Appendix C

Matters of State Environmental Significance

QUEENSLAND PACIFIC METALS

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QPM Energy Project

Matters of State Environmental Significance Report

Prepared for Queensland Pacific Metals

October 2022

QPM Energy Project

Matters of State Environmental Significance Report

Queensland Pacific Metals

E210671 RP1

October 2022

Version	Date	Prepared by	Approved by	Comments
1	11 August 2022	Andrew Jensen and Sandra Walters	Anna McRae	
2	15 September 2022	Andrew Jensen and Sandra Walters	Dylan Falconer	
3	4 October 2022	Andrew Jensen and Sandra Walters	Dylan Falconer	

Approved by

Dylan Falconer
Associate Environmental Planner
5 October 2022

Level 1 87 Wickham Terrace
Spring Hill QLD 4000

Abbreviations

The following abbreviations are used in this report:

Table 1 Abbreviations

Abbreviation	Term
ALA	Atlas of Living Australia
BD status	Biodiversity status
BOM	Bureau of Meteorology
BVG	Broad vegetation group
CAMBA	China-Australia Migratory Bird Agreement
CEEVNT	Critically Endangered, Endangered, Vulnerable and Near Threatened
CEMP	Construction Environmental Management Plan
DA	Development application
DAWE	Department of Agriculture, Water, and the Environment (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at breast height
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
DERM	Department of Environment and Resource Management (now DES)
DEWHA	Department of the Environment, Water, Heritage, and the Arts (now DCCEEW)
DFS	Definitive Feasibility Study
DNRME	Department of Natural Resources, Mines and Energy (now DoR)
DoE	Department of the Environment (now DCCEEW)
DoEE	Department of the Environment and Energy (now DCCEEW)
DoR	Department of Resources
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (now DCCEEW)
DTMR	Department of Transport and Main Roads
EA	Environmental Authority
EMM	EMM Consulting Pty Ltd
EMP	Environmental Management Plan
EO Act	*Environmental Offsets Act 2014*
EO Reg	Environmental Offsets Regulation 2014
EP Act	*Environmental Protection Act 1994*

Table 1 Abbreviations

Abbreviation	Term
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically sustainable development
ESCP	Erosion and Sediment Control Plan
EVNT	Endangered, vulnerable or near threatened
GCF	Gas Compression Facility
GTRE	Ground-truthed regional ecosystem
ha	hectare
HVR	High value regrowth
IECA	International Erosion Control Association
JAMBA	Japan-Australia Migratory Bird Agreement
km	kilometre
m	metres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
NQGP	North Queensland Gas Pipeline
PIR-triggered	Passive infrared triggered
PMST	Protected matters search tool
QEOP	Queensland Environmental Offsets Policy
QPM Energy	Queensland Pacific Metals Energy Pty Ltd
RE	Regional ecosystem
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SLC	Special Least Concern
SMP	Species Management Program
SPRAT	Species Profile and Threats Database
SRI	Significant Residual Impact
the Project	QPM Energy Project
TEC	Threatened ecological community
TECH	Townsville Energy Hub
TSSC	Threatened Species Scientific Committee
VM Act	*Vegetation Management Act 1999*

Table 1 Abbreviations

Abbreviation	Term
WWBW	Waterway Barrier Works

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1 Introduction

1.1 Project overview

The QPM Energy Project (the Project) involves the design, construction and operation of a gas compression facility (GCF) and a high-pressure pipeline that links the proposed GCF to the nearby existing and operational North Queensland Gas Pipeline (NQGP).

The Project proposes to collect waste coal mine gas at the proposed GCF via waste gathering lines from existing coal mines located adjacent to the proposed site. At the GCF, waste coal mine gas will be dehydrated and filtered, with the remaining clean gas then compressed and transported via high-pressure pipeline to the existing and operational NQGP. The NQGP will then transport the compressed gas north to Townsville, where in turn it will be depressurised and distributed, by a third party, to industrial users, including the QPM Townsville Energy Chemicals Hub (TECH) Project.

The Project is located approximately 43 kilometres (km) north of Moranbah.

1.2 Purpose of this report

This MSES assessment has been prepared by EMM Consulting Limited (EMM) on behalf of QPM Energy in support of an application for a new EA for a resource activity, as part of the Project.

The purpose of this document is to provide sufficient detail to support an application for a site-specific EA.

Key objectives of this MSES assessment are to:

- present results of desktop and field ecological assessments;
- prepare a significant impact assessment under the *Significant Residual Impact Guideline* for projects requiring assessment under the *Environmental Protection Act 1994;*
- outline potential impacts and mitigation measures relating to MSES; and
- identify any State offset obligations.

This assessment has been made in accordance with the *Significant Residual Impact Guideline* (Department of Environment and Heritage Protection (DEHP), 2014).

1.3 Project footprint and study area

The Project footprint is comprised of the following components and land areas:

- Gas Compression Facility – 200 metres (m) by 300 m, an area of 6 hectares (ha).
- Pipeline – easement initially a 30 m wide construction right of way (an area of 51 ha) which reduces to a 15 m wide operating easement (an area of 25 ha) after the first 3.2 kilometres (km) from the GCF.
- Access road – 8 ha being a 30 m wide easement from Red Hill Road to the GCF – a distance of 2.8 km.
- Other incidental/ancillary activities, within the above footprint.

A detailed project description is provided in Section 2.

The proposed high-pressure pipeline is situated over two properties (Denham Park and Dabin Station), comprising the following lot/plans – Lot 23 on SP262530, herein named Lot 23, Lot 11 on SP262530, herein named Lot 11 both located on Denham Park, and Lot 2 on SP214117 located on Dabin Station, herein named Lot 2. The pipeline also crosses Lot 100 on SP235905 (Goonyella rail system) which will be underbored to avoid surface impacts within the rail reserve. The pipeline also crosses underneath the Sunwater Moranbah and Eungella pipelines, within the existing disturbed Sunwater corridor

The assessed Project area also includes a 40 m buffer from the proposed high-pressure pipeline corridor which is 30 m in width (total width surveyed along the alignment is 110 m). This buffer also intersects a small portion of Lot 411 on SP285383 and Lot 14 on CP846391 located on Burton Downs, herein named Lot 14.

The proposed gas compression facility and access road is located on Lot 2, and is also buffered by 40 m, for the purpose of this ecological assessment.

Part way through the assessment, the alignment of the proposed high-pressure pipeline and location of the compressor facility changed. The original alignment passed through Lot 411 on SP285383 (Lot 411), with the compressor facility situated at the eastern extent of the alignment on Lot 411. The ecological assessment of the original proposed alignment, which passed through Lot 411 instead of Lot 11 and Lot 2, was completed in March 2022. This comprised a desktop assessment and field surveys in December 2021, March 2022, and June 2022.

In late June 2022, QPM Energy advised of a revised pipeline alignment which comprises minor edits to the alignment on Lot 23 and replaces the alignment on Lot 411 with a completely new high-pressure pipeline alignment and compressor facility location, situated wholly on Lot 23, Lot 11 and Lot 2.

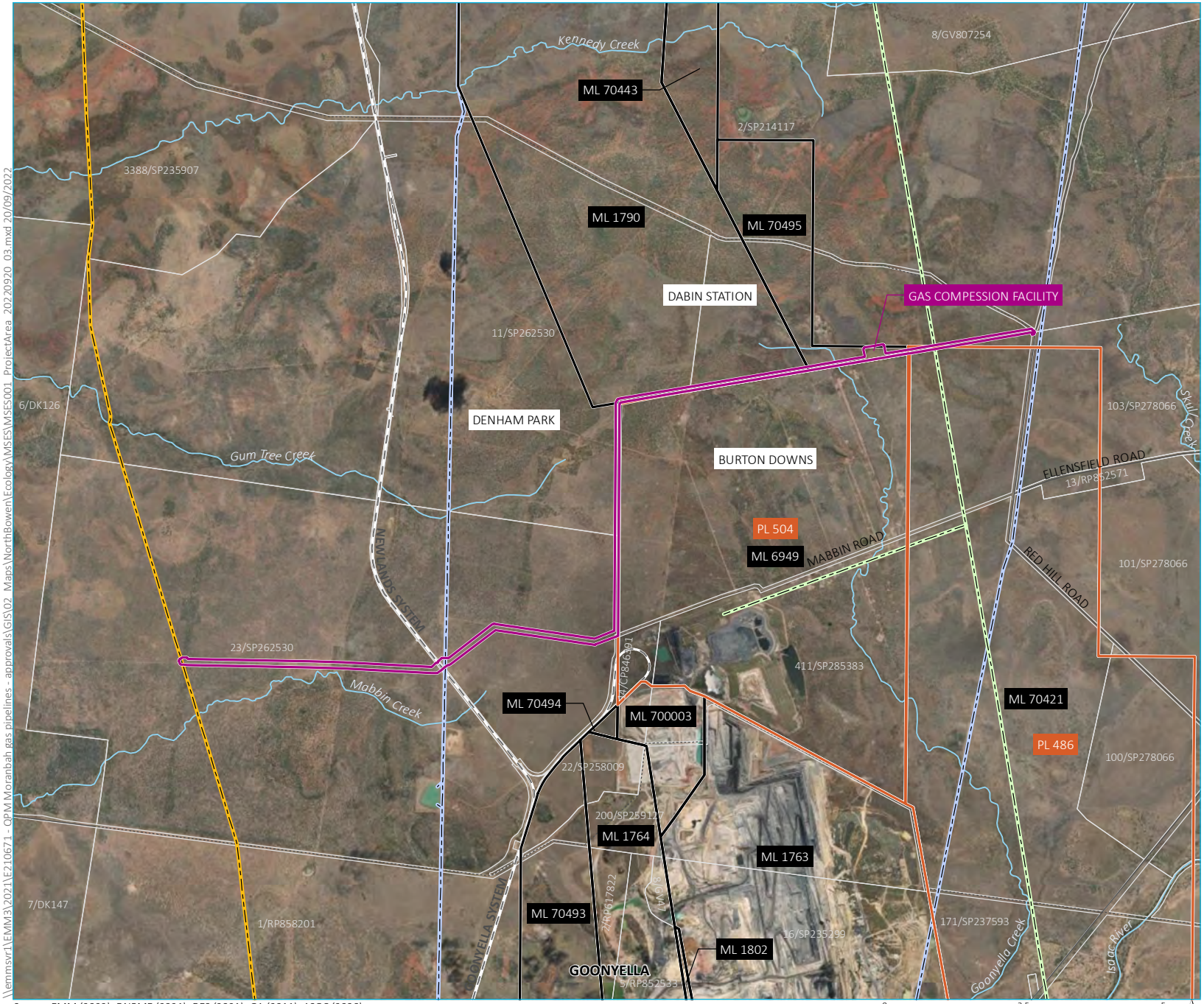
The minor revisions to the area already surveyed on Lot 23 will not trigger any further survey requirements, as the EMM ecology team were consulted regarding potential amendments to the alignment on Lot 23 prior to field surveys being completed. EMM proposed an updated alignment to best suit the lessee's operational requirements (eg placement of the high-pressure pipeline in existing cleared areas, farm tracks, fence lines and firebreaks) and to minimise ecological constraints. Some minor areas of this new alignment have not been field-verified, however are considered to contain known habitat values for threatened species due to the close proximity (within ~200 m) to areas recently surveyed.

The edits relating to the new alignment on Lot 11 and Lot 2 were not formulated prior to the end of March 2022 fieldwork, and as such these areas were not subject to field survey effort at this time. However, a subsequent field survey of these areas was completed between 28 June and 1 July 2022. Field information from Lot 411 is still included in this document for local context.

Further seasonal targeted surveys for the threatened species likely to be impacted by the Project will be completed on Lot 11 and Lot 2, at a time appropriate to the ecology of each species. For the candidate threatened species relevant to this Project, the appropriate survey time is during the warmer months (November onwards).

The location of the Project area, including the original and current alignments, is shown in Figure 1.1.

For the purpose of this report, a 20 km buffer from the Project area has been applied and this is referred to as the 'study area' for the MSES assessment (Figure 1.2).



KEY

- Project area
- Mining lease
- Petroleum lease
- Electrical transmission line
- North Queensland Gas Pipeline
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Named watercourse
- Cadastral boundary

INSET KEY

- Main road
- National park
- State forest

Project area

QPM Energy Project
MSES
Figure 1.1

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Source: EMM (2022); DNRME (2021); DES (2021); GA (2011); ASGC (2006)

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GDA 1994 MGA Zone 55

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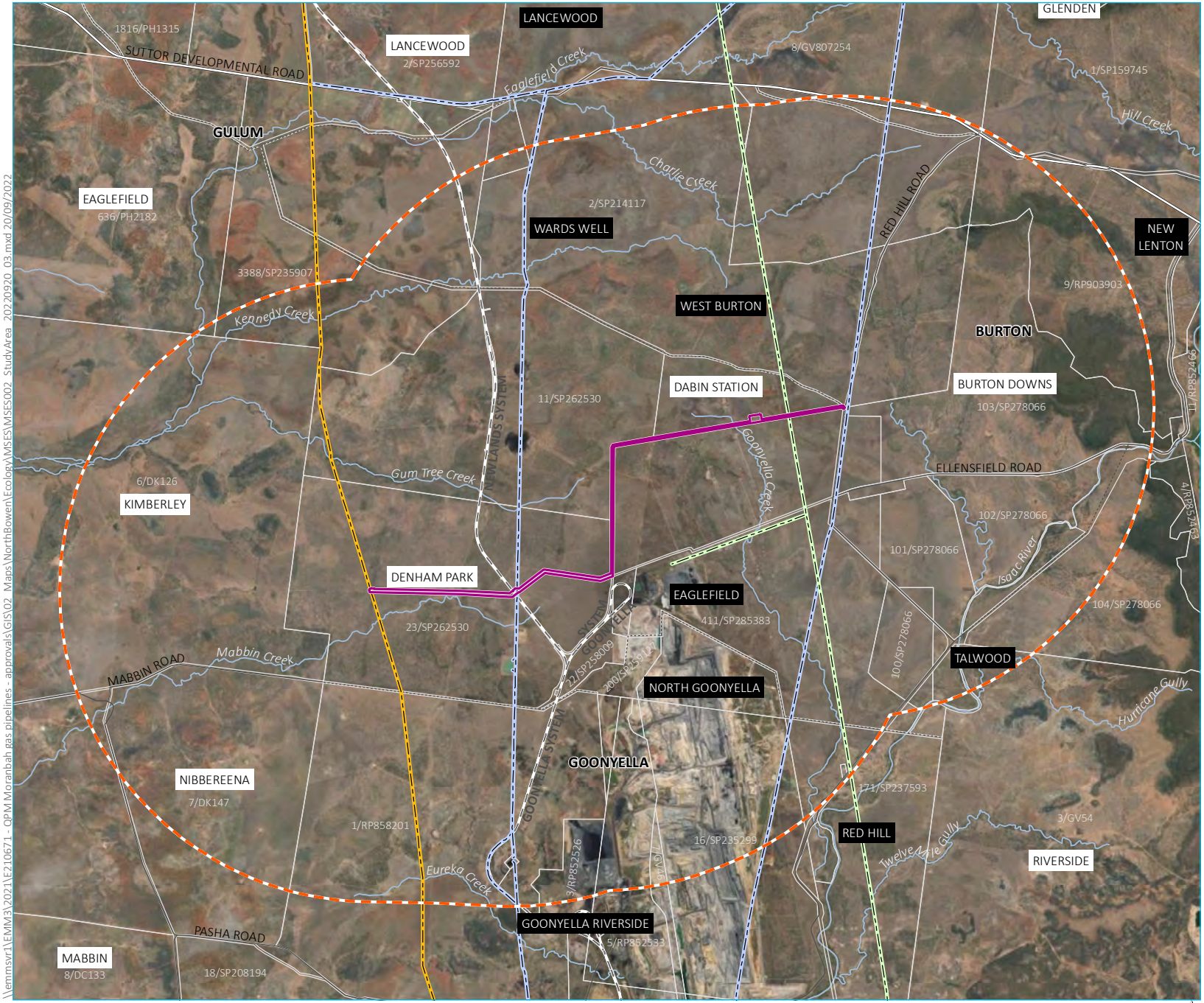

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Source: EMM (2022); DNRME (2021); DES (2021); GA (2011); ASGC (2006)

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2 Project description

2.1 Project overview

The Project involves the design, construction, and operation of a GCF and a high-pressure pipeline that links the proposed GCF to the nearby existing and operational NQGP.

The Project proposes to collect waste coal mine gas at the proposed GCF via waste gas gathering lines located at adjacent coal mines. At the GCF, waste coal mine gas will be dehydrated and filtered, with the clean gas then compressed and transported via high-pressure pipeline to the existing and operational NQGP. The NQGP will then transport the compressed gas north to Townsville, where in turn it will be depressurised and distributed, by a third party, to industrial users, including QPM's TECH Project.

Access to the GCF will be provided via the construction of a 2.8 km all-weather access road from Red Hill Road.

Ancillary activities will also occur within the defined project area.

The Project is proposed 43 km north of Moranbah.

It should be noted that the Project involves capturing and converting methane in waste coal mine gas (a greenhouse gas) into carbon dioxide that would otherwise be released into the atmosphere by the relevant coal mining operator. The Project proposes to capture and convert waste coal mine gas through a process of filtration to remove water slugs and fine coal dust, compression, dehydration to remove water vapour, and flaring, in the event of a shutdown. It does not involve refining natural gas or coal seam methane gas.

For further detail on the Project description refer to Section 3 of the Environmental Assessment Report.

