Telephone : +61 07 47253751
Project : DCM REMP/AQUATIC ECOLOGY 23020
Order number : ----
C-O-C number : ----
Sampler : JASON SCHAFFER
Site : ----
Quote number : TV/036/22 V4
No. of samples received : 26
No. of samples analysed : 26

Page : 1 of 9
Laboratory : Environmental Division Brisbane
Contact : Madison Forster
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61-7-3243 7222
Date Samples Received : 14-Nov-2023 15:55
Date Analysis Commenced : 20-Nov-2023
Issue Date : 05-Dec-2023 17:16



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Beatriz Llarinas	Senior Chemist - Inorganics	Brisbane Inorganics, Stafford, QLD
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Soil Preparation, Stafford, QLD
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Total Fluoride conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	AQ05	S7	DCM-REMP-S11	S6	AQ01
Sampling date / time					09-Nov-2023 09:50	07-Nov-2023 07:45	07-Nov-2023 13:43	08-Nov-2023 12:15	07-Nov-2023 16:41
Compound	CAS Number	LOR	Unit		EB2335574-001	EB2335574-002	EB2335574-003	EB2335574-004	EB2335574-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		0.9	15.6	18.7	38.0	0.4
EA150: Particle Sizing									
+75µm	----	1	%		70	81	77	38	81
+150µm	----	1	%		69	76	66	31	75
+300µm	----	1	%		68	61	33	23	56
+425µm	----	1	%		67	50	17	20	40
+600µm	----	1	%		66	42	12	17	29
+1180µm	----	1	%		63	34	7	13	14
+2.36mm	----	1	%		47	28	3	8	6
+4.75mm	----	1	%		18	22	<1	3	2
+9.5mm	----	1	%		<1	<1	<1	<1	<1
+19.0mm	----	1	%		<1	<1	<1	<1	<1
+37.5mm	----	1	%		<1	<1	<1	<1	<1
+75.0mm	----	1	%		<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size									
Fines (<75 µm)	----	1	%		30	19	23	62	19
Sand (>75 µm)	----	1	%		18	51	72	29	72
Gravel (>2mm)	----	1	%		52	30	5	9	9
Cobbles (>6cm)	----	1	%		<1	<1	<1	<1	<1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		0.21	0.22	1.34	5.19	0.52



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S1	DCM-AQ-02	AQ04	AQ03	S13
Sampling date / time					08-Nov-2023 14:05	08-Nov-2023 06:30	07-Nov-2023 09:39	07-Nov-2023 09:50	07-Nov-2023 07:50
Compound	CAS Number	LOR	Unit		EB2335574-006	EB2335574-007	EB2335574-008	EB2335574-009	EB2335574-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		41.2	0.3	0.6	0.2	0.2
EA150: Particle Sizing									
+75µm	----	1	%		38	86	98	99	72
+150µm	----	1	%		28	84	97	99	68
+300µm	----	1	%		20	76	94	98	60
+425µm	----	1	%		17	64	91	97	51
+600µm	----	1	%		16	54	86	94	43
+1180µm	----	1	%		13	34	72	81	32
+2.36mm	----	1	%		9	20	44	37	23
+4.75mm	----	1	%		5	11	18	8	12
+9.5mm	----	1	%		<1	<1	<1	<1	<1
+19.0mm	----	1	%		<1	<1	<1	<1	<1
+37.5mm	----	1	%		<1	<1	<1	<1	<1
+75.0mm	----	1	%		<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size									
Fines (<75 µm)	----	1	%		62	14	2	<1	28
Sand (>75 µm)	----	1	%		28	61	45	48	46
Gravel (>2mm)	----	1	%		10	25	53	51	26
Cobbles (>6cm)	----	1	%		<1	<1	<1	<1	<1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		3.20	0.28	0.15	0.09	1.56



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S12	DCM-REMP-S3	AQ06	AQ05 <63µm fraction	S7 <63µm fraction
Sampling date / time				07-Nov-2023 08:23	08-Nov-2023 12:40	08-Nov-2023 07:55	09-Nov-2023 09:50	07-Nov-2023 07:45
Compound	CAS Number	LOR	Unit	EB2335574-011	EB2335574-012	EB2335574-013	EB2335574-014	EB2335574-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	3.7	20.0	2.2	----	----
EA150: Particle Sizing								
+75µm	----	1	%	80	55	97	----	----
+150µm	----	1	%	78	46	96	----	----
+300µm	----	1	%	75	39	91	----	----
+425µm	----	1	%	73	35	83	----	----
+600µm	----	1	%	71	33	75	----	----
+1180µm	----	1	%	69	29	55	----	----
+2.36mm	----	1	%	64	23	26	----	----
+4.75mm	----	1	%	55	12	5	----	----
+9.5mm	----	1	%	<1	<1	<1	----	----
+19.0mm	----	1	%	<1	<1	<1	----	----
+37.5mm	----	1	%	<1	<1	<1	----	----
+75.0mm	----	1	%	<1	<1	<1	----	----
EA150: Soil Classification based on Particle Size								
Fines (<75 µm)	----	1	%	20	45	3	----	----
Sand (>75 µm)	----	1	%	15	30	62	----	----
Gravel (>2mm)	----	1	%	65	25	35	----	----
Cobbles (>6cm)	----	1	%	<1	<1	<1	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	----	----	----	210	230
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	7990	10200
Boron	7440-42-8	50	mg/kg	----	----	----	<50	<50
Arsenic	7440-38-2	5	mg/kg	----	----	----	<5	6
Cadmium	7440-43-9	1	mg/kg	----	----	----	<1	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	19	14