2.2 Key project components

Table 2.1 describes the key components of the Project.

Table 2.1 Project components

Component	Description
Gas Compression Facility	• Captures and converts waste coal mine gas to clean gas which is then compressed to 15.3 megapascal (mPa) for transport within the high-pressure gas pipeline. • Proposed to be located at Dabin Station on the southern boundary of Lot 2 SP214117 and 2.8 km west of the Red Hill Road reserve. • Sited on a 200 m by 300 m pad. • 6 ha disturbance footprint.
High-pressure pipeline	• High-pressure pipeline to transport clean compressed gas from the GCF to the NQGP. • 16.8 km in length, running along fence lines and property boundaries. • During construction, a 30 m wide construction right of way (disturbance area of 51 ha). • During operations, a 15 m wide operating easement (disturbance area of 25 ha) after the first 3.2 km.
Access road	• Road to provide all-weather access to the GCF from Red Hill Road reserve. • 2.8 km long and 30 m wide. • 8 ha disturbance footprint.

The GCF will receive gas at a normal pressure of 138 kilopascals (kPa) from upstream field systems and deliver at a maximum pressure of 15,300 kPa. The waste coal seam methane will be dehydrated to remove water and filtered to remove particulates. The clean gas will be compressed using small 5.5 terajoules per day (TJ/d) compressor units powered by reciprocating engines drives using clean gas. The high-pressure pipeline will then transport the gas 16.8 km where it connects into the NQGP through a Hot Tap Tee connection.

The pipeline will cross Goonyella Creek, Denham Park Access Road, two water pipelines and a rail line before connecting with the NQGP.

A pipeline inspection gauge (pig) receival station is proposed to be installed adjacent to the connection which is used to accept a cleaning unit inserted into the pipeline to remove pipe wall build-up and contaminants as it moves down the pipeline under pressure from compressed gas behind it. Further ancillary facilities will also be installed such as a gas flare header, an oily water separation facility, service structures and gas blow down facilities for the operation of the high-pressure pipeline.

3 Legislation, policies, standards, and guidelines

The following legislation, policies, standards, and guidelines in Table 3.1 are relevant to this MSES assessment.

Table 3.1 Relevant legislation, policies, standards, and guidelines to the MSES assessment

Document	Relevance to the assessment
Legislation	
Environmental Protection Act 1994 (EP Act)	The Project will require an EA to be issued under the EP Act. As part of the application an environmental impact assessment is required to be undertaken to assess the potential for environmental impacts, and identify how those impacts will be avoided, reduced, and mitigated. As part of the impact assessment, the presence of MSES within the proposed impact areas will need to be identified, and determination made as to whether the proposed actions would result in a 'significant' residual impact to MSES. If a significant impact is considered likely to occur to MSES, environmental offsets will be conditioned through the EA, and they will need to be delivered in accordance with the *Environmental Offsets Act 2014* (EO Act). This will be assessed applying the *Significant Residual Impact Guideline* (DEHP 2014).
Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	The EPBC Act is the Commonwealth Government's central piece of environmental legislation that provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places – defined in the EPBC Act as MNES. If a proposed development or other action ('proposed action') is likely to have a significant impact upon a protected matter, then it must be referred for assessment under the EPBC Act. The Project is likely to impact on EPBC listed threatened species, and therefore a referral is required. The Project was referred to DCCEEW on 11 August 2022 (EPBC REF 01340). The referral was made in accordance with the *Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DoE 2013). This report does not assess the potential impacts of the Project on MNES as they are addressed in a separate technical report to support the EPBC Act referral. However, this report does consider MNES to the extent that they are relevant to a comprehensive description of the ecological values of the Project area (as some MNES are also MSES) and therefore are applicable to the assessment.

Table 3.1 Relevant legislation, policies, standards, and guidelines to the MSES assessment

Document	Relevance to the assessment
Nature Conservation Act 1992 (NC Act)	For a proposed activity that will have an unavoidable impact on breeding places of protected animals (which include all classes of native wildlife including least concern) a Species Management Program (SMP) is required to be prepared and approved by the Department of Environment and Science (DES) under the NC Act. DES has prepared an Information Sheet that outlines when a SMP is required. Animal breeding places are defined in this document as: a bower; burrow; cave; hollow; nest; or other thing that is commonly used by the animal to incubate or rear the animal's offspring. A Low Risk SMP can authorise tampering with animal breeding places for least concern species. A High Risk SMP will authorise tampering for all fauna breeding places including colonial breeders, SLC and Critically Endangered, Endangered, Vulnerable and Near Threatened (CEEVNT) species. The duration of the SMP must be identified and must be relevant to the activity being undertaken and allow for a periodic review of the program. The standard term for an SMP is three years. The purpose of an SMP is to: • assess the threats to native animal breeding places resulting from a planned activity; • incorporate management actions that will avoid or minimise both the immediate and the long-term impact of removing or altering an animal breeding place; and • set monitoring and reporting requirements that demonstrate the management actions in the SMP are effectively implemented and produce the intended results. The seasonal terrestrial ecology surveys have included habitat assessments and identification of animal breeding places. This information will be used at a later date to support the preparation of an SMP specific to the Project, as required. **Protected plants in high-risk trigger mapping** In Queensland, all plants that are native to Australia are protected plants under the NC Act to prevent whole plants or protected plant parts from being illegally removed from the wild or illegally traded. Clearing, growing, harvesting, and trading of protected plants in Queensland is regulated by the Nature Conservation (Wildlife Management) Regulation 2006. If a proposed area to be cleared contains native plants in the wild, and there is no relevant exemption, and the area is shown as 'high risk' on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken prior to any clearing. If the flora survey identifies the presence of an endangered, vulnerable or near threatened plants in the clearing impact area, or 100 m buffer, a clearing permit under NC Act is required prior to any clearing. A clearing permit authorises the clearing of an area of land rather than the individual species of plant present. Clearing that has complied with a permit will not be subject to any further survey or approval requirements once clearing commences. A proponent can then carry out re-clearing or routine maintenance for up to 10 years after the original authorised clearing. Where a significant residual impact to a protected plant is likely to occur, an offset may be required. If the flora survey of the high risk area does not detect any EVNT plants in the clearing impact area, or the impacts on EVNT plants can be avoided (ie clearing will not take place within 100 m of the EVNT plants), a clearing permit is not required but an exempt clearing notification must be submitted to DES within one year of the survey being undertaken, and at least one week prior to the clearing commencing.

Table 3.1 Relevant legislation, policies, standards, and guidelines to the MSES assessment

Document	Relevance to the assessment
Vegetation Management Act 1999	The purpose of the VM Act is to regulate the clearing of native vegetation in a way that conserves remnant vegetation in declared areas, ensures clearing does not cause land degradation, prevents the loss of biodiversity, and maintains ecological processes. Under the VM Act, REs are assigned one of three statuses which are: • Endangered RE; • Of Concern RE; or • Least Concern RE. These statuses are taken from the RE description database, and respective definitions are provided in the Act. Within this report, the definition of an RE follows that described by Sattler and Williams (1999) ie 'a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil'. Both VM Act status and biodiversity status (BD status) of REs have been included. Under the EP Act, projects have to consider both VM Act status of a RE when assessing if there may be significant impacts to MSES, and BD status when identifying the presence of Environmentally Sensitive Areas (ESAs) for an EA. The flora surveys included an assessment of vegetation communities and whether they meet remnant status under VM Act. REs are present within the study area and will be impacted by the Project.
Environmental Offsets Act 2014	In Queensland there is an offsets framework governed by a range of legislation, policies, and guidelines to support a determination as to when environmental offsets are required, and how they are to be delivered. A summary of the framework and guiding principles that apply are summarised below. The Queensland Offsets Framework includes: • *Environmental Offsets Act 2014* (Qld) (EO Act); • Environmental Offsets Regulation 2014 (Qld) (EO Regulation); • *Queensland Environmental Offsets Policy* (QEOP) (version 1.6); and • *Significant Residual Impact Guideline* – for prescribed activities under NC Act, EP Act and Marine Parks Act (DEHP 2014). Under the QEOP Framework an environmental offset is required when a significant, residual impact occurs to an MSES. To support a determination if the Project will result in a significant residual impact to MSES the proposed activity is to be assessed under the Significant Residual Impact Guideline (DEHP 2014).
Biosecurity Act 2014	The Biosecurity Act 2014 provides a legislative framework to manage pest flora and fauna, diseases, and environmental contaminants, to address the impacts they have on the economy, environment, agriculture, tourism, and society. The Act prohibits or restricts the introduction and spread of declared plant and animal pests within Queensland. Field ecology surveys identified the presence of pest plants and animals within the Project area.
Fisheries Act 1994	Waterway barrier works may inhibit the free movement of fish along waterways and onto floodplains, injure fish and affect fish health and habitat. Waterways for the purposes of the Fisheries Act are defined by the Queensland Government mapping layer Queensland Waterways for Waterway Barrier Works. It is recognised this layer may not be accurate on the ground therefore the responsibility for ensuring appropriate procedures are employed rests with the user. Waterways are colour coded based on level of risk. Streams higher in the catchment generally have reduced habitat area and steeper slopes supporting smaller populations of fish, therefore these are of lower risk than larger streams lower in the catchment.

Table 3.1 Relevant legislation, policies, standards, and guidelines to the MSES assessment

Document	Relevance to the assessment
Policies, standards, guidelines	
Survey guidelines	The timing and survey methods adopted for the seasonal flora and fauna surveys were guided by applicable State and Commonwealth survey guidelines. Vegetation community survey methods were consistent with the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*, Version 5.1 (Neldner et al. 2020). Targeted fauna surveys were designed and implemented in accordance with the following guidelines: • *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* – Version 3.0 (Eyre et al. 2018); • *Survey guidelines for Australia's threatened reptiles*; Department of Sustainability, Environment, Water, Population and Communities(DSEWPC 2011a); • *Survey guidelines for Australia's threatened mammals* (DSEWPC 2011b); • *Survey guidelines for Australia's threatened bats* (DEWHA 2010a); • *Survey guidelines for Australia's threatened birds* (DEWHA 2010b); • *Survey guidelines for Australia's threatened frogs* (DEWHA 2010c); • *Referral guidelines for the vulnerable Koala* (DoE 2014); and • *Draft referral guidelines for the nationally listed Brigalow Belt reptiles* (DSEWPC 2011c).

4 Assessment methodology

4.1 Desktop assessment

Background research and desktop ecological assessments have been completed to provide an understanding of the broader ecological values, landscape features, vegetation communities and threatened species associated with the Project area.

Geographic boundaries of the searches undertaken, and the subsequent assessment results are defined as the following:

- Project area: area surveyed – eg pipeline corridor and compressor facility plus buffer (Figure 1.1).
- Study area: a 20 km buffer from the Project area (Figure 1.2).

The desktop assessment was completed through evaluation of a range of information sources regarding the potential ecological values that may occur across the study area. Data sources reviewed include:

- Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matter Search Tool (PMST) (Appendix A.1);
- DES Wildlife Online (Appendix A.2);
- Department of Resources (DoR) regulated vegetation mapping (remnant, high value regrowth (HVR) and non-remnant);
- DES Certified Regional Ecosystem Mapping;
- Atlas of Living Australia (ALA);
- eBird to access records of threatened bird species and migratory birds that occur in the study area;
- DES Protected Plants High Risk Trigger Mapping;
- DES Essential Habitat mapping;
- current aerial imagery and historical aerial imagery supplied by QImagery;
- DES Wetland mapping;
- Department of Agriculture and Fisheries (DAF) Waterways for Waterway Barrier Works Mapping; and
- the EPBC Listing advice and/or Conservation Advice for relevant Threatened Ecological Community (TEC), to identify analogous QLD REs that are mapped within the Project area.

4.2 Field survey

An initial walkover of the Project area was undertaken over four consecutive days between 6–9 December 2021 by a team of two EMM ecologists, led by Sandra Walters and supported by Daniel Kelly. The walkover included general habitat assessments, incidental threatened flora and fauna searches and vegetation community assessments across the Project area.

The site walkover was completed on Lot 411 and 14 only, as land access to Lot 23 was not available for the December survey.

Further field ecology surveys were undertaken across the Project area between 7–12 March 2022 by a team of four EMM ecologists, led by Sandra Walters and Andrew Jensen and supported by Daniel Kelly and Elliot Leach.

The survey in March represents a late wet season/autumn seasonal survey for the Brigalow Belt bioregion under the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al. 2018). At this time temperatures are decreasing but it is typically before the onset of cold winter nights and coincides with an active period for fauna including dispersal and migration of many species. It is also more likely to be moist from summer rainfalls, than during the spring to early summer period, and overlaps with grass reproduction and propagation, which is important for granivores. Late wet season is also suitable timing for undertaking vegetation community surveys and certain targeted searches for threatened flora species as summarised in Section 5.8.2.

A subsequent field survey was completed by a team of two EMM ecologists, led by Sandra Walters and supported by Elliot Leach between 28 June 2022 and 1 July 2022 on Lot 11 and Lot 2. These surveys focussed on verification of regional ecosystems present, potential for TEC and species habitat mapping.

Curricula vitae of field team members are provided in Annexure B.

4.2.1 Survey methods

Field survey methods included a range of survey techniques including spotlighting for nocturnal mammals and birds, deployment of Anabat detectors for recording of echolocating insectivorous bats, diurnal bird surveys, habitat assessments, active searches, and verification of vegetation community mapping by ground-truthing REs. Records were taken of incidental observations during surveys.

The following sections outline in more detail the surveys completed, methodologies used and the total survey effort. Survey sites are illustrated in Figure 4.1 and Figure 4.2.

i Flora

Flora surveys were conducted in conjunction with fauna surveys across four consecutive survey days during the December 2021 surveys and across five consecutive days during the March 2022 surveys. The revised alignment was surveyed over four days in June 2022. A desktop constraints assessment as part of the gap analysis (EMM 2021) was undertaken prior to field surveys to identify the presence of potential significant environmental values such as Endangered or Of Concern REs, TECs or protected flora species that have the potential to occur within the Project area. Desktop results informed the flora survey locations. The results of the desktop assessment are summarised in Section 6.

a Quaternary site assessments

The vegetation community surveys were undertaken using quaternary assessments consistent with the *Methodology for Surveying and Mapping Regional Ecosystems and Vegetation Communities in Queensland, Version 6.0* (Neldner et al. 2022). The objective of these assessments was to ground truth REs, determine their conditional status (remnant and non-remnant) and overall extent.

Data collection associated with quaternary assessments included the following:

- dominant species across all identified strata;
- height and cover of the Ecologically Dominant Layer;
- condition (remnant or non-remnant);
- connectivity with nearby habitats; and
- presence of weed species.

Forty-three (43) quaternary survey sites were completed across the Project area during December 2021, an additional 17 in March 2022 and a further 52 quaternary sites in the revised alignment in June 2022 (Figure 4.1). Survey sites were selected to ensure all patches of mapped regulated vegetation were surveyed, as well as representative areas of regrowth and non-remnant areas. Quaternary sites were also placed where regulated vegetation mapping was not consistent with the vegetation present on site (eg had been cleared, regrown or was a different vegetation community to that mapped). The flora surveys were completed in accordance with the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland, Version 6.0* (Neldner et al. 2022).

Quaternary vegetation assessments are used to rapidly identify REs and their corresponding condition. Information collected includes dominant species in all applicable strata and structural attributes including stratum heights and canopy cover percentage. Validation of the geological landform is also performed for land zone designation of each vegetation community although this is also typically informed by geological surface mapping and state pre-clear RE mapping.

b BioCondition assessments

In a limited number of circumstances, RE condition (ie remnant/non-remnant) was difficult to verify utilising quaternary assessments, due to the naturally open structure of the vegetation community, abundance of weed species, or previous disturbance through clearing activity. In those instances, a BioCondition assessment was completed, to allow the site characteristics to be determined quantitatively and compared to the benchmark for the relevant RE. BioCondition data was collected in accordance with the methodology described in *BioCondition – A condition assessment framework for biodiversity in Queensland. Assessment Manual* (Eyre et.al, 2015).

c Threatened ecological communities

TECs potentially occurring within the Project area were identified via the PMST search. The EPBC listing advice for each, and certified Regional Ecosystem Mapping was reviewed, to identify whether any REs that are analogous to the TECs were mapped within the Project area.

The field survey method to confirm TECs included an assessment against the key diagnostic characteristics and condition thresholds of each TEC, where conditions allowed. These are discussed further in Section 6.2.3.

d Threatened flora

Informal searches for potentially occurring threatened flora species were undertaken across the Project area. High-risk trigger mapping exists at the eastern end of the Project area (refer Figure 4.1), associated with records of the threatened grass *Dichanthium queenslandicum* (endangered EPBC Act, vulnerable *Nature Conservation Act 1992* (Qld) (NC Act)). With the exception of the non-native Buffel Grass (*Cenchrus ciliaris*), the majority of grasses were not in flower during the December 2021 field survey, however, were flowering in March and June 2022.

No formal protected plant meanders applying the *Queensland Protected Plant Survey Guidelines* for areas within 'high risk' trigger mapping under NC Act were proposed for the field survey program. This was due to the fact survey results are only valid for 12 months. However, incidental records were made when both flora and fauna teams were performing respective field surveys and formal surveys will be undertaken in appropriate timeframes.

Informal meanders for protected plants were completed while traversing the Project area to complete alternative flora surveys. Meanders were primarily undertaken in the Project footprint and within suitable habitat for candidate threatened species.