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S12	DCM-REMP-S3	AQ06	AQ05 <63µm fraction	S7 <63µm fraction
Sampling date / time				07-Nov-2023 08:23	08-Nov-2023 12:40	08-Nov-2023 07:55	09-Nov-2023 09:50	07-Nov-2023 07:45
Compound	CAS Number	LOR	Unit	EB2335574-011	EB2335574-012	EB2335574-013	EB2335574-014	EB2335574-015
				Result	Result	Result	Result	Result
EG005(ED093)T: Total Metals by ICP-AES - Continued								
Copper	7440-50-8	5	mg/kg	----	----	----	54	117
Lead	7439-92-1	5	mg/kg	----	----	----	16	24
Nickel	7440-02-0	2	mg/kg	----	----	----	12	14
Zinc	7440-66-6	5	mg/kg	----	----	----	40	65
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	----	----	----	<1	<1
Silver	7440-22-4	0.1	mg/kg	----	----	----	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	----	----	----	190	161
Antimony	7440-36-0	0.1	mg/kg	----	----	----	0.3	0.5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	<0.1	<0.1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	----	----	430	390
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.10	3.51	0.14	----	----
GEO26: Sieving								
-63µm	----	0.01	%	----	----	----	1.74	6.56



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				DCM-REMP-S11 <63µm fraction	S6 <63µm fraction	AQ01 <63µm fraction	S1 <63µm fraction	DCM-AQ-02 <63µm fraction
Sampling date / time				07-Nov-2023 13:43	08-Nov-2023 12:15	07-Nov-2023 16:41	08-Nov-2023 14:05	08-Nov-2023 06:30
Compound	CAS Number	LOR	Unit	EB2335574-016	EB2335574-017	EB2335574-018	EB2335574-019	EB2335574-020
				Result	Result	Result	Result	Result
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	660	1260	180	170	360
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	9000	9890	7780	5720	9710
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Arsenic	7440-38-2	5	mg/kg	7	6	8	<5	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	13	11	18	9	12
Copper	7440-50-8	5	mg/kg	703	3510	14	15	641
Lead	7439-92-1	5	mg/kg	19	20	18	13	23
Nickel	7440-02-0	2	mg/kg	14	9	12	8	14
Zinc	7440-66-6	5	mg/kg	180	168	31	28	183
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	<1	7	<1	<1	<1
Silver	7440-22-4	0.1	mg/kg	<0.1	2.0	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	292	77.8	287	68.6	328
Antimony	7440-36-0	0.1	mg/kg	0.4	0.6	0.3	0.5	0.4
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.8	<0.1	<0.1	<0.1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	410	430	460	420	420
GEO26: Sieving								
-63µm	----	0.01	%	23.5	37.6	10.2	49.4	2.24



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				AQ04 <63µm fraction	AQ03 <63µm fraction	S13 <63µm fraction	S12 <63µm fraction	DCM-REMP-S3 <63µm fraction
Sampling date / time				07-Nov-2023 09:39	07-Nov-2023 09:50	07-Nov-2023 07:50	07-Nov-2023 08:23	08-Nov-2023 12:40
Compound	CAS Number	LOR	Unit	EB2335574-021	EB2335574-022	EB2335574-023	EB2335574-024	EB2335574-025
				Result	Result	Result	Result	Result
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	830	1470	330	260	200
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	9380	7070	9860	9850	11400
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Arsenic	7440-38-2	5	mg/kg	15	15	6	6	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	9	7	11	13	16
Copper	7440-50-8	5	mg/kg	35	172	64	1370	77
Lead	7439-92-1	5	mg/kg	21	15	27	19	23
Nickel	7440-02-0	2	mg/kg	11	9	13	15	18
Zinc	7440-66-6	5	mg/kg	63	91	57	278	392
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	<1	<1	<1	<1	<1
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Manganese	7439-96-5	0.1	mg/kg	346	448	180	256	152
Antimony	7440-36-0	0.1	mg/kg	0.2	0.2	0.5	0.3	0.4
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	490	440	480	440	570
GEO26: Sieving								
-63µm	----	0.01	%	0.56	0.40	9.68	1.70	31.7