Where a threatened flora species or possible threatened flora species was recorded, a direct count or estimate (where high densities were present) was undertaken (including mapping the population extent within the Project area), and a specimen was collected for submission to the Queensland Herbarium for confirmation if necessary (eg for species difficult to identify).

If a threatened flora species was detected, the following additional details were noted:

- number of individuals (GPS coordinate for each individual or patch);
- habitat description; and
- photos of individuals and habitat.

e Pest flora

PMST and Wildlife Online searches were used to identify pest flora listed as a 'Restricted Matter' under *Queensland's Biosecurity Act 2014* and/or Weeds of National Significance known and potentially occurring within the Project area. Presence of these, and any others not identified in desktop searches were recorded in the field.

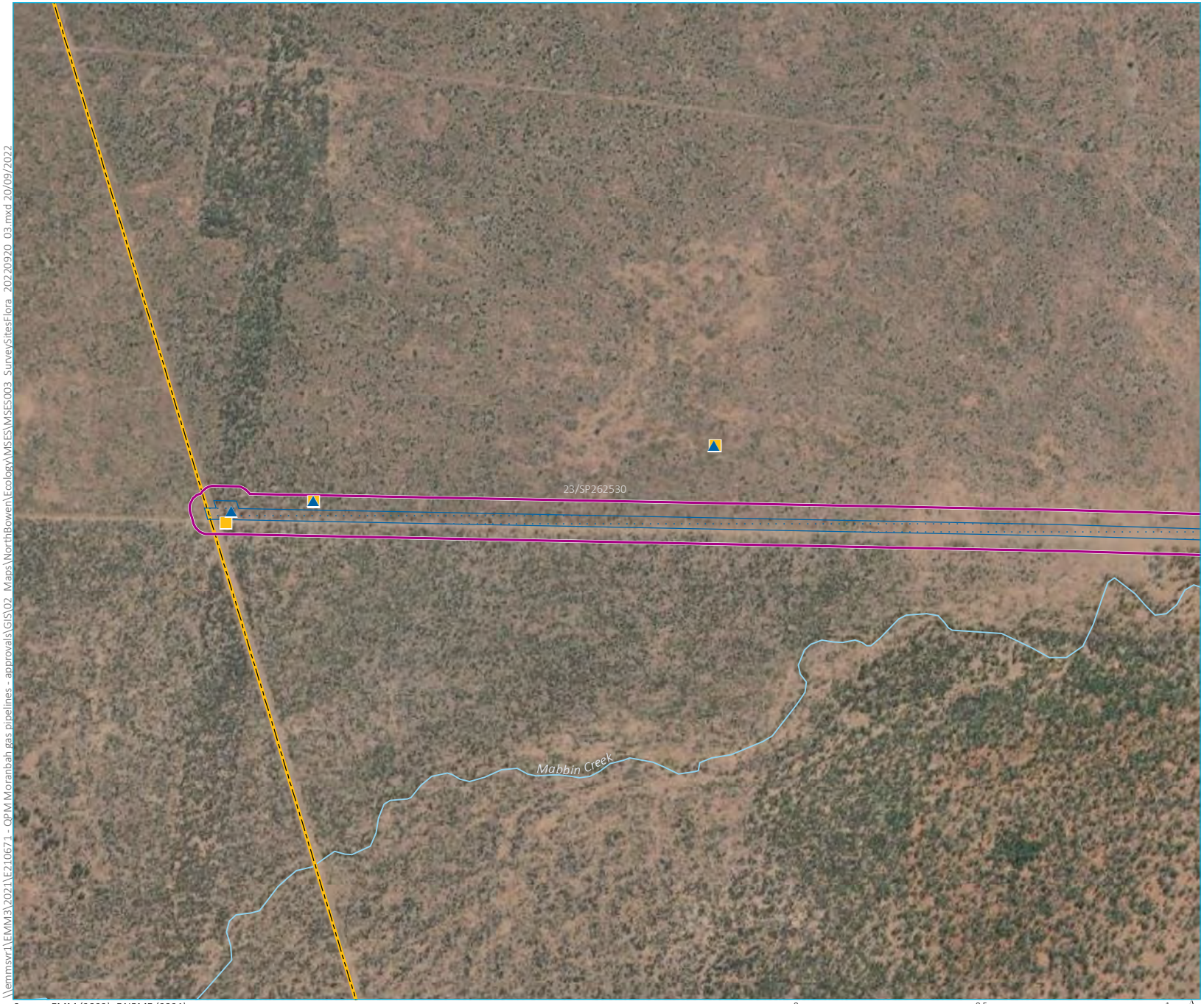
f Habitat assessments

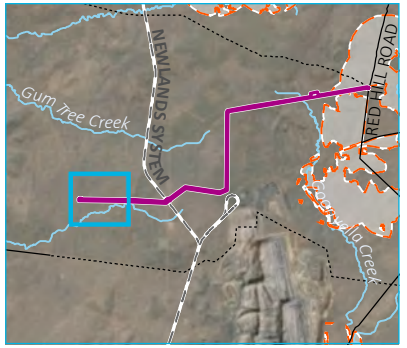
Habitat assessments across the Project area were completed at 43 sites in December 2021, 15 sites in March 2022 and a further 20 sites in the revised alignment during June 2022 (Figure 4.1). The aim of habitat assessments is to identify key habitat features such as nests, tree hollows, fallen woody debris, gilgai habitat and availability of surface water, to support an assessment of threatened fauna species that may occur in the Project area and habitat mapping.

Habitat assessments included the recording of the following habitat attributes:

- the presence of fallen logs, leaf litter, rocks;
- vegetative groundcover;
- presence of cracking soils and gilgai habitat;
- presence rocky overhangs, caves, decorticating bark;
- foraging resources such as native grasses, preferred food trees for Koalas etc;
- available water sources;
- animal breeding places such as hollow-bearing trees, dens, and nests;
- presence and abundance of weeds; and
- signs of pest animals.

Habitat assessments focussed on habitat requirements for the Ornamental Snake, Squatter Pigeon, Koala, Greater Glider, and wetland-dependent species. The assessments included recording of cracking clay soil and gilgai habitat, land uses, grassland quality and composition, including proportions of exotic/native groundcover (grass to herb ratio), areas of bare ground, presence of native and exotic grasses, connectivity, and proximity to water. These were guided by the information presented in the EPBC Act significant impact guidelines for the target species and/or their Species Profile and Threats Database (SPRAT) description.





KEY

- Project area
- Proposed disturbance footprint
- Protected plants high risk trigger mapping
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Flora survey sites

- Quaternary assessment
- Habitat assessment

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Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

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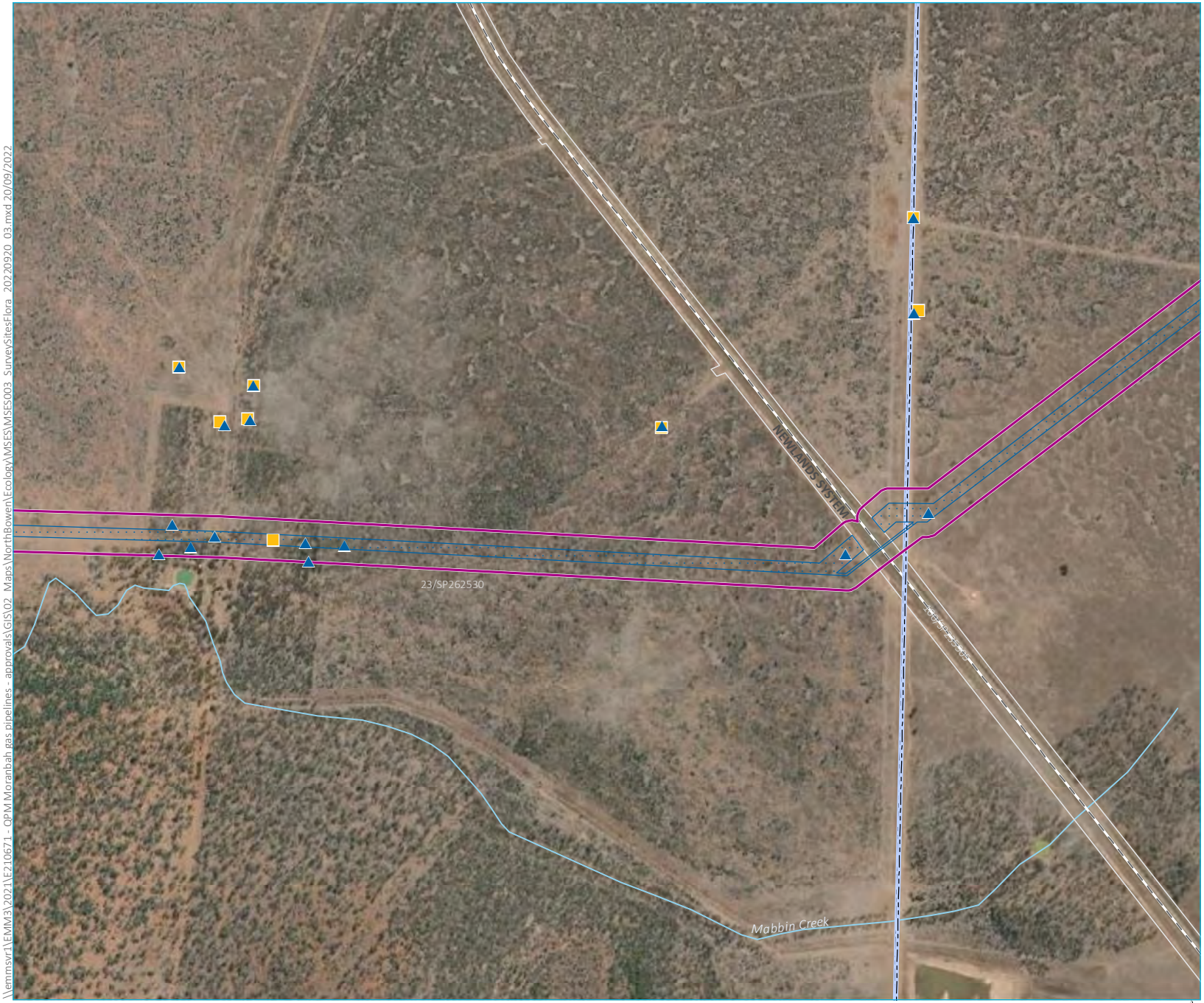
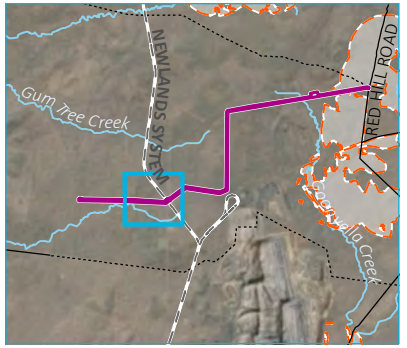
Survey sites - flora
Map 1 of 6

QPM Energy Project
MSES
Figure 4.1

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Protected plants high risk trigger mapping
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Flora survey sites

- Quaternary assessment
- Habitat assessment

Survey sites - flora
Map 2 of 6

QPM Energy Project
MSES
Figure 4.1

Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

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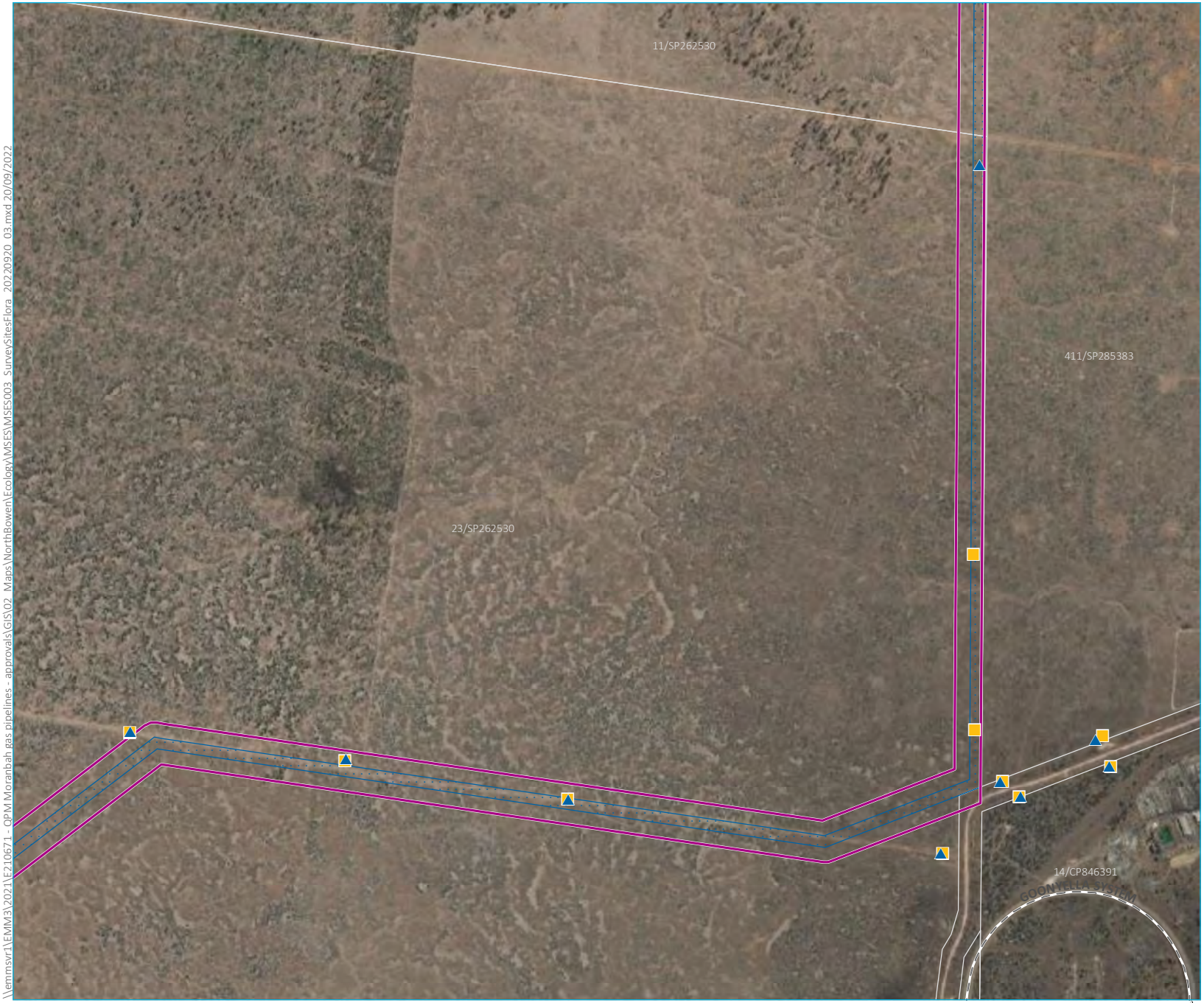

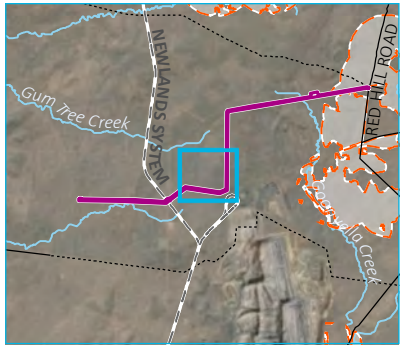

KEY

- Project area
- Proposed disturbance footprint
- Protected plants high risk trigger mapping
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Flora survey sites