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				AQ06 <63µm fraction	----	----	----	----
Sampling date / time				08-Nov-2023 07:55	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2335574-026	-----	-----	-----	-----
Result				----	----	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	360	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	8820	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	24	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	9	----	----	----	----
Copper	7440-50-8	5	mg/kg	25	----	----	----	----
Lead	7439-92-1	5	mg/kg	20	----	----	----	----
Nickel	7440-02-0	2	mg/kg	12	----	----	----	----
Zinc	7440-66-6	5	mg/kg	58	----	----	----	----
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	<1	----	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/kg	728	----	----	----	----
Antimony	7440-36-0	0.1	mg/kg	0.2	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	550	----	----	----	----
GEO26: Sieving								
-63µm	----	0.01	%	0.90	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EK040T: Fluoride Total



CERTIFICATE OF ANALYSIS

Work Order : **EB2414243**
Client : **C & R CONSULTING PTY LTD**
Contact : MR MATT KNOTT
Address : 188 ROSS RIVER ROAD
AITKENVALE QUEENSLAND 4812
Telephone : +61 07 47253751
Project : DCM REMP/AQUATIC ECOLOGY 23076
Order number : ----
C-O-C number : ----
Sampler : JASON SCHAFFER
Site : ----
Quote number : TV/036/22 V5
No. of samples received : 26
No. of samples analysed : 26

Page : 1 of 9
Laboratory : Environmental Division Brisbane
Contact : Madison Forster
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61-7-3243 7222
Date Samples Received : 30-Apr-2024 08:00
Date Analysis Commenced : 30-Apr-2024
Issue Date : 21-May-2024 11:11



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Jarvis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Soil Preparation, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Total Fluoride analysis will be conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				AQ02	S14	AQ05	AQ03	AQ01
Sampling date / time				23-Apr-2024 07:30	23-Apr-2024 09:35	23-Apr-2024 15:25	23-Apr-2024 11:50	24-Apr-2024 09:40
Compound	CAS Number	LOR	Unit	EB2414243-001	EB2414243-002	EB2414243-003	EB2414243-004	EB2414243-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	9.1	16.2	5.1	12.4	46.4
EA150: Particle Sizing								
+75µm	----	1	%	92	76	66	97	42
+150µm	----	1	%	90	73	63	95	30
+300µm	----	1	%	86	68	62	72	17
+425µm	----	1	%	71	63	62	46	13
+600µm	----	1	%	54	57	61	30	11
+1180µm	----	1	%	34	43	53	15	9
+2.36mm	----	1	%	17	27	33	9	7
+4.75mm	----	1	%	3	10	14	7	4
+9.5mm	----	1	%	<1	<1	<1	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size								
Fines (<75 µm)	----	1	%	8	24	34	3	58
Sand (>75 µm)	----	1	%	70	44	26	86	35
Gravel (>2mm)	----	1	%	22	32	39	11	7
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.16	0.53	0.13	0.14	4.04



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S1	S7	S13	S6	S11
Sampling date / time					24-Apr-2024 08:00	22-Apr-2024 10:05	22-Apr-2024 07:30	22-Apr-2024 17:30	22-Apr-2024 15:30
Compound	CAS Number	LOR	Unit		EB2414243-006	EB2414243-007	EB2414243-008	EB2414243-009	EB2414243-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		42.0	22.6	22.0	51.5	23.9
EA150: Particle Sizing									
+75µm	----	1	%		43	72	85	67	91
+150µm	----	1	%		30	68	84	53	89
+300µm	----	1	%		20	57	83	39	67
+425µm	----	1	%		16	49	82	34	53
+600µm	----	1	%		15	42	81	31	44
+1180µm	----	1	%		12	33	71	28	33
+2.36mm	----	1	%		8	26	52	23	23
+4.75mm	----	1	%		4	18	36	13	14
+9.5mm	----	1	%		<1	<1	<1	<1	<1
+19.0mm	----	1	%		<1	<1	<1	<1	<1
+37.5mm	----	1	%		<1	<1	<1	<1	<1
+75.0mm	----	1	%		<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size									
Fines (<75 µm)	----	1	%		57	28	15	33	9
Sand (>75 µm)	----	1	%		34	44	27	42	65
Gravel (>2mm)	----	1	%		9	28	58	25	26
Cobbles (>6cm)	----	1	%		<1	<1	<1	<1	<1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		2.68	1.02	0.13	2.32	0.15



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S3	AQ06	S12	AQ02 <63µm fraction	S14 <63µm fraction
Sampling date / time				24-Apr-2024 10:15	23-Apr-2024 16:00	22-Apr-2024 13:30	23-Apr-2024 07:30	23-Apr-2024 09:35
Compound	CAS Number	LOR	Unit	EB2414243-011	EB2414243-012	EB2414243-013	EB2414243-014	EB2414243-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	36.9	15.1	0.4	----	----
EA150: Particle Sizing								
+75µm	----	1	%	60	61	84	----	----
+150µm	----	1	%	46	58	77	----	----
+300µm	----	1	%	31	50	58	----	----
+425µm	----	1	%	25	45	49	----	----
+600µm	----	1	%	21	41	44	----	----
+1180µm	----	1	%	16	32	41	----	----
+2.36mm	----	1	%	10	21	37	----	----
+4.75mm	----	1	%	4	12	22	----	----
+9.5mm	----	1	%	<1	<1	<1	----	----
+19.0mm	----	1	%	<1	<1	<1	----	----
+37.5mm	----	1	%	<1	<1	<1	----	----
+75.0mm	----	1	%	<1	<1	<1	----	----
EA150: Soil Classification based on Particle Size								
Fines (<75 µm)	----	1	%	40	39	16	----	----
Sand (>75 µm)	----	1	%	48	37	46	----	----
Gravel (>2mm)	----	1	%	12	24	38	----	----
Cobbles (>6cm)	----	1	%	<1	<1	<1	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	----	----	----	760	350
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	11900	14600
Boron	7440-42-8	50	mg/kg	----	----	----	<50	<50
Arsenic	7440-38-2	5	mg/kg	----	----	----	8	6
Cadmium	7440-43-9	1	mg/kg	----	----	----	<1	2
Chromium	7440-47-3	2	mg/kg	----	----	----	14	15



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S3	AQ06	S12	AQ02 <63µm fraction	S14 <63µm fraction
Sampling date / time				24-Apr-2024 10:15	23-Apr-2024 16:00	22-Apr-2024 13:30	23-Apr-2024 07:30	23-Apr-2024 09:35
Compound	CAS Number	LOR	Unit	EB2414243-011	EB2414243-012	EB2414243-013	EB2414243-014	EB2414243-015
				Result	Result	Result	Result	Result
EG005(ED093)T: Total Metals by ICP-AES - Continued								
Copper	7440-50-8	5	mg/kg	----	----	----	245	1480
Lead	7439-92-1	5	mg/kg	----	----	----	23	17
Nickel	7440-02-0	2	mg/kg	----	----	----	15	18
Zinc	7440-66-6	5	mg/kg	----	----	----	114	376
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	----	----	----	<1	<1
Silver	7440-22-4	0.1	mg/kg	----	----	----	<0.1	0.1
Manganese	7439-96-5	0.1	mg/kg	----	----	----	297	259
Antimony	7440-36-0	0.1	mg/kg	----	----	----	0.4	0.2
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	<0.1	<0.1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	----	----	610	460
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	1.27	0.48	0.23	----	----
GEO26: Sieving								
-63µm	----	0.01	%	----	----	----	2.03	11.9



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				AQ05 <63µm fraction	AQ03 <63µm fraction	AQ01 <63µm fraction	S1 <63µm fraction	S7 <63µm fraction
Sampling date / time				23-Apr-2024 15:25	23-Apr-2024 11:50	24-Apr-2024 09:40	24-Apr-2024 08:00	22-Apr-2024 10:05
Compound	CAS Number	LOR	Unit	EB2414243-016	EB2414243-017	EB2414243-018	EB2414243-019	EB2414243-020
				Result	Result	Result	Result	Result
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	630	490	450	290	310
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	11300	10900	9230	10400	10500
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Arsenic	7440-38-2	5	mg/kg	6	9	22	5	5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	26	11	19	14	15
Copper	7440-50-8	5	mg/kg	92	266	19	22	101
Lead	7439-92-1	5	mg/kg	20	19	19	20	20
Nickel	7440-02-0	2	mg/kg	17	12	13	14	13
Zinc	7440-66-6	5	mg/kg	65	96	44	47	54
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	<1	<1	<1	<1	<1
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	257	168	197	109	140
Antimony	7440-36-0	0.1	mg/kg	0.3	0.1	0.3	0.4	0.3
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	420	480	300	480	390
GEO26: Sieving								
-63µm	----	0.01	%	1.18	7.77	33.0	40.3	20.4



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S13 <63µm fraction	S6 <63µm fraction	S11 <63µm fraction	S3 <63µm fraction	AQ06 <63µm fraction
Sampling date / time				22-Apr-2024 07:30	22-Apr-2024 17:30	22-Apr-2024 15:30	24-Apr-2024 10:15	23-Apr-2024 16:00
Compound	CAS Number	LOR	Unit	EB2414243-021	EB2414243-022	EB2414243-023	EB2414243-024	EB2414243-025
				Result	Result	Result	Result	Result
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	500	790	430	300	380
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	11900	9180	12200	11300	11800
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Arsenic	7440-38-2	5	mg/kg	9	7	8	<5	6
Cadmium	7440-43-9	1	mg/kg	<1	2	2	<1	<1
Chromium	7440-47-3	2	mg/kg	16	13	14	12	10
Copper	7440-50-8	5	mg/kg	114	3170	1070	41	26
Lead	7439-92-1	5	mg/kg	24	20	22	27	22
Nickel	7440-02-0	2	mg/kg	17	12	18	16	13
Zinc	7440-66-6	5	mg/kg	78	247	318	585	63
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	<1	2	<1	<1	<1
Silver	7440-22-4	0.1	mg/kg	<0.1	0.8	0.1	<0.1	<0.1
Manganese	7439-96-5	0.1	mg/kg	320	107	403	206	201
Antimony	7440-36-0	0.1	mg/kg	0.5	0.4	0.3	0.3	0.2
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	380	260	480	420	480
GEO26: Sieving								
-63µm	----	0.01	%	1.80	16.8	1.69	31.9	13.3