- Quaternary assessment
- Habitat assessment

Survey sites - flora
Map 3 of 6

QPM Energy Project
MSES
Figure 4.1

Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

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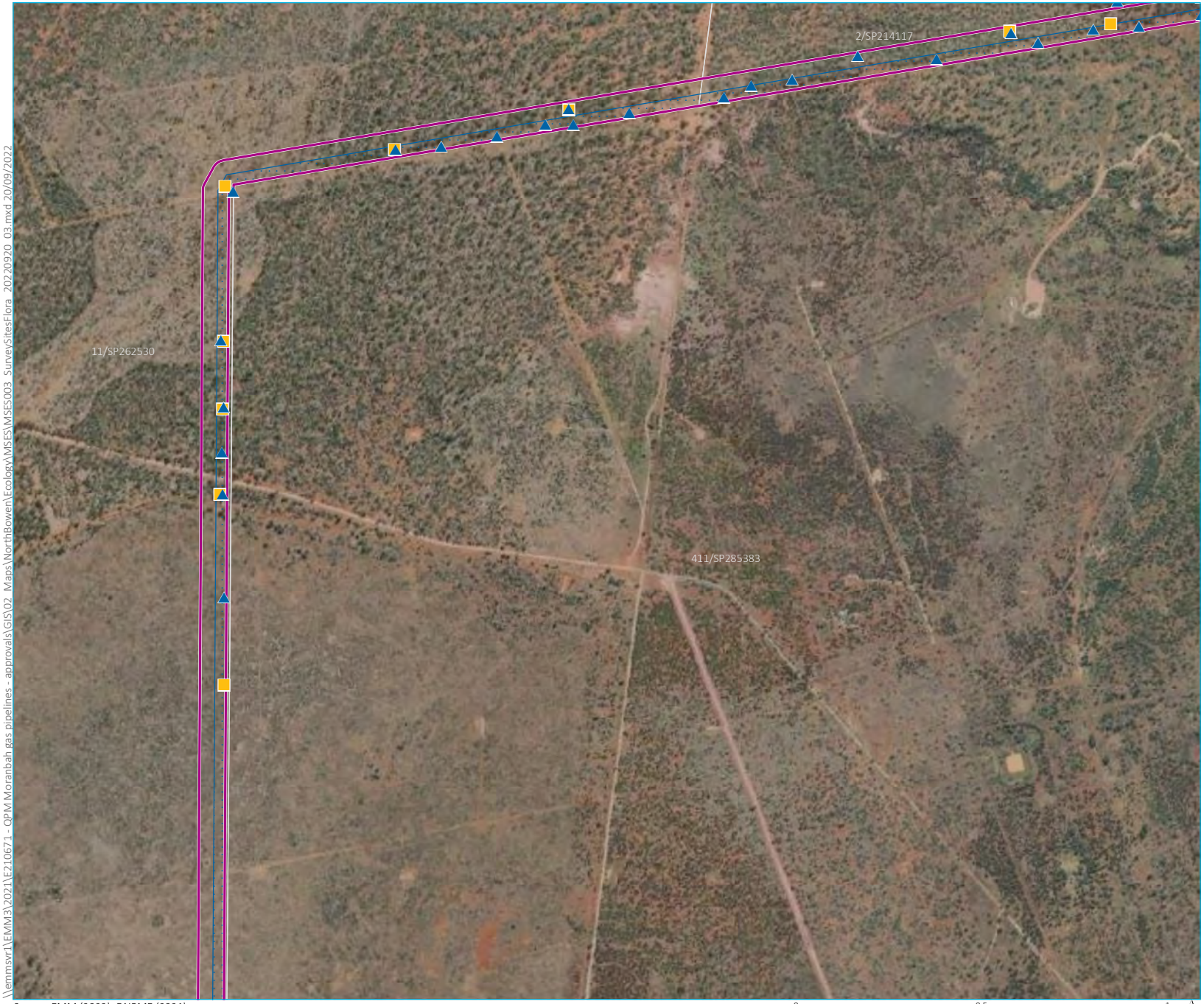
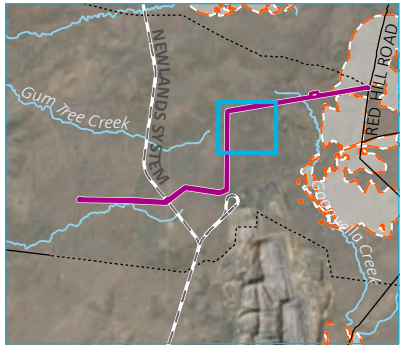
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Protected plants high risk trigger mapping
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Flora survey sites

- Quaternary assessment
- Habitat assessment

Survey sites - flora
Map 4 of 6

QPM Energy Project
MSES
Figure 4.1

EMM
creating opportunities

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Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

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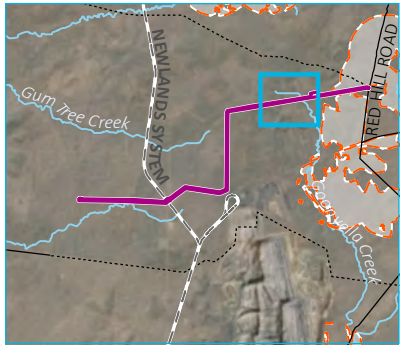

KEY

- Project area
- Proposed disturbance footprint
- Protected plants high risk trigger mapping
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Flora survey sites

- Quaternary assessment
- Habitat assessment

Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

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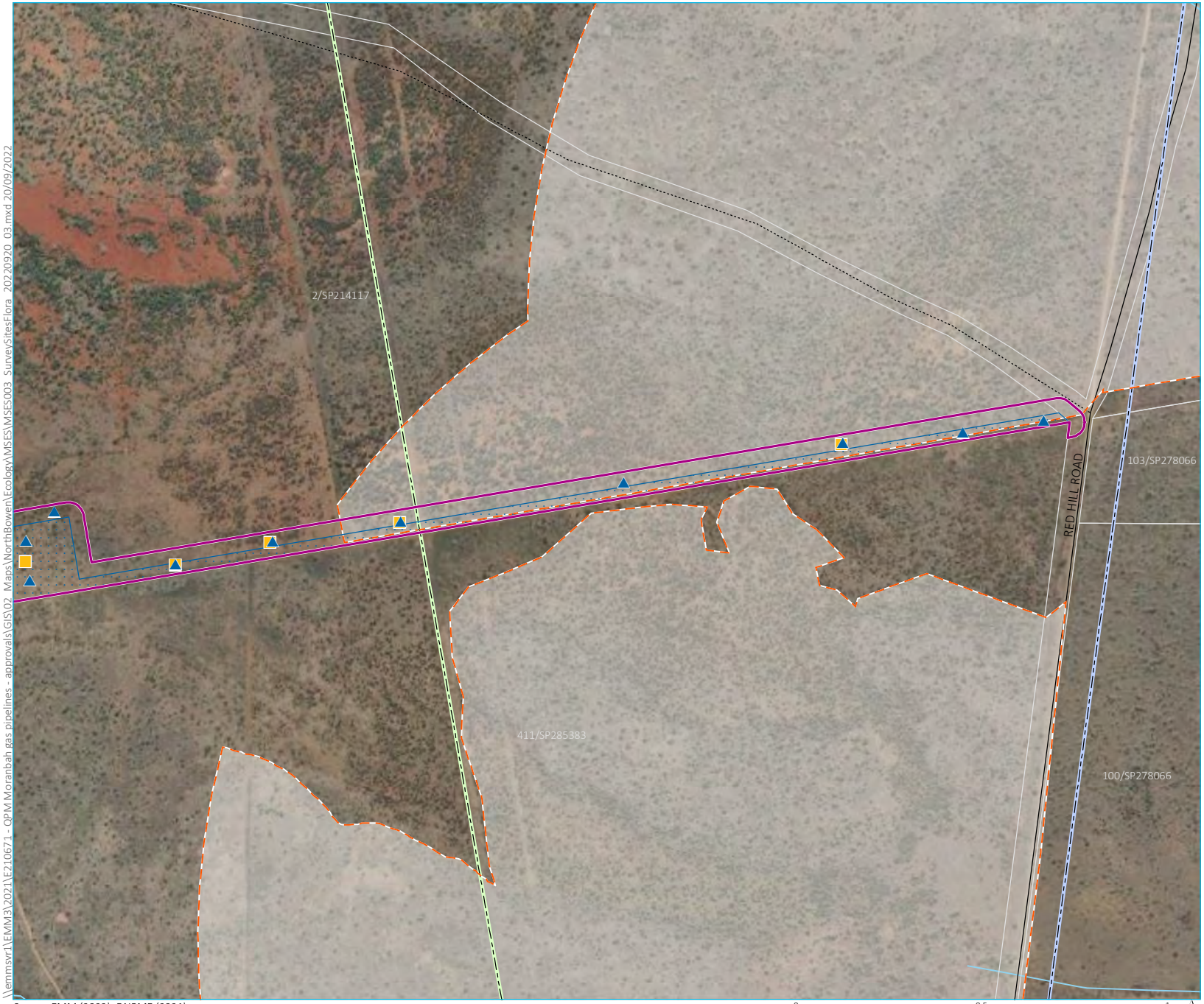
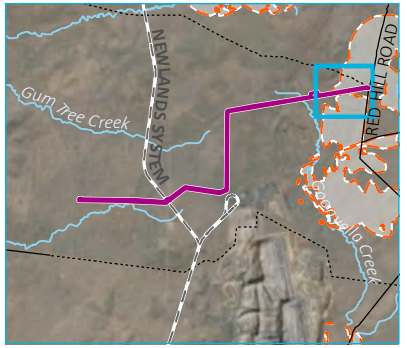
Survey sites - flora
Map 5 of 6

QPM Energy Project
MSES
Figure 4.1

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Protected plants high risk trigger mapping
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Flora survey sites

- Quaternary assessment
- Habitat assessment

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Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

N

Survey sites - flora
Map 6 of 6

QPM Energy Project
MSES
Figure 4.1

EMM
creating opportunities

ii Fauna

Fauna surveys were conducted in conjunction with flora surveys across four consecutive survey days during the December 2021 surveys and across five consecutive days/nights during the March 2022 surveys. During the site walkover of the revised alignment over four days in June 2022, fauna surveys were limited to incidental observations and habitat assessment for threatened species. A desktop constraints assessment as a part of the gap analysis (EMM 2021) was undertaken prior to field surveys to identify the presence of significant environmental values such as threatened fauna species that have the potential to occur within the Project area. Desktop results informed the fauna survey locations. The results of the desktop assessment are summarised in Section 6.

Survey sites were selected based on the different vegetation community types and desktop review information to stratify habitat types across the Project area and determine target species for survey. Site selection was further refined in the field depending on the site conditions and habitat features present. Representative sites were placed in both remnant and non-remnant areas.

Based on initial desktop assessments the following threatened fauna were targeted during site surveys:

- *Denisonia maculata* (Ornamental Snake);
- *Geophaps scripta scripta* (Squatter Pigeon (southern));
- *Rostratula australis* (Australian Painted Snipe);
- *Hirundapus caudacutus* (White-throated Needletail);
- *Phascolarctos cinereus* (Koala);
- *Petauroides volans volans* (Greater Glider);
- *Egernia rugosa* (Yakka Skink);
- *Cuculus optatus* (Oriental Cuckoo);
- *Calidris acuminata* (Sharp-tailed Sandpiper);
- *Gallinago hardwickii* (Latham's Snipe); and
- *Apus pacificus* (Fork-tailed Swift).

Fauna survey methods are outlined below.

a Diurnal bird surveys

Five diurnal bird surveys (standardised 20-minute counts) were undertaken over four days in December 2021, along with an incidental list of all avifauna encountered across the survey period. During March and June 2022, an incidental bird list was kept over the respective five and four survey days whilst completing diurnal flora surveys. The GPS location and number of individuals of threatened species (squatter pigeon) was recorded for each encounter across all survey periods. Surveys were stationary or meanders and were predominantly located close to watercourses and in areas of native vegetation. Assessments were performed at different times of the day to maximise detection of all species present. Bird surveys took place post dawn, at noon and mid/late afternoon. Survey locations are shown on Figure 4.2.

Target species were continuously searched for during travel around the Project area and while completing other surveys totalling 266 person-hours of survey time (80 person-hours in December 2021, 120 person hours in March 2022 and 66 person-hours in June 2022).

b Nocturnal surveys

Five nights of non-intrusive nocturnal surveys were conducted in March 2022 using spotlights (Figure 4.1). Nocturnal surveys targeted Ornamental Snake, Australian Painted Snipe, Koala and Greater Glider. Total nocturnal survey effort was 50 person hours over five nights. This included spotlighting and assessment of hollow-bearing trees for occupation by owls and mammals. The surveys targeted Koala and Greater Glider. Spotlighting involved walking through areas of potential habitat (ie native woodland or forest) with powerful spotlights and shining them into the canopy to try and identify eye-shine of active avian, mammal or reptile species. The spotlights were also periodically shone onto the ground to identify reptiles or amphibians that may be foraging on the ground surface.

Spotlighting for Ornamental Snake comprised meanders through suitable gilgai and Brigalow habitat, scanning the ground with spotlights for the species.

Survey locations are shown in Figure 4.2.

c Hollow bearing tree records

Hollow bearing trees were recorded where observed across the Project area during December 2021 and March 2022. Time constraints in June 2022 prevented this data being collected in the revised alignment although general observations of abundance were made as part of habitat assessments described in Section 4.2.1i. Data recorded included:

- tree species;
- tree diameter at breast height (DBH);
- number of hollows;
- size of hollows – small (<5 cm), medium (5–20 cm), large (>20 cm) and very large (>40 cm); and
- any observation notes (ie species using hollow).

d Anabat detector

Microbats rely on echolocation for orientation and foraging, and though the calls of almost all species are outside the range of human hearing, they can be detected by a bat detector. Bat detectors are typically installed orientated into open areas along a potential flyway, eg an animal track or waterway. The devices are set to automatically record and store bat calls between dusk and dawn each night. The resulting library of recorded calls are then processed by an experienced technician and identified to species level where possible.

Three Anabats (Anabat Express Passive Bat Detector, Titley Scientific) were deployed over five nights across the Project area in March 2022 (Figure 4.2), for a total of 15 detector nights. Seven separate sites were surveyed (see Figure 4.2), with one site sampled for five nights, four sites sampled for two nights, and two sites sampled for one night.

e Pitfall and funnel trapping

Trapping was conducted over four consecutive nights in March 2022, as per the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland, V3.0* (Eyre et al., 2018). Trapping comprised two sites with pitfall traps and funnel traps and three sites with funnel traps only, and targeted potential areas of Ornamental Snake habitat to supplement spotlighting effort for this species.

The survey methods are outlined below.

- Pitfall traps – five twenty litre buckets, with their tops flush with the surface of the soil, were set out at 7.5 m intervals with a 30 m drift fence in a "t-design". Pitfall trapping targets small terrestrial mammals, as well as amphibians and reptiles. Traps were cleared early in the morning, soon after first light. This ensures that heat stress of any trapped animals is minimised and reduces the risk of diurnal predation of trapped animals. Shelter in the form of soil, leaves and twigs was also provided for captured animals in the bottom of each pitfall trap.

- Funnel traps – funnel traps, in pairs were installed along the 30 m drift fence as part of the pitfall trapping array – one pitfall site had ten funnel traps, the other six. Additionally, three dedicated funnel trap sites each had ten funnel traps placed in a single transect in pairs along a drift fence. Funnel traps capture reptiles that may not be caught in pitfall traps, such as snakes, dragons, large skinks, and legless lizards. Checking of the traps proceeded as for pitfall trapping, but extra care was taken to ensure small reptiles were not hidden in the seams of the funnel and that small rodents have not chewed their way out, leaving a hole in the mesh. Shade material was provided over the funnel to avoid dehydration of trapped animals.

An example of a pitfall and funnel site is provided in Photograph 4.1.

Photograph 4.1 Pitfall and funnel trap site

Source: (EMM, March 2022)

Trap site locations are shown on Figure 4.2. Total trapping survey effort comprised 25 pitfall trap-nights and 112 funnel trap-nights.

f Habitat features

Distinctive habitat features such as drainage depressions or discrete patches of small wetland areas were incidentally recorded as the ecologists traversed the Project area.

g Koala searches

Searches for Koalas, or signs of their presence through scats and scratches was assessed across the Project area. Searches were completed at all quaternary sites and in areas of Eucalypt vegetation. Searches also included individual paddock trees in regrowth and non-remnant areas.

h Active searches

Active diurnal searches were conducted in areas where microhabitat such as leaf litter, log piles or rocks were abundant. Active searching targeted Ornamental Snake and Yakka Skink. During active searches, the surveyors would look for active animals under rocks and logs, look through leaf litter, under exfoliating bark and in crevices to find sheltering animals. Active searches in suitable habitat were conducted on an incidental basis while traversing the Project area, and two ecologists spent ten minutes searching whilst conducting each habitat assessment (refer Section 4.2.1), with a total effort of 19 person-hours.

Additionally, spotlighting searches of gilgai and other Brigalow habitats was undertaken in March 2022 totalling 50 person hours over five consecutive nights.

i Incidental sightings

Incidental sightings of animal signs such as scat and tracks were recorded as the Project area was traversed. Ecologists recorded any secondary signs encountered at each site during the survey period, or while walking between sites in the Project footprint. Secondary signs can lead to the positive identification of mammals, reptiles, and birds. Animals often reveal their presence through tracks left in soft substrate. Similarly, arboreal animals may leave distinctive scratches on tree trunks as they climb. Some Petaurus spp. leave feeding marks on tree trunks. Scats of many mammals can be identified, and in particular, the faecal pellets of Koalas or Greater Gliders often found at the base of trees are a sign of Koala or Glider presence. Hair, feathers, bones, or nests can often be identified to species level.

j Pest fauna

As per pest flora, PMST and Wildlife Online searches were used to identify pest fauna listed as a 'Restricted Matter' under Queensland's *Biosecurity Act 2014*, known and potentially occurring within the Project area. Presence of these, and any others not identified in desktop searches were recorded in the field.

k Summary of fauna survey effort

Timing and methods for seasonal fauna surveys are guided by the applicable State and Commonwealth survey guidelines. Based on the initial list of candidate species reviewed prior to field surveys, a summary of the fauna survey effort implemented and consistency with applicable survey guidelines is provided in Table 4.1.

Table 4.1 Fauna survey guidelines and EMM survey effort

Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
Koala	**Survey methods for arboreal mammals** Broadcast surveys for 2 sessions of call playback of relevant species at midpoint of survey site. Spotlighting for 2 x 30 person-minute searches within the 100 x 100 m survey area. Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrats of the survey site. Otherwise incidental (Eyre et al. 2018).	**Survey methods for Koalas** Scat SAT for 2 person-minutes under 30 trees at each site. Diurnal strip transects where koala activity and density is high. **Spotlighting** Broadcasting surveys during breeding season (August to February). Camera trapping where fresh signs have been detected. Indirect sightings such as scratches and scat (DoE 2014).	Searches for Koalas, or signs of their presence through scats and scratches was assessed across the Project area in patches of eucalypt woodlands as well as non-remnant areas. Searches were completed at all 112 quaternary sites within the original Project area. Searches also included individual paddock trees in regrowth and non-remnant areas. Searches within suitable habitat in the revised alignment was incidental only. Five nights of nocturnal surveys were conducted in March 2022 using spotlights. Total nocturnal survey effort was 50 person hours over five nights although the majority of this effort was in non-suitable non-remnant habitat and Koala habitat is limited in the Project area.	Within the original alignment, survey methods are consistent with guidelines and adequate survey effort has been completed within the Project area to assess presence of Koala habitat and presence of individuals. Further survey effort will be required in the revised alignment, where suitable habitat occurs.

Table 4.1 Fauna survey guidelines and EMM survey effort

Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
Ornamental Snake	**Survey methods for reptiles** Pitfall trapping with 4 buckets at 7.5 m intervals on T-design; 45 m fence for 4 nights. Funnel trapping with 6 funnels 3 m in on distal ends of T-design; 45 m fence for 4 nights. Diurnal active searches under rocks and logs for 2 x 30 person-minute searches within 2 different 50 x 50 m quadrants of the survey site. Nocturnal active search for 2 x 30 person-minute searches within the 100 x 100 m survey site. Camera trapping with 1 camera per site for minimum of 4 nights. Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrats of the survey site. Otherwise incidental sightings are noted (Eyre et al. 2018).	**Survey methods for Brigalow Belt reptiles** Targeting water-inundated gilgai, wetlands, riparian habitats, and the surrounding environment (eg tracks) and large logs between dusk and early morning hours. More effective on warm, humid evenings. Survey over a minimum of 1.5 person hours per hectare for habitats of average complexity per targeted species. Survey over a minimum of 3 nights. **Active searches** Actively look for reptiles whilst driving along roadways in your survey area especially following heavy rainfall events and during warm evenings for snakes. **Pitfalls** Six 20 litre (500 mm deep) buckets evenly distributed under a 30 m drift fence where optimal microhabitats occur. Place a funnel at each end of a pitfall line. At least 2 replicates per habitat type. Checked every morning and early evening (after the optimal foraging periods) over four days.	Spotlighting searches of gilgai and other Brigalow habitats totalling 50 person hours over five consecutive nights. Up to three trap nights (funnels and pitfalls) at five trap sites, totalling 25 pitfall trap nights and 112 funnel trap nights. As noted in Section 4.2.3 these traps were closed early due to heavy rain. The revised alignment on Lot 11 and Lot 2 was surveyed for habitat suitability for ornamental snake, and gilgai areas on cracking clay soil was noted as suitable habitat. It is expected that ornamental snake will be present in this area, in similar density to that recorded in similar habitat on Lot 23, which was surveyed extensively in March 2022. No further targeted survey effort for ornamental snake is proposed.	The species has been shown to occur in cleared areas of gilgai and the Brigalow Belt reptile guideline includes cleared areas of gilgai as potential habitat for this species. Multiple records in cleared gilgai were made within the Project area during March 2022. Diurnal searches were not performed due to a lack of microhabitat in the form of timber/ground logs that would provide refuge when cracks aren't available. The Project area has been stick-raked following historical clearing. If the species is present, it is likely to be resting in cracking soils of gilgai or creek lines. The Commonwealth survey guidelines recommend surveys over a minimum of three nights targeting gilgai wetlands and riparian habitats of average complexity, especially following rainfall events. The seasonal surveys were conducted in these preferred habitats before and after rainfall events by spotlighting, over five nights.

Table 4.1 Fauna survey guidelines and EMM survey effort

Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
				A total of 50 person hours was spent on nocturnal survey effort, and Ornamental Snake presence in the Project area has been confirmed. The species was identified in gilgai areas, some containing microhabitat. Therefore, adequate survey effort has been applied to determine Ornamental Snake populations and habitat distribution and condition.
Greater Glider	**Survey methods for arboreal mammals** Spotlighting for 2 x 30 person-minute searches within 100 x 100 m survey site.	No specific requirements for Greater Glider.	Five nights of nocturnal surveys were conducted in March 2022 using spotlights. Total nocturnal survey effort was 50 person hours over five nights although the majority of this effort was in non-suitable non-remnant habitat and Greater Glider habitat is not present in the original Project area. Hollow bearing trees were recorded where observed across the Project area, in the original alignment only although observations were also made on Lot 11 and Lot 2 on general abundance of suitable HBT for this species. Informal scat searches. Some areas of potential Greater Glider habitat, albeit marginal, occurs in the revised alignment on Lot 11. This habitat, characterised by remnant *Eucalyptus crebra* woodland with small to medium-sized hollows, should be surveyed utilising targeted methods (eg nocturnal spotlighting) in Spring 2022.	Within the original alignment, survey methods are consistent with guidelines and adequate survey effort has been completed. Spotlighting was focused on hollow bearing trees and riparian woodlands. Potential habitat for the species is present in the revised alignment, which will be subject to further survey effort.

Table 4.1 Fauna survey guidelines and EMM survey effort

Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
Squatter Pigeon	**Survey methods for diurnal birds** Diurnal bird surveys within the 100 x 100 m survey site by one observer for 5 minutes, on at least 6 occasions within a survey period. Longer (up to 10 minutes) may be required in complex habitats. Where practicable, two of the bird counts should be done in the early morning (<2 hours after sunrise), two in mid-morning (2 to 4 hours after sunrise), and the remaining two during less optimal times in the day (between 4 hours after sunrise and 2 hours before sunset) (Eyre et al. 2018). No specific requirements for Squatter Pigeon.	**Survey methods for birds** Area searches or transect surveys for 15 hours over 3 days. Applicable in areas of less than 50 ha. Flushing surveys for 10 hours over 3 days (DSEWPC 2010a). Applicable in areas of less than 50 ha.	Time driving around site is accepted to count to survey effort for this species, as the species often forages on bare dusty ground adjacent to natural habitats. Point counts were undertaken morning and evening at water sources in December 2021. Flushing surveys were undertaken while driving along unsealed roads and while traversing the Project area. Accumulated survey effort at all times when within the Project area while completing alternative surveys. The target species was continuously searched for during travel around the Project area. A total of 266 person hours was spent across the Project area over the course of the December 2021 and March 2022 surveys during daylight hours. A total of 70 person hours was spent in the revised alignment in the June 2022 surveys on Lot 2 and Lot 11.	The extent of survey effort is considered appropriate for the size of the Project area and consistent with survey guidelines. The species has been recorded in the Project area therefore considered as known to occur. Habitat has been mapped following DCCEEW criteria.

Table 4.1 Fauna survey guidelines and EMM survey effort

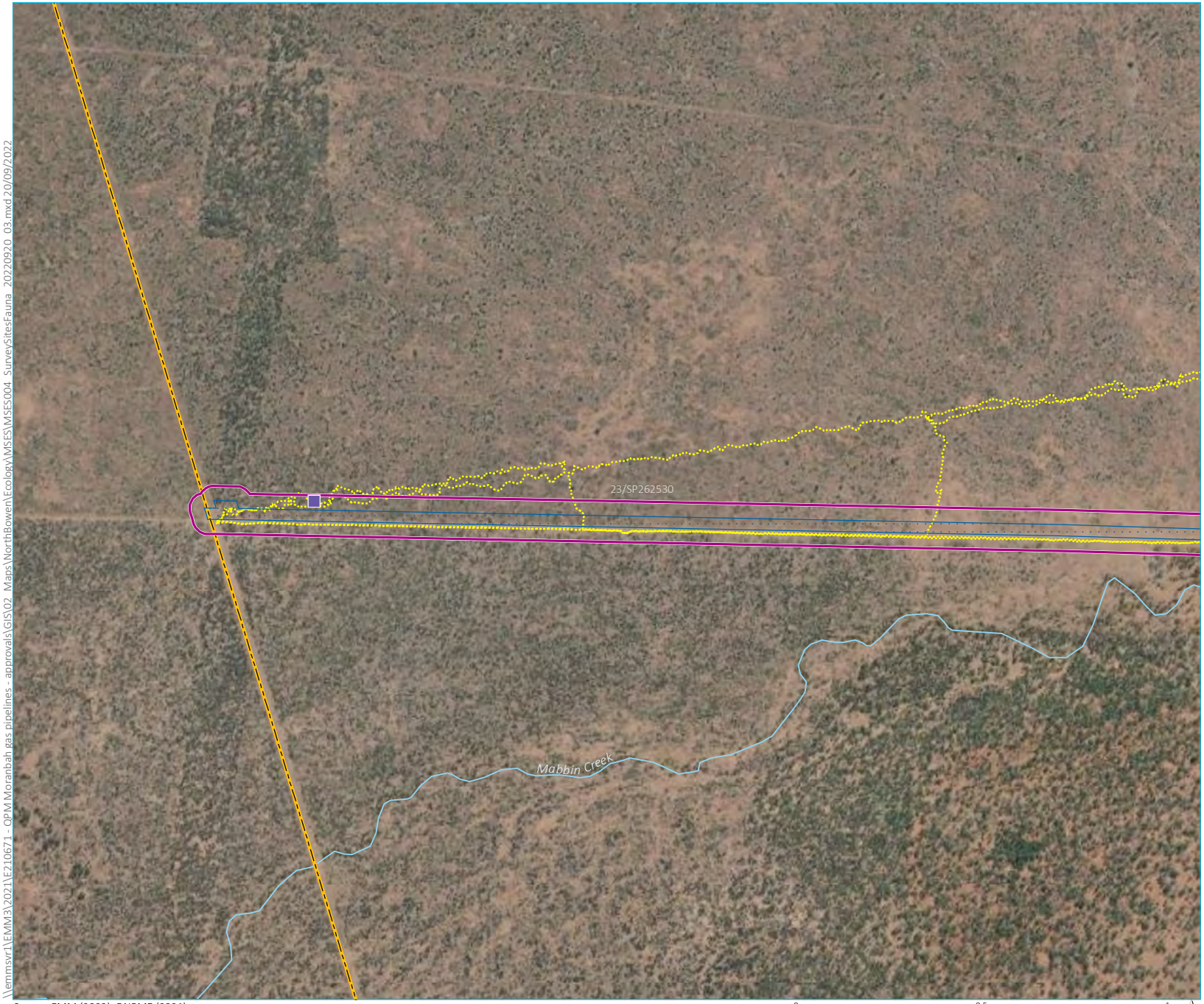
Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
Yakka Skink	Diurnal search for 20 minutes per hectare in a single search. • Search 20% of suitable habitat when the project area is 50 ha or greater. • Search 40% of suitable habitat when the project area is less than 50 ha. • Distant observation for 20 minutes per day scanning suitable microhabitat for 3 days. • Camera traps for 12 camera trap nights per colony over 4 nights. • Funnel traps for 60 trap nights per colony over 4 nights.	**Survey methods for Brigalow Belt reptiles** Searching microhabitats, such as carefully turning woody debris, rocks, and artificial debris, raking the soil surface or leaf litter beneath trees, and looking beneath peeling bark for reptiles or their sloughs. Optimal survey time is during the coolest parts of the day. Survey over a minimum of 1.5 person hours per hectare for habitats of average complexity per targeted species. Survey over a minimum of 3 days. Transects (number and size of area sampled) should be strategically designed/ positioned in large habitat patches (>10 ha) to adequately sample representative microhabitats in each habitat type. Target colony sites through diurnal surveys of suitable habitat. One large Elliott-style trap (15.5 cm x 15 cm x 46 cm) and one cage trap placed as close as possible to burrow entrances. Check every morning and early evening (after the optimal foraging periods) over four days.	19 person hours of diurnal active searching (generally in cooler parts of day) and 137 trap nights (combination of funnels and pitfalls over five trap sites in total).	Limited open woodland habitat and fallen timber and rock microhabitat reduce the likelihood of the species being present in the Project area. Survey methods and effort are considered to meet guideline requirements for this species, as habitats of average complexity for the species are not considered to be present.

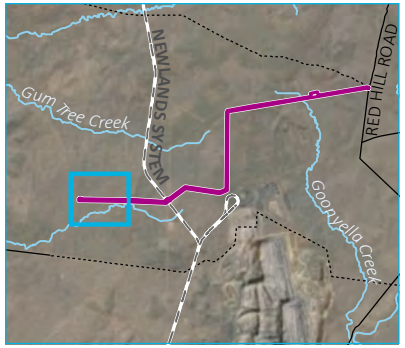
Table 4.1 Fauna survey guidelines and EMM survey effort

Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
		Survey methods for Australia's threatened reptiles Searching for burrow systems and communal defecation sites. The species can be confirmed by Elliott trapping around the burrows, by distant observation with binoculars or by shining a torch down the burrows at night.		
Australian Painted Snipe Latham's Snipe Sharp-tailed Sandpiper	**Terrestrial Vertebrate Fauna Survey Guidelines for Queensland** No specific survey guidelines. Generic diurnal bird survey: Six x 5–10 min area searches within 100 x 100 m survey site. Incidental detections.	**Australian Painted Snipe** Intensive vigilance is required to detect flushed birds. Area searches or transects through suitable wetlands; detection by sighting and flushing. Targeted stationary observations at dawn and dusk of suitable foraging locations within wetlands; detection by sighting. Also, a brief spotlight search shortly after dusk may detect birds. Stationary observations for 10 hours over 5 days for sites of less than 50 ha. Land-based area searches or line transects for 10 hours over 3 days for sites of less than 50 ha when wetland holds water but is not flooded.	Six diurnal bird surveys were undertaken over four days in December 2021. Surveys were stationary or meanders and were predominantly located close to watercourses and in areas of native vegetation. Surveys took place post dawn, at noon and mid/late afternoon. The target species was continuously searched for during travel around the Project area. A total of 266 person hours was spent across the Project area over the course of the three surveys during daylight hours.	This reduced effort when compared to the guideline recommendations is justified based on the limited optimal habitat in the Project area.

Table 4.1 Fauna survey guidelines and EMM survey effort

Target species	State guidelines	Commonwealth guidelines	EMM survey effort	Guidelines met
White-throated Needletail Fork-tailed Swift Oriental Cuckoo Rufous Fantail Black-faced Monarch Spectacled Monarch	No specific guidelines.	**From EPBC Referral Guidelines for Migratory species:** While there are no standard survey techniques for swifts, they should be counted by an experienced person from elevated viewpoints (if present) during the Austral summer. Prevailing weather conditions should be noted. The best methods of survey for the Oriental Cuckoo in non-breeding areas and the five breeding migrant flycatchers in breeding habitat is an area survey, preferably a 2 ha survey in 20 minutes, over sufficient survey plots to estimate a density, and hence the population size across the proposed development area. Surveys should be undertaken in an appropriate season – spring or summer in southern Australia.	Six diurnal bird surveys were undertaken over four days in December 2021 and incidental observations were recorded over five days in March 2022 and four days in June 2022. Surveys were stationary or meanders and were predominantly located close to watercourses and in areas of native vegetation. Surveys took place post dawn, at noon and mid/late afternoon. The target species was continuously searched for during travel around the Project area. A total of 266 person hours was spent across the Project area over the course of the three surveys during daylight hours.	Guidelines were met for these species.





KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Fauna survey sites

- Funnel trap
- Spotlighting transect

Source: EMM (2022); DNRME (2021)

0 0.5 1 km

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N

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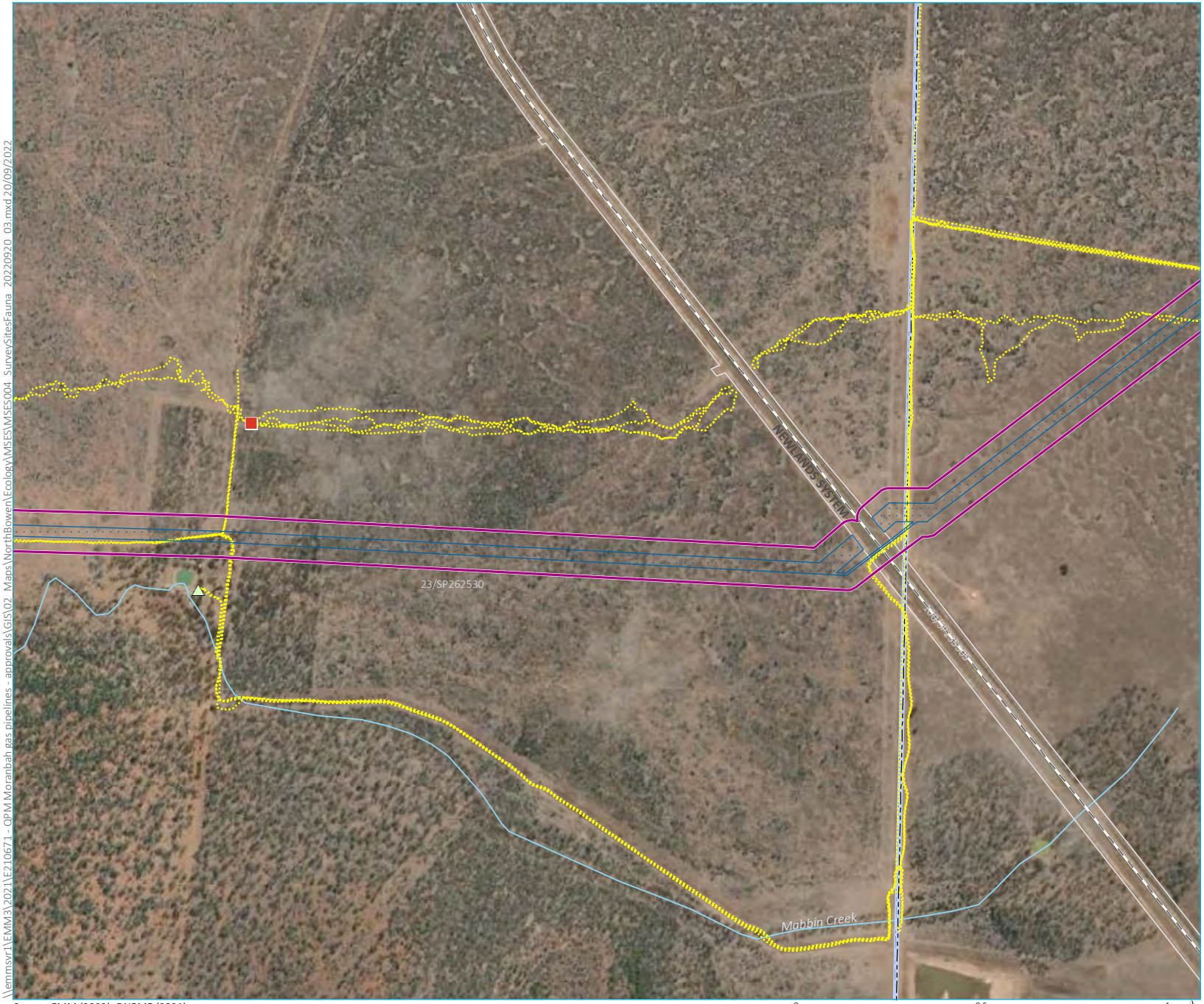
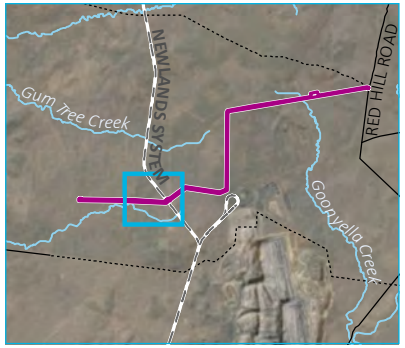
Survey sites - fauna
Map 1 of 6