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S12 <63µm fraction	----	----	----	----
Sampling date / time				22-Apr-2024 13:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2414243-026	-----	-----	-----	-----
Result				----	----	----	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	670	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	10400	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	6	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	13	----	----	----	----
Copper	7440-50-8	5	mg/kg	852	----	----	----	----
Lead	7439-92-1	5	mg/kg	20	----	----	----	----
Nickel	7440-02-0	2	mg/kg	14	----	----	----	----
Zinc	7440-66-6	5	mg/kg	185	----	----	----	----
EG020T: Total Metals by ICP-MS								
Selenium	7782-49-2	1	mg/kg	<1	----	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----
Manganese	7439-96-5	0.1	mg/kg	253	----	----	----	----
Antimony	7440-36-0	0.1	mg/kg	0.3	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	430	----	----	----	----
GEO26: Sieving								
-63µm	----	0.01	%	4.95	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EK040T: Fluoride Total

Appendix C – Macroinvertebrate data

Table C1: Macroinvertebrate data collected from bed and composite habitat in November 2023.

Phylum	Class/order	Family	SIGNAL grade	S1 bed	AQ06 composite	AQ03a bed	S11 bed
Annelida	Oligochaeta	Oligochaeta	2	0	4	0	0
Acarina	Acarina	Hydracarina	6	21	3	20	0
Arthropoda	Cladocera	Cladocera	5.5	2	0	8	0
Arthropoda	Copepoda	Copepoda	5.5	3	2	13	0
Arthropoda	Collembola	Collembola	1	1	0	0	0
Crustacea	Ostracoda	Ostracoda	5.5	2	1	0	0
Crustacea	Decapoda	Atyidae	3	0	1	0	0
Crustacea	Decapoda	Palaemonidae	4	0	6	4	0
Crustacea	Decapoda	Parastacidae	4	0	0	0	0
Insecta	Coleoptera	Dytiscidae	2	7	6	0	0
Insecta	Coleoptera	Hydrochidae	4	0	2	0	0
Insecta	Diptera	Ceratopogonidae	4	0	1	0	1
Insecta	Chironomidae	Chironominae	3	4	15	1	14
Insecta	Chironomidae	Orthocladiinae	4	0	0	0	0
Insecta	Chironomidae	Tanypodiinae	4	2	9	4	4
Insecta	Ephemeroptera	Baetidae	5	3	0	7	1
Insecta	Ephemeroptera	Caenidae	4	0	0	0	0
Insecta	Ephemeroptera	Leptophlebiidae	8	0	0	2	0
Insecta	Ephemeroptera	Corixidae	2	1	0	0	0
Insecta	Ephemeroptera	Micronectidae	2	4	3	0	0
Insecta	Ephemeroptera	Pleidae	2	3	1	0	0
Insecta	Ephemeroptera	Veliidae	3	0	0	1	0
Insecta	Ephemeroptera	Corduliidae	5	0	0	0	2
Insecta	Ephemeroptera	Gomphidae	5	0	1	0	0
Insecta	Ephemeroptera	Libellulidae	4	0	0	0	2

Phylum	Class/order	Family	SIGNAL grade	S1 bed	AQ06 composite	AQ03a bed	S11 bed
Insecta	Zygoptera	Coenagrionidae	2	0	1	0	0
Insecta	Zygoptera	Ecnomidae	4	0	1	0	0
Insecta	Zygoptera	Leptoceridae	6	0	2	0	0
Mollusca	Gastropoda	Lymnaeidae	1	2	1	0	0
Mollusca	Gastropoda	Planorbidae	2	0	0	0	0

Table C2: Macroinvertebrate data collected from bed and edge habitats in April 2024.