QPM Energy Project
MSES
Figure 4.2

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Fauna survey sites

- Pitfall trap
- Anabat
- Spotlighting transect

Survey sites - fauna
Map 2 of 6

QPM Energy Project
MSES
Figure 4.2

EMM
creating opportunities

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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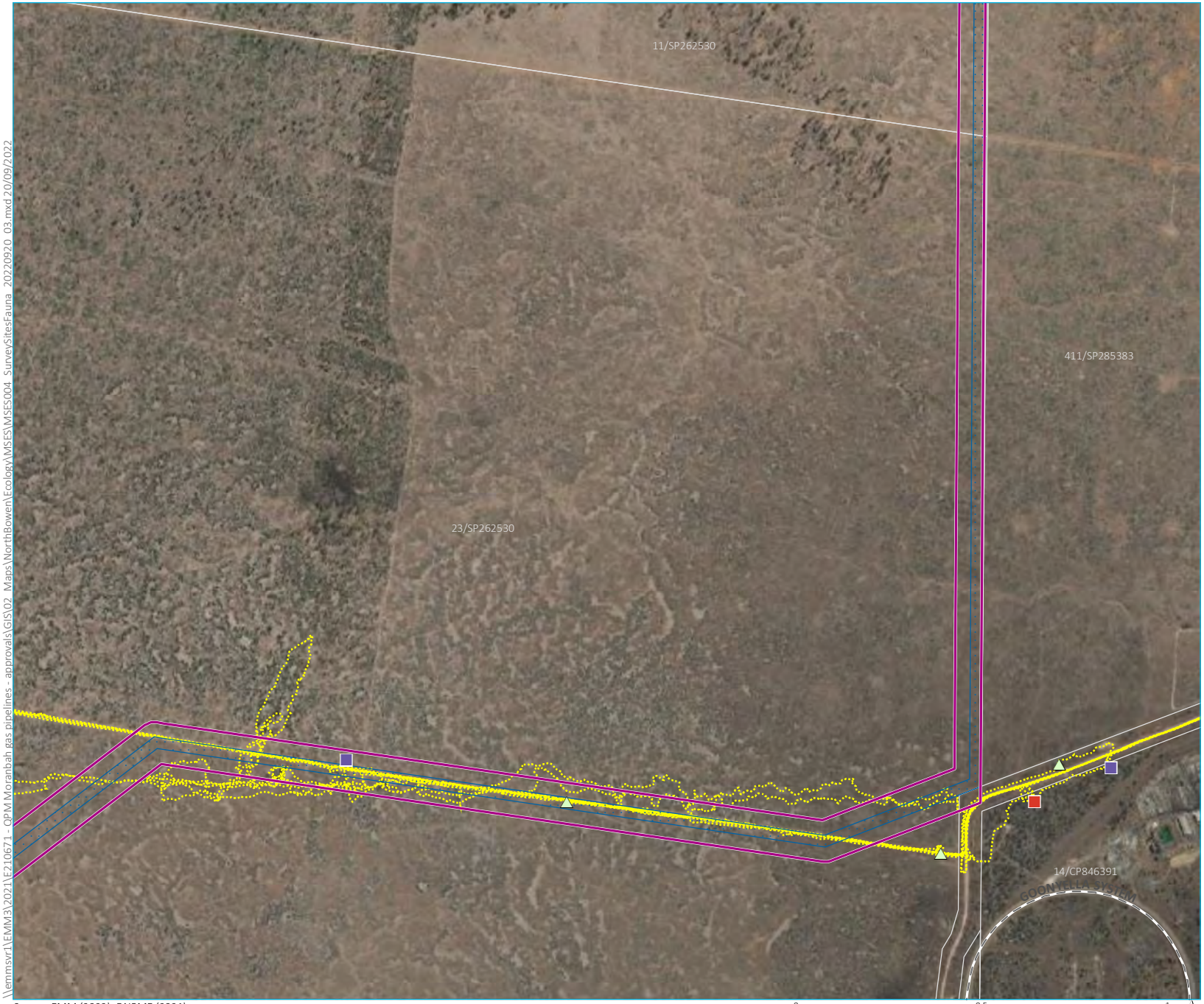

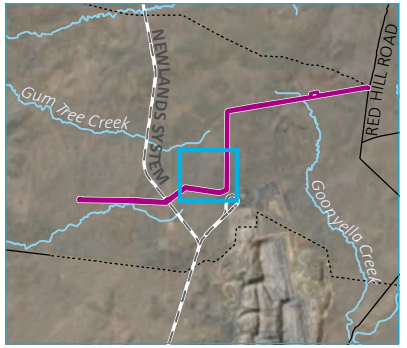

KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Fauna survey sites

- Pitfall trap
- Funnel trap
- Anabat
- Spotlighting transect

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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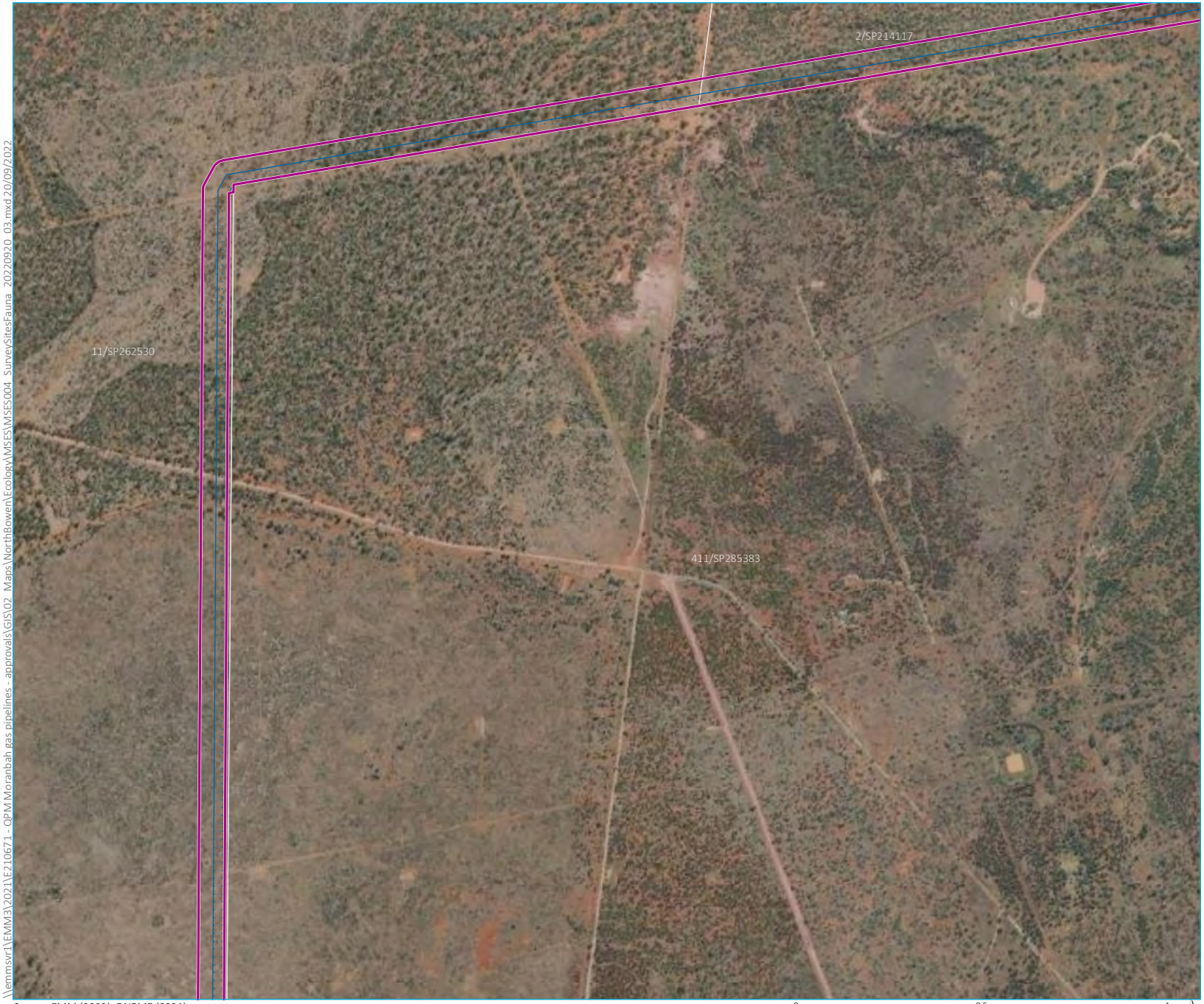
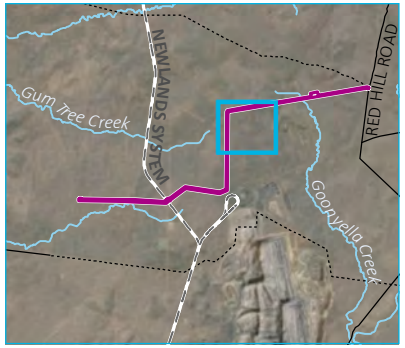
Survey sites - fauna
Map 3 of 6

QPM Energy Project
MSES
Figure 4.2

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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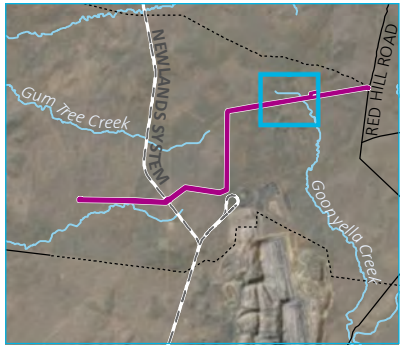
Survey sites - fauna
Map 4 of 6

QPM Energy Project
MSES
Figure 4.2

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Survey sites - fauna
Map 5 of 6

QPM Energy Project
MSES
Figure 4.2

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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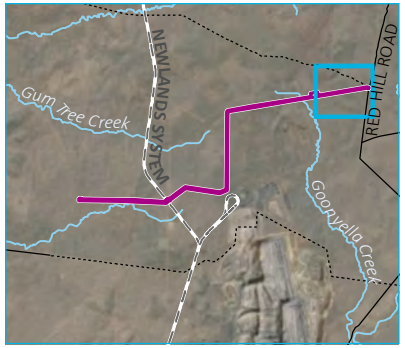

KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

Survey sites - fauna
Map 6 of 6

QPM Energy Project
MSES
Figure 4.2

EMM
creating opportunities

4.2.2 Survey timing and climatic conditions

i December 2021

Conditions during the field survey ranged between 19–35 °C with 0.2 mm of rain recorded at Moranbah to 9.00 am on 9 December 2021. Localised rain was observed to be higher on this date, with heavy downpour occurring during an afternoon storm on 8 December 2021, although no data of the actual rain received was available. The nearest weather station at Moranbah received 182.4 mm of rainfall in the three months leading up to the survey (BOM, 2022), with 29.4 mm falling the week prior.

In December 2021, with the exception of Buffel Grass, most grasses were not in flower, making specific identification of grass species challenging. The potential detection of threatened grasses was reduced throughout the Project area due to lack of fertile material. Plant material was collected for some grass species and provided to the Queensland Herbarium for verification.

Overnight rain occurred during the survey period, on 8 December 2021. Frogs (Green tree frog (*Litoria caerulea*) and Ruddy tree frog (*Litoria rubella*)) were heard calling at the site the next day, despite the absence of standing water. This is an indication of how the site transforms after rain, and would provide suitable habitat for the Ornamental Snake, which feeds almost exclusively on frogs.

ii March 2022

Conditions during the field survey ranged between 21–41 °C with 13.8 mm of rain recorded at Moranbah on 10 March 2022, although it is suspected the amount in the Project area was higher than this, as a local landholder reported approximately 40 mm at a nearby homestead. The nearest weather station at Moranbah received 193.8 mm of rainfall in the three months (December to February) leading up to the survey (BOM, 2022a), with no rain falling the week prior.

Overnight rain occurred during the survey period, on 10 March 2022. This resulted in inundation of the gilgai from a dry baseline, and flooding of the Project area in areas of low-lying clay soils. Frogs were heard calling that evening from the rain, as well as an emergence of Ornamental Snake in the gilgai areas.

iii June 2022

Conditions during the field survey ranged between 8.1–24.8 °C with 0.2 mm of rain recorded at Moranbah on 30 June 2022. The nearest weather station at Moranbah received 150.6 mm of rainfall in the three months (April to June) leading up to the survey (BOM, 2022b), with no rain falling in the month of June, except on the 30 June, as noted above. Above-average rainfall occurred in May (108.6 mm, mean 34.5 mm).

4.2.3 Limitations

Rainfall prior to the March 2022 surveys produced good conditions for identifying grasses and other herbaceous species, however there was a significant amount of Buffel Grass growth competing with the native flora present within the Project area.

During the March 2022 surveys, a significant rainfall event occurred on the evening of 10 March, requiring the pitfall and funnel traps to be closed early to avoid inundation of the traps. Although the traps did not complete the desired four nights of survey, the implications of this are negligible due to the large number of Ornamental Snakes recorded during separate spotlighting effort (see Section 6.3). The rain event did not prevent access on foot to complete remaining flora and fauna survey effort.

4.3 Risk assessment

The risk-based approach to hazard assessment and management involved the following key steps:

- Identification: This step identifies the areas of impact, potential hazards and their causes and potential consequences.
- Analysis of inherent risk: This involves developing an understanding of the risks, including the likelihood and consequences of particular events, without considering mitigation measures. The likelihood, consequence and risk scoring criteria are defined in Table 4.2, Table 4.3 and Table 4.4.
- Evaluation: Information from the risk analysis is combined to assess the overall level of risk of an event as demonstrated in Table 4.4. This helps to determine which hazards and risks need treatment or management. It also prioritises treatment.
- Mitigation: This involves identification of relevant and appropriate mitigation measures and how they will be implemented to reduce the risk.
- Analysis of residual risk: Risks are analysed again after the application of mitigation measures.

Likelihood criteria are given in Table 4.2.

Table 4.2 Likelihood criteria

Likelihood	Description	Frequency
A) Almost certain	Can be expected to occur in most circumstances	>85%
B) Likely	Will probably occur in most circumstances	40–85%
C) Possible	Might occur at some time	20–40%
D) Unlikely	Could occur at some time	5–20%
E) Rare	May only occur in exceptional circumstances	<5%

Consequence criteria are given in Table 4.3.

Table 4.3 Consequence criteria

Rating	Description
5. Severe: widespread serious permanent effect	Incident is reportable to the regulator, serious permanent/persistent and irreversible damage is caused, significant public interest and media coverage and/or uncontained impacts.
4. Major: widespread, moderate to long-term effect	Incident is reportable to the regulator and notable damage is caused to an area or asset from which it will take more than 10 years to recover with long-term evidence of the incident resulting. OR Incident is reportable to the regulator and public concern raised.
3. Moderate: localised, short-term to moderate effect	Moderate but repairable damage that will take up to 10 years to recover or incident is reportable to the regulator.
2. Minor: localised short-term effect	Minor damage to the environment or heritage asset or area that is immediately contained on-site. It will take less than two years for the resource or asset to fully recover or it will only require minor repair OR Disturbance to scarce or sensitive environmental or heritage resources.
1. Insignificant: no impact or no lasting effect	Negligible damage that is contained on-site OR The damage is fully recoverable with no permanent effects, taking less than three months to fully recover

The risk assessment matrix in Table 4.4 is used to combine the likelihood and consequence rating, to give a risk assessment score.

Table 4.4 Risk assessment matrix

Likelihood	Consequence				
	1) Insignificant	2) Minor	3) Moderate	4) Major	5) Severe
A) Almost certain	Medium A1	Medium A2	High A3	Extreme A4	Extreme A5
B) Likely	Low B1	Medium B2	High B3	Extreme B4	Extreme B5
C) Possible	Low C1	Low C2	Medium C3	High C4	High C5
D) Unlikely	Low D1	Low D2	Low D3	Medium D4	Medium D5
E) Rare	Low E1	Low E2	Low E3	Low E4	Medium E5

4.4 Significant impact assessment

Significant residual impact assessments have been undertaken in accordance with the SRI Guideline (DEHP 2014). The methods provided within the guidelines are intended to determine the level of significant impacts on MSES due to the proposed action. This is achieved through 'significant impact criteria' which are imposed on identified values and vary according to the status of each value. Summary of SRI assessments for MSES are provided in Section 9 of this report.

5 Desktop assessment results

The following sections present the results of the background research and desktop assessments which were completed prior to the commencement of field surveys. MNES values are included here for completeness and context but covered in a separate EPBC referral technical report (EMM 2022).

5.1 Summary of PMST

A PMST search was undertaken on 6 December 2021, and recompleted on 5 May 2022 to inform this report, with a 20 km buffer added to the Project area. A summary of the results is provided in Table 5.1, with further detail in the sub-sections below.

Table 5.1 PMST results for the study area

MNES	PMST result
World Heritage Properties	None
National Heritage Properties	None
Wetlands of International Importance	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed threatened ecological communities	4
Listed threatened species	24
Listed migratory species	9

5.2 World heritage and national heritage properties

No World Heritage or National Heritage Properties are located within the Project area or Study area (Appendix A.1). The closest World Heritage property, the Great Barrier Reef, is located over 135 km east of the Project area.

5.3 Protected area estates

No Protected Area estates are located within the Project area (Appendix A.1). The nearest Protected Area is Homevale National Park approximately 60 km to the north-east.

5.4 Wetlands of international importance

No Wetlands of International Importance are located within the Project area (Appendix A.1). The closest Wetlands of International Importance are Bowling Green Bay, located approximately 250 km to the north of the Project area and Shoalwater and Corio Bays approximately 250 km to the southeast of the Project area.

Although not listed as a Wetland of International Importance, and therefore not an MNES, Lake Elphinstone (listed in the Directory of Important Wetlands in Australia) is located approximately 30 km north-east of the Project area.

5.5 Great Barrier Reef Marine Park and Commonwealth Marine Area

The Great Barrier Reef Marine Park is located approximately 135 km east of the Project area (Appendix A.1).

5.6 Regional ecosystems and regulated vegetation

Results of the desktop assessment indicated that a total of eight REs are mapped within the Project area in the Queensland Government regulated vegetation mapping (including subdominant REs within heterogenous polygons). These are summarised in Table 5.2 including Vegetation Management Act class and Biodiversity Status.

The certified RE mapping for the Project area on Lot 23 includes:

- one polygon of 'Endangered' RE 11.4.9 – *Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains; and
- one heterogeneous polygon of 'Endangered'- dominant RE 11.4.11/11.4.8/11.4.9.

The majority of vegetation within the new alignment and compressor facility on Lot 11 and Lot 2 is mapped as non-remnant, with an area of 'Least Concern' RE 11.5.3/11.5.15 and 'Of Concern' RE 11.8.11, as well as 'Endangered' RE 11.8.13. The short description for these vegetation communities are as follows:

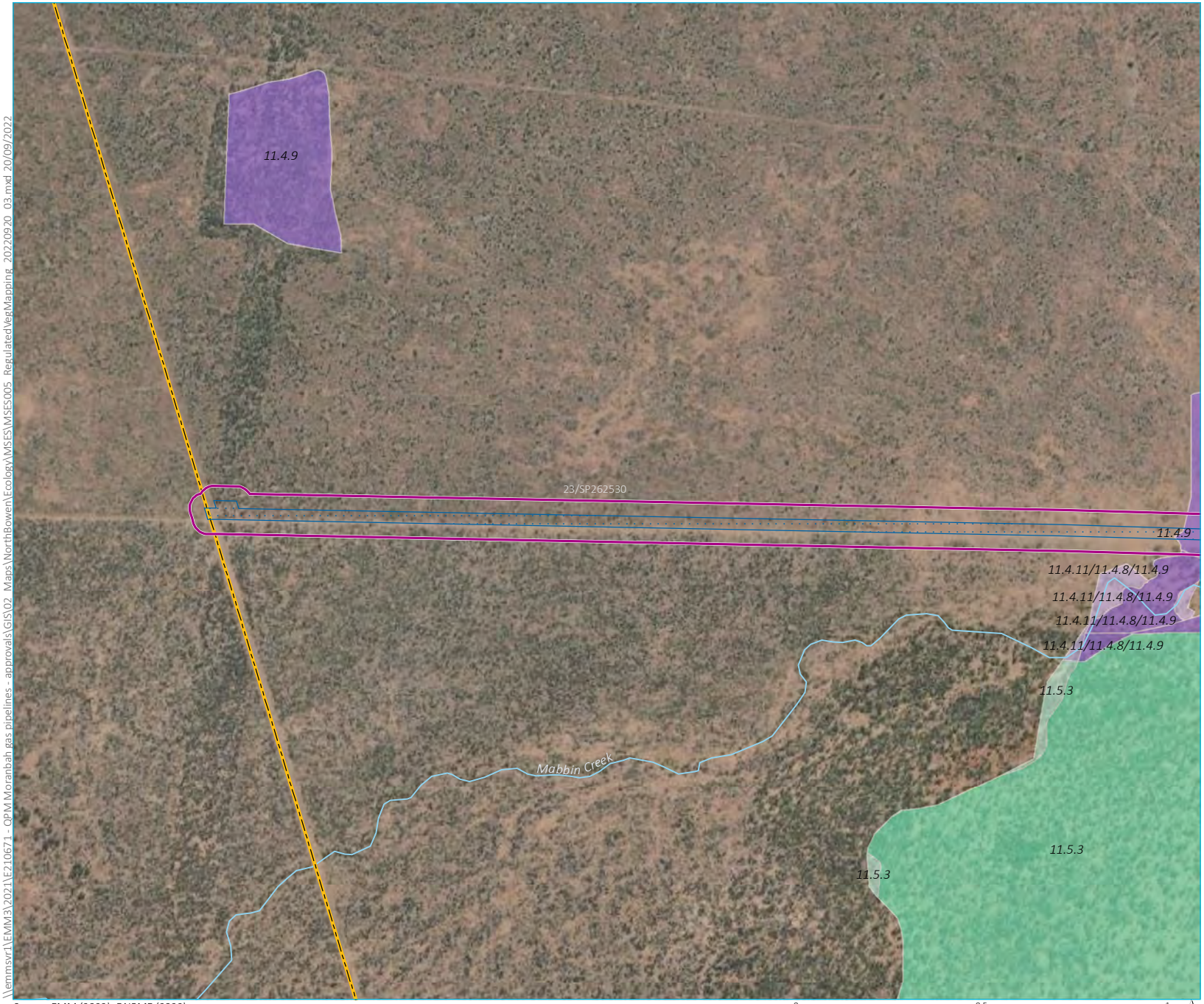
- Heterogenous polygons of 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces and 11.5.15 - Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces;
- Heterogenous polygons of 11.8.11 - *Dichanthium sericeum* grassland on Cainozoic igneous rocks and 11.8.5 *Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks; and
- 11.8.13 – Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks.

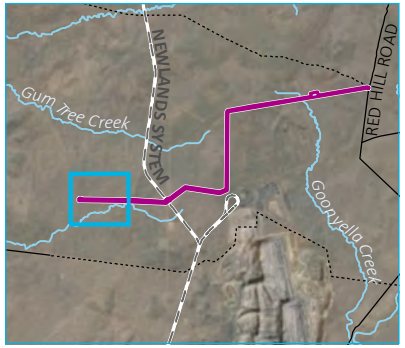
RE 11.5.3 may provide suitable habitat for Koala, Squatter Pigeon, Greater Glider, and Yakka Skink, whilst Quassia (*Samadera bidwillii*) may occur in RE 11.5.15. A review of the aerial imagery indicates that gilgai are present within areas mapped as non-remnant vegetation, which is suitable habitat for Ornamental Snake. Non-remnant grassland areas within this new alignment may also provide suitable habitat for Squatter Pigeon and King Bluegrass. The proposed access road, at the eastern end of the alignment near Red Hill Road is mapped within the Protected Plants High Risk Trigger Map, as shown in Figure 5.1.

Table 5.2 Regional ecosystems mapped in the Project area

RE code	Description	Vegetation Management Act class	Biodiversity Status
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	Endangered	Endangered
11.4.9	*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains	Endangered	Endangered
11.4.11	*Dichanthium sericeum* and *Astrebla spp.* grassland with patchy *Acacia harpophylla* or *Eucalyptus coolabah* on Cainozoic clay plains	Of Concern	Of Concern
11.5.3	*Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces	Least Concern	No concern at present
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces	Least Concern	Endangered
11.8.5	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks	Least Concern	No concern at present
11.8.11	*Dichanthium sericeum* grassland on Cainozoic igneous rocks	Of Concern	Of Concern
11.8.13	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks	Endangered	Endangered

Regional Ecosystems within the Project area based on certified mapping is illustrated in Figure 5.1.





KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Regional ecosystems (VM status)

- Remnant - endangered
- High value regrowth - endangered
- Remnant - least concern
- High value regrowth - least concern

Source: EMM (2022); DNRME (2022)

0 0.5 1 km

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N

Regulated vegetation mapping in project area
Map 1 of 6

QPM Energy Project
MSES
Figure 5.1

EMM creating opportunities

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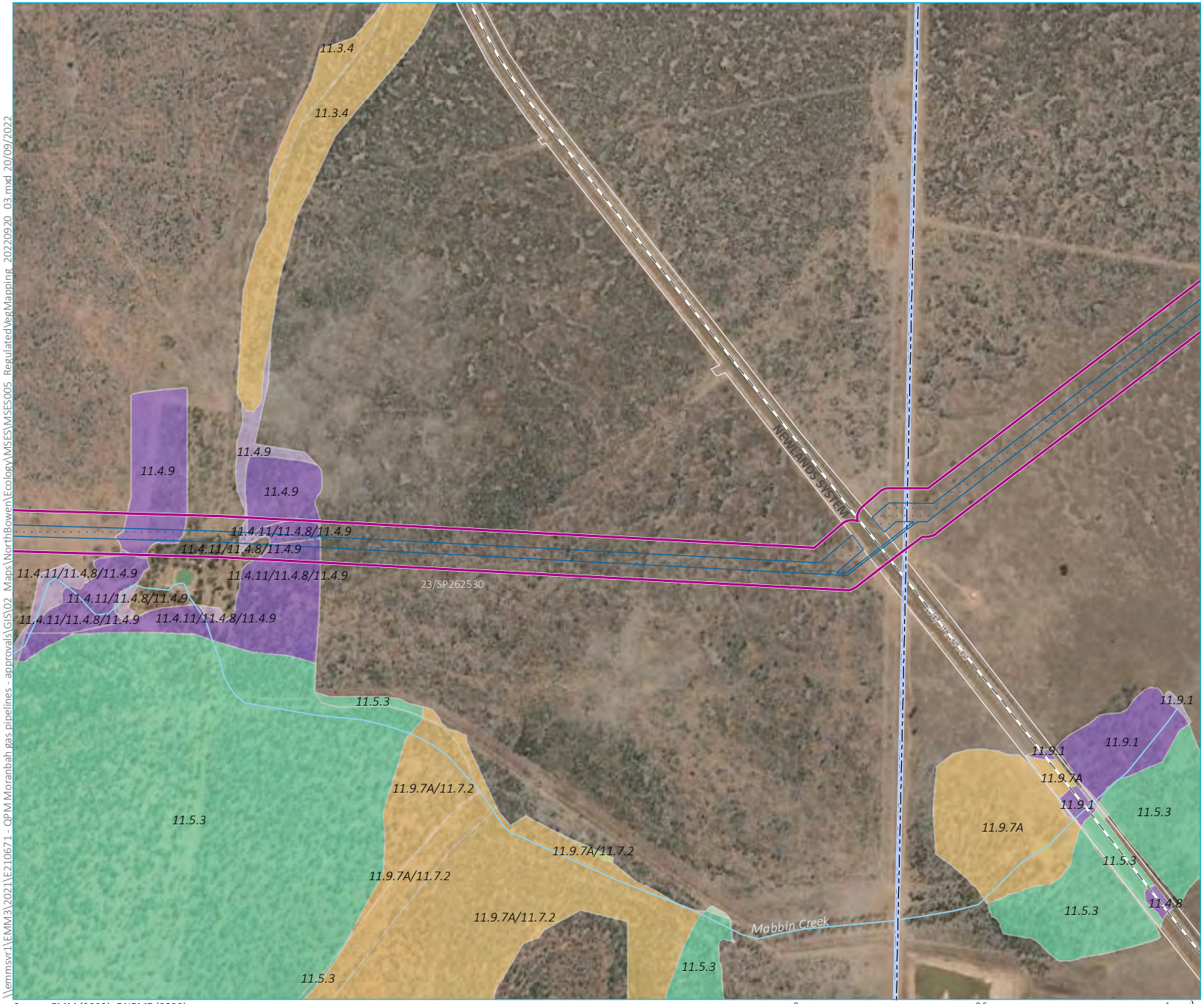

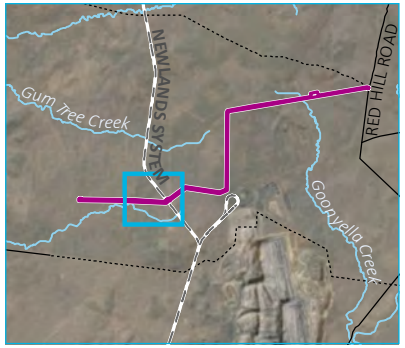

KEY

- Project area
- Proposed disturbance footprint
- Rail line
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- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Regional ecosystems (VM status)

- Remnant - endangered
- High value regrowth - endangered
- Remnant - of concern
- High value regrowth - of concern
- Remnant - least concern
- High value regrowth - least concern

Source: EMM (2022); DNRME (2022)

0 0.5 1 m

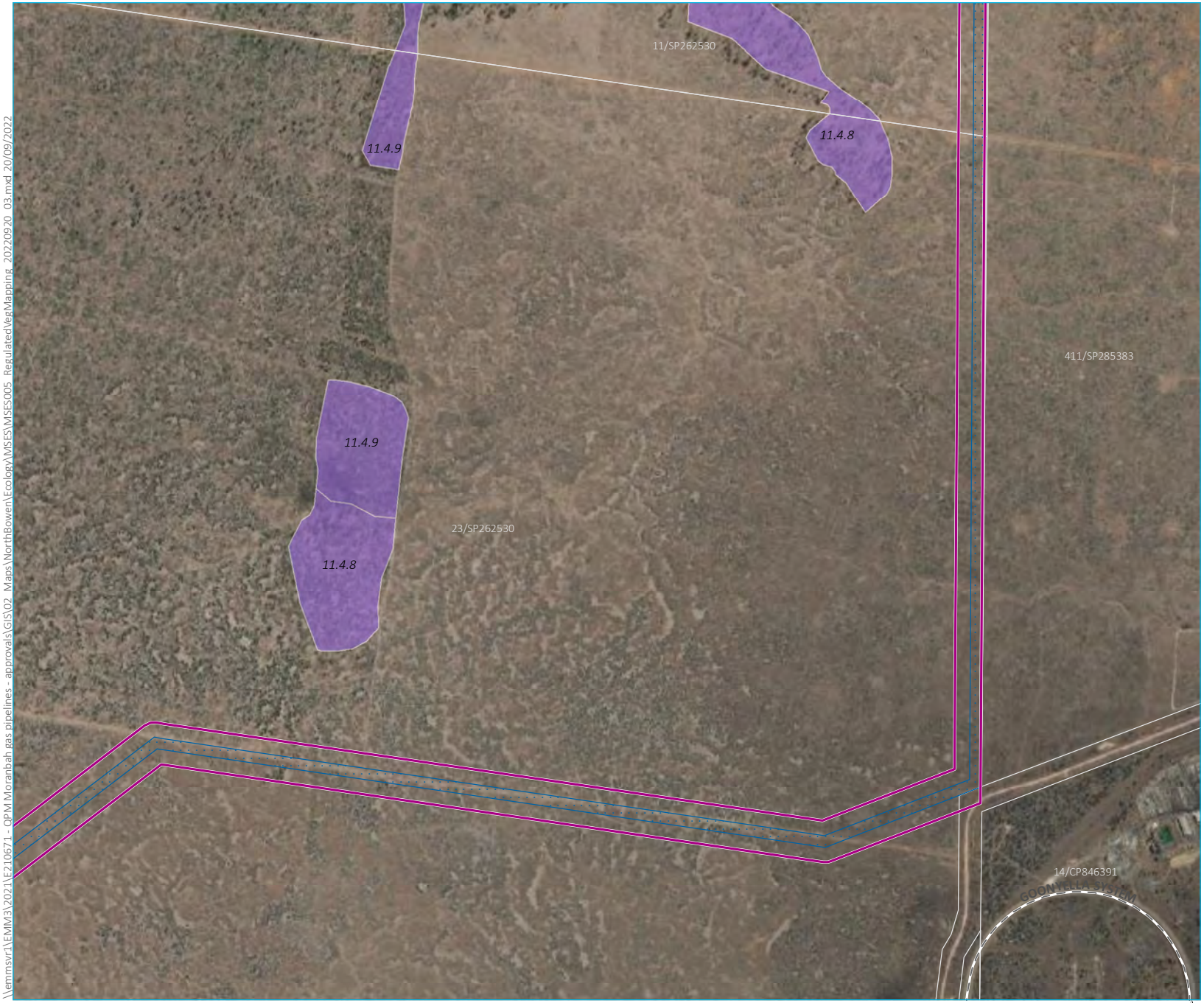
GDA 1994 MGA Zone 55

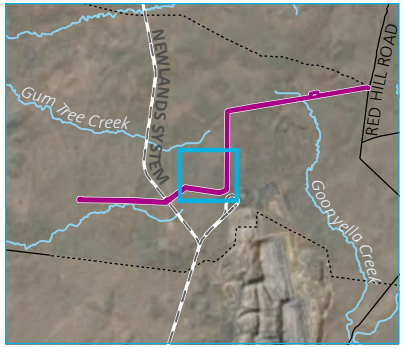
N

Regulated vegetation mapping in project area
Map 2 of 6

QPM Energy Project
MSES
Figure 5.1

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Regional ecosystems (VM status)