Phylum	Class/order	Family	SIGNAL grade	S1 comp	S7	S11	S12	S13	AQ06		AQ03		AQ01	AQ02	S14
				1	Bed	Bed	Bed	Bed	Bed	Edge	Bed	Edge	Bed	Bed	Bed
Acarina	Acarina	Hydracarina	6	19	8	0	1	1	3	5	10	10	1	3	2
Annelida	Annelida	Oligochaeta	2	2	0	0	0	0	2	3	6	0	7	0	0
Arthropoda	Cladocera	Cladocera	5.5	11	1	0	0	0	0	3	0	0	0	0	0
Arthropoda	Copepoda	Copepoda	5.5	3	2	0	0	2	1	1	0	2	4	1	0
Arthropoda	Ostracoda	Ostracoda	5.5	2	1	0	0	1	0	0	0	0	6	0	0
Arthropoda	Conchostraca	Conchostraca	1	2	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Decapoda	Atyidae	3	0	0	0	0	0	1	0	0	0	0	0	0
Arthropoda	Decapoda	Palaemonidae	4	0	1	1	0	0	1	0	0	0	0	0	0
Arthropoda	Decapoda	Parathelphusidae	3	0	0	0	0	2	0	0	0	0	0	0	0
Insecta	Coleoptera	Dytiscidae	2	3	2	8	8	0	3	0	1	0	2	16	3
Insecta	Coleoptera	Hydraenidae	3	0	0	0	0	0	0	0	0	0	1	0	0
Insecta	Coleoptera	Hydrochidae	4	0	0	0	0	0	0	0	4	0	0	0	0
Insecta	Coleoptera	Hydrophilidae	2	1	0	1	0	0	0	0	0	0	0	1	0
Insecta	Diptera	Ceratopogonidae	4	1	0	0	1	2	0	0	0	0	0	0	0
Insecta	Diptera	Chaoboridae	2	1	0	0	0	0	0	0	0	0	0	0	0
Insecta	Chironomidae	Chironominae	3	3	0	0	0	2	4	0	0	3	8	2	0
Insecta	Chironomidae	Orthoclaadiinae	4	0	0	0	0	0	0	2	0	0	0	0	0
Insecta	Chironomidae	Tanytopodiinae	4	6	0	1	0	5	0	4	0	3	13	1	0
Insecta	Diptera	Culicidae	1	14	0	0	0	1	0	0	0	0	0	0	0
Insecta	Diptera	Tipulidae	5	0	0	0	0	0	0	0	1	0	0	0	0
Insecta	Ephemeroptera	Baetidae	5	11	1	0	0	12	10	13	2	18	1	1	0
Insecta	Ephemeroptera	Caenidae	4	0	11	0	0	37	33	32	4	8	1	1	0

Phylum	Class/order	Family	SIGNAL grade	S1 comp	S7	S11	S12	S13	AQ06		AQ03		AQ01	AQ02	S14
				1	Bed	Bed	Bed	Bed	Bed	Edge	Bed	Edge	Bed	Bed	Bed
Insecta	Ephemeroptera	Leptophlebiidae	8	0	0	0	0	4	22	2	0	0	0	0	0
Insecta	Hemiptera	Gerridae	4	0	0	0	0	0	0	1	1	0	1	0	0
Insecta	Hemiptera	Micronectidae	2	1	7	0	0	0	0	3	0	0	5	3	0
Insecta	Hemiptera	Pleidae	2	6	0	0	0	1	0	0	0	0	0	0	0
Insecta	Hemiptera	Veliidae	3	0	0	0	0	0	0	0	0	0	2	0	0
Insecta	Odonata	Gomphidae	5	0	7	0	0	0	4	4	0	1	0	1	0
Insecta	Odonata	Libellulidae	4	3	1	0	2	0	0	3	6	4	20	1	1
Insecta	Zygoptera	Coenagrionidae	2	23	0	0	0	1	0	0	0	2	8	0	0
Insecta	Trichoptera	Ecnomidae	4	0	1	0	0	0	1	1	0	0	0	0	0
Insecta	Trichoptera	Hydropsychidae	6	0	0	0	0	1	0	0	0	0	0	0	0
Insecta	Trichoptera	Leptoceridae	6	1	0	0	0	0	1	0	2	2	0	0	0
Insecta	Trichoptera	Philopotamidae	8	0	0	0	0	0	0	0	0	1	0	0	0
Mollusca	Gastropoda	Lymnaeidae	1	1	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Planorbidae	2	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Hyriidae	5	0	0	0	1	0	0	0	0	0	0	0	0
Platyhelminthes	Turbellaria	Temnocephalidae	5	0	0	0	0	9	0	0	0	0	0	0	0



***Macrobrachium australiense* (freshwater prawn)** is one of the most widespread freshwater invertebrates in Australia, distributed throughout half of the continent, including the major inland drainages and in most of the northwestern, northeastern and central-eastern coastal drainages (Murphy and Austin, 2004). Although *Macrobrachium australiense* is an entirely-freshwater species, *Macrobrachium* is a diverse genus with some species inhabiting marine systems, generally utilising estuarine and intertidal areas (Jones and Morgan, 2002).



***Cherax quadricarinatus* (redclaw crayfish)** is native to northwestern Queensland and eastern Northern Territory creeks that flow north into the Gulf of Carpentaria (Jones and Morgan, 2002). However, because these crayfish are widely sought-after in the aquaculture trade and by recreational anglers, they have subsequently been translocated to numerous tributaries throughout central and northern Queensland. The species is very hardy, able to tolerate adverse environmental conditions, including elevated temperatures and low dissolved oxygen levels (Jones and Morgan, 2002).



Austrothelphusa agassizi is part of a species complex that is widespread throughout Cape York in Queensland. A specialist in ephemeral environments, *A. agassizi* undergo direct development from large eggs, foregoing the planktonic larval stage of their marine counterparts. Their preference for lentic ecosystems and the lack of larval dispersal mean that catchment boundaries are likely to be effective barriers to movement, leading to isolation and the evolution of both distinct and cryptic sister species (Naser et al., 2018).

Appendix D – Fish data

Table D1: Seasonal fish species richness and abundance at North Creek, Gum Creek and South Creek sites (2023–2024). Note: Abundance data are pooled across methods, including the relative abundance measure MaxN obtained from BRUVS footage. Dates are in MM/YY format.

Family	Scientific Name	Common Name	North Creek	Gum Creek				South Creek						
			AQ02	AQ03		AQ06		S1		S13	S7	S11	S12	S14
			04/24	11/23 (a)	04/24 (b)	11/23	04/24	11/23	04/24	04/24	04/24	04/24	04/24	04/24
Apogonidae	<i>Glossamia aprion</i>	Mouth almighty	0	0	0	1	0	0	0	0	0	0	0	0
Eleotridae	<i>Mogurnda mogurnda</i>	Northern purple-spotted gudgeon	2	0	9	1	11	13	6	11	15	4	1	4
Melanotaeniidae	<i>Melanotaenia splendida inornata</i>	Chequered rainbowfish	1	100	57	37	72	71	22	3	10	0	0	36
Plotosidae	<i>Neosilurus ater</i>	Black catfish	0	0	1	0	3	0	0	0	0	0	0	0
Plotosidae	<i>Neosilurus hyrtlui</i>	Hyrtl's catfish	0	0	2	0	7	0	0	0	0	0	0	0
Terapontidae	<i>Hephaestus fuliginosus</i>	Sooty grunter	0	0	0	0	2	0	0	0	0	0	0	0
Terapontidae	<i>Leiopotherapon unicolor</i>	Spangled perch	0	10	17	0	11	18	6	2	9	15	1	7
Species richness			2	2	5	3	6	3	3	3	3	2	2	3
Abundance			3	110	86	39	106	102	34	16	34	19	2	47

D.1 ECOLOGY OF LOCAL FISH SPECIES

Table D2 displays the life history and ecological traits of the species of freshwater fish identified within the project site. Photos of caught specimen are provided in Table D3. Most fish species caught during the study exhibited broad tolerances to the fundamental, environmental conditions of concern to fish survival (Table D2). This is common of freshwater fish species that inhabit intermittent watercourses because each species must be able to withstand large, natural fluctuations of environmental parameters in order to establish populations. For instance, the electrical conductivity of such systems can fluctuate widely from the wet season – when there are large volumes of freshwater input – to the dry season, when the remnant pools that act as refuges experience increases in ionic concentrations due to evaporative processes (Townsend, 2002).

The resident native fish species all display similar reproductive life histories (Table D2). Whereas some of the species can reproduce year-round, most of the native species time their reproductively active period with the warmer wet season months (austral summer). The influx of water during this period ensures a substantial increase in primary production and therefore a rise in food availability and opportunities for dispersal in juvenile fish.

Many of the observed fish species prefer to adhere their eggs to macrophytes or the roots of terrestrial plants exposed within the undercut banks. As outlined within Table 5 and Section 7.3, many of the upstream freshwater sites possessed considerable cover and structure generally associated with undercut banks. Trailing vegetation was also often noted at many creek sites. These would be suitable as egg shelters as long as water levels kept them inundated for an extended period of time.

It should be noted that none of the fish species have a dormant stage within their life history to cope with the dry season and, therefore, must seek refuge in permanent pools within the catchments (Table D2).

Table D2: Environmental tolerances and life history of the fish species caught within the project site boundaries.

Species	Common name	Environmental tolerances					Life history / ecology (Pusey et al., 2004)
		Temp (°C)	EC (µS/cm)	pH	DO (mg/L)	Turbidity (NTU)	
<i>Glossamia aprion</i>	Mouth almighty	14.1–38	2–1,429	4.9–9.1	1.1–11.9	0.1–200	This species reaches sexual maturity at <12 months old. Spawning is triggered when water temperatures exceed 22°C in the late dry season / early wet season. Spawning is suggested to occur in lentic habitats. After spawning, the females transfer the eggs to the male's mouth. Males then brood the eggs and young in their mouth for approximately two weeks prior to dispersal. Mouth almighty movement patterns are not well understood. However, they are thought to move into lowland lagoons for spawning, with the young dispersing across the riverine landscape at the end of the incubation period. The species predominantly feeds on aquatic insects, fish, macrocrustaceans and microcrustaceans.
<i>Hephaestus fuliginosus</i>	Sooty grunter	17–34	6.03–790	4.5–8.6	4.2–11.0	0.25–80	This species is widely distributed in flowing freshwater habitats across Northern Australia and southern New Guinea, from small 1st-order streams to large 5th-order rivers with large catchments. This species is associated with instream structure and is most abundant in areas dominated by gravel and cobbles with little mud or fine sediments. Due to its large distribution, this species is able to tolerate a wide range of environmental conditions. However, they have a preference for moderately- to well-oxygenated waters which reflect their preference for lotic habitats. Sooty grunters are a large-sized, robust species, attaining a maximum size exceeding 450 mm SL (standard length) but are more commonly encountered around 350 mm SL. This species is long-lived, with females delaying reproduction until their second or third year. It is highly likely that females spawn several times in one season and over several seasons. The onset of breeding typically occurs with the onset of the wet season. Sooty grunters form aggregations to spawn in shallow backwater habitats adjacent to riffle/rapid habitats. Temperatures above 25°C are generally thought to be required before this species spawns. Reproductive movements have been observed where aggregations move out of dry-season, refugial habitats and into ephemeral, wet-season habitats for spawning. Sooty grunters are an omnivorous species, with a diverse diet composed of fish, aquatic insect larvae, macrocrustaceans, aquatic vegetation – and terrestrial insects, vertebrates and vegetation.

Species	Common name	Environmental tolerances					Life history / ecology (Pusey et al., 2004)
		Temp (°C)	EC (µS/cm)	pH	DO (mg/L)	Turbidity (NTU)	
<i>Leiopotherapon unicolor</i>	Spangled perch	4.1–37.5	<50,000	4.0–8.6	>0.4	1.52–5.44	This species has a large distribution, covering over two-thirds of northern Australia. They occur in a number of habitats, including large rivers, small isolated creeks and off-channel waterbodies. They are able to tolerate a broad range of environmental conditions. Spangled perch can grow to about 30 cm and develop quickly, maturing at a small size within their first year. The breeding season commences during the summer months, when temperatures exceed 20°C–26°C. This species is highly fecund, producing thousands of small, non-adhesive eggs which hatch in about 3 days, with larval development between 28 and 35 days. Spangled perch are capable of extensive and rapid dispersal movements away from dry-season refugia with the onset of the wet season, associated with reproduction in either a downstream or upstream direction. A second type of movement occurs when adults and juvenile fish disperse away from dry-season refugia onto the floodplain or riverine habitats once connectivity is re-established. This species has a generalist, omnivorous diet, including plant material, small fish, invertebrates, crustaceans, molluscs and terrestrial inputs.
<i>Melanotaenia splendida inornata</i>	Chequered rainbowfish	15–32.5	6–790	6–8.47	1.1–11.6	0.1–16	Rainbowfish reach sexual maturity in less than one year and generally spawn within the summer months. They deposit their adhesive eggs onto macrophyte beds or root masses. Fertilised eggs will hatch after approximately 7 to 12 days. Rainbowfish will commence upstream migration with the onset of the wet season. Their diet is dominated by aquatic insects, algae and terrestrial invertebrates.
<i>Morgunda morgunda</i>	Northern purple-spotted gudgeon	11.9–31.7	72–2,495	5.6–8.8	0.6–12.8	0.2–200	Purple-spotted gudgeons reach sexual maturity at approximately 6 months old. Their spawning period in northern Queensland occurs at the beginning of the wet season (September–November). An individual can spawn up to 7 times during this period, laying up to approximately 1,500 eggs on each occasion. The eggs are deposited on hard substrates such as rocks, woody debris and macrophytes. The male then guards the eggs until they hatch, which can take up to 2 weeks. The species has a very broad diet, mainly targeting aquatic and terrestrial insects but also preying on crustaceans, molluscs and other fish. They are not known to migrate. However, further studies need to be undertaken.

Species	Common name	Environmental tolerances					Life history / ecology (Pusey et al., 2004)
		Temp (°C)	EC (µS/cm)	pH	DO (mg/L)	Turbidity (NTU)	
<i>Neosilurus ater</i>	Black eel-tailed catfish	21–33.4	2–790	4.5–9.1	0.6–11.2	0.1–360	Black eel-tailed catfish reach sexual maturity within a year, when individuals are in excess of 260 mm total length. The species spawns in the summer months – when individuals migrate upstream with the onset of the wet season, generally spawning in gravel beds in feeder tributaries. Their diet consists primarily of aquatic insects, molluscs, microcrustaceans and detritus, although they have been known to actively predate on fish.
<i>Neosilurus hyrtl</i>	Hyrtl's tandan	12.8–36	4–1,855	5.2–9.1	1–11.4	0.25–170	Hyrtl's tandan reach sexual maturity at approximately 1 year old. They spawn throughout the wet season, generally in bed habitat. Fertilised eggs will hatch after approximately 60 hours. This species is rarely observed migrating on mass. However, they are known to travel upstream with the onset of the wet season. Their diet consists mostly of aquatic insects, microcrustaceans, detritus and molluscs.

Table D3: Fish species and picture of caught specimen.

Scientific name	Common name	Picture
<i>Glossamia aprion</i>	Mouth almighty	N/A
<i>Hephaestus fuliginosus</i>	Sooty grunter	
<i>Leiopotherapon unicolor</i>	Spangled perch	
<i>Melanotaenia splendida inornata</i>	Chequered rainbowfish	
<i>Morgunda morgunda</i>	Northern purple-spotted gudgeon	
<i>Neosilurus ater</i>	Black catfish	



Scientific name	Common name	Picture
<i>Neosilurus hyrtlii</i>	Hyrtl's catfish	