- Remnant - endangered

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Source: EMM (2022); DNRME (2022)

0 0.5 1 m

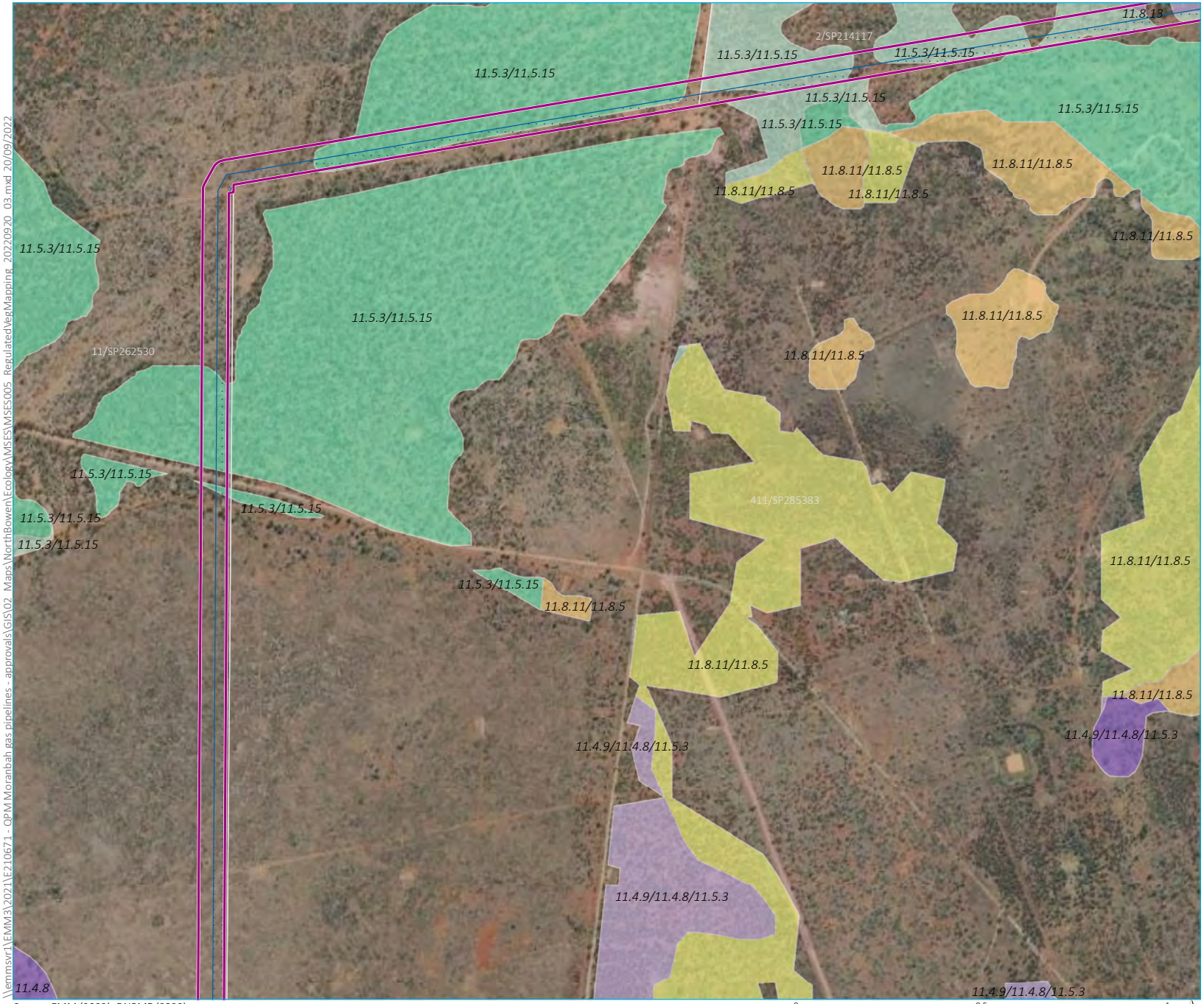
GDA 1994 MGA Zone 55

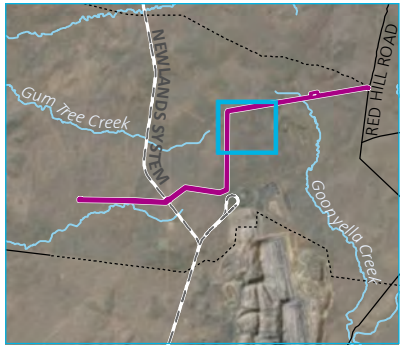
N

Regulated vegetation mapping in project area
Map 3 of 6

QPM Energy Project
MSES
Figure 5.1

EMM creating opportunities





KEY

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- Minor road
- Vehicular track
- Cadastral boundary

Regional ecosystems (VM status)

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- High value regrowth - endangered
- Remnant - of concern
- High value regrowth - of concern
- Remnant - least concern
- High value regrowth - least concern

Source: EMM (2022); DNRME (2022)

0 0.5 1 m

GDA 1994 MGA Zone 55

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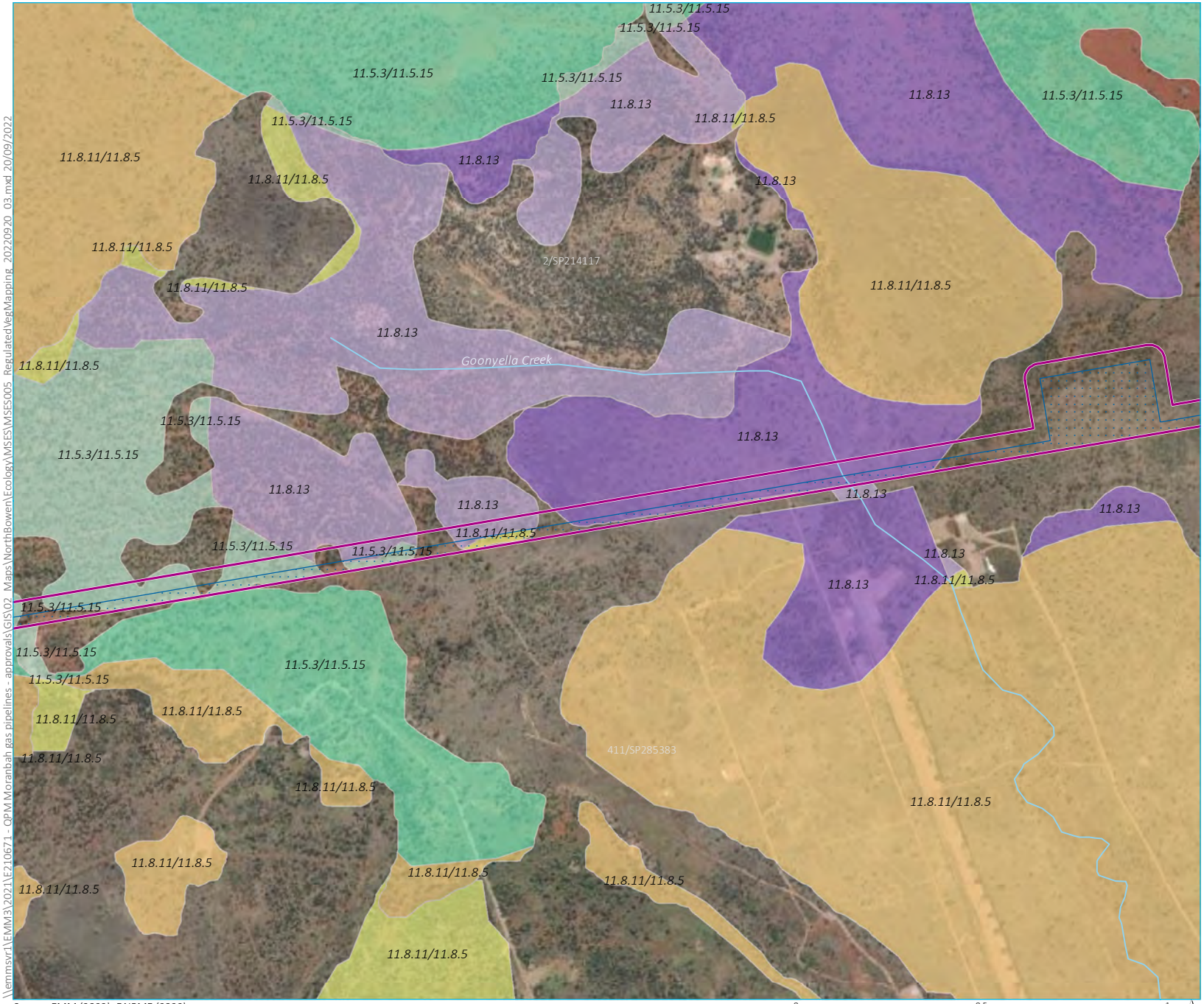
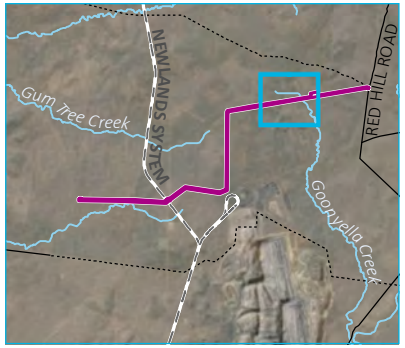
Regulated vegetation mapping in project area
Map 4 of 6

QPM Energy Project
MSES
Figure 5.1

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Regional ecosystems (VM status)

- Remnant - endangered
- High value regrowth - endangered
- Remnant - of concern
- High value regrowth - of concern
- Remnant - least concern
- High value regrowth - least concern

Source: EMM (2022); DNRME (2022)

0 0.5 1 m

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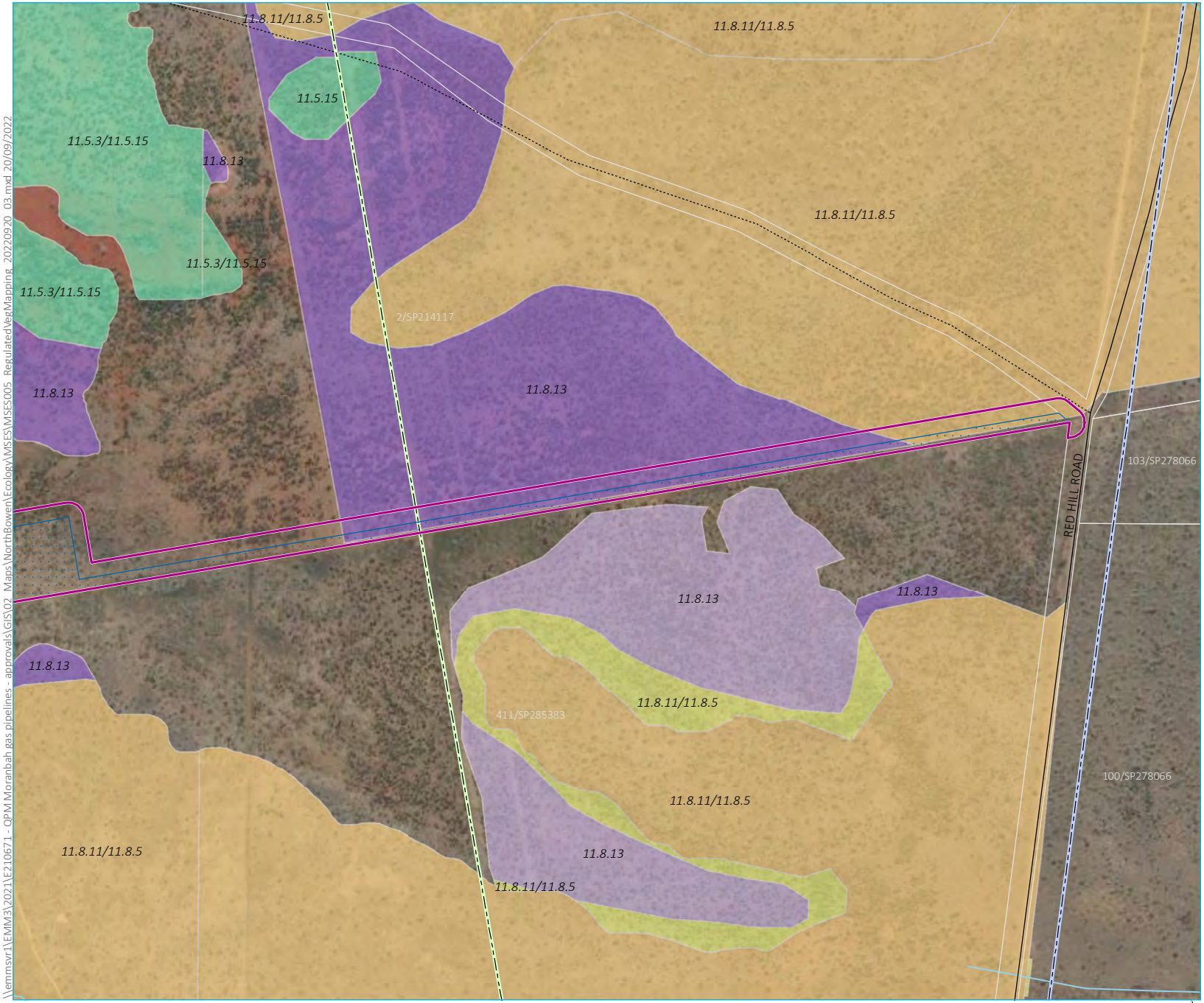
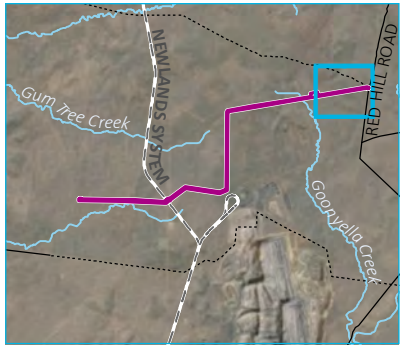
Regulated vegetation mapping in project area
Map 5 of 6

QPM Energy Project
MSES
Figure 5.1

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Regional ecosystems (VM status)

- Remnant - endangered
- High value regrowth - endangered
- Remnant - of concern
- High value regrowth - of concern
- Remnant - least concern

Source: EMM (2022); DNRME (2022)

0 0.5 1 m

GDA 1994 MGA Zone 55

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Regulated vegetation mapping in project area
Map 6 of 6

QPM Energy Project
MSES
Figure 5.1

EMM creating opportunities

5.7 Threatened ecological communities

Four TECs were identified as potentially occurring with the study area based on results from the PMST desktop assessment and review of the REs mapped in the Project area and adjacent properties. These TECs are:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC);
- Natural Grasslands of the Queensland Central Highlands and Fitzroy River Basin (Grassland TEC);
- Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC);
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC).

Table 5.3 summarises the TECs with potential to occur in the Project area identified through PMST search and their analogous REs. The table shows in bold those analogous REs that are mapped in the certified mapping, within the Project area.

Table 5.3 TECs with potential to occur in Project area

TEC	EPBC Act status	Associated regional ecosystems
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	11.3.1, 11.4.3, 11.4.7, **11.4.8**, **11.4.9**, 11.4.10, 11.5.16, 11.9.2, 11.9.5, 11.9.6, 11.11.14, 11.12.21
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	11.3.21, 11.4.4, **11.4.11**, **11.8.11**, 11.9.9, 11.9.12, 11.11.17
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	11.3.11, 11.4.1, **11.8.13**, 11.11.18, 11.2.3, 11.9.4
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	11.3.2, 11.3.17, 11.4.7, 11.4.12, 12.3.10

Notes: *The table shows in bold those analogous REs that are mapped in the certified mapping, within the Project area*

5.8 Threatened species

The following database searches were undertaken to identify listed flora species under EPBC Act and NC Act with potential to occur in the Project area:

- a search of the PMST (Annexure A) for listed flora species with potential to occur within 20 km of the Project area;
- a search of Wildlife Online databases (Annexure A) for listed flora species that occur within 20 km of the Project area; and
- Essential Habitat mapping.

Results of the desktop assessment for threatened flora and fauna species under EPBC Act and NC Act are summarised in subsequent sections, based on the results of the PMST and a Queensland Wildlife Online search completed 5 May 2022. Desktop records of all threatened species in the study area are mapped in Figure 5.2. A refined likelihood of occurrence table to identify candidate threatened species for the Project area is located in Annexure C.

5.8.1 Threatened flora species

A total of five threatened flora species under the NC Act are considered to have potential to occur within the Project area based on desktop assessments.

The five NC Act threatened flora species identified with potential to occur are described in Table 5.4.

Table 5.4 Flora species with potential to occur

Scientific name	Common name	EPBC Act status[1]	NC Act status[2]	PMST search	Wildlife Online
Cerbera dumicola		-	NT		✓
Dichanthium queenslandicum	King Bluegrass	E	V	✓	✓
Digitaria porrecta	-	-	NT		✓
Ptilotus uncinellus		-	E		✓
Samadera bidwillii	Quassia	V	V	✓	×

1. *EPBC Act status: CE- critically endangered, E – endangered, V – vulnerable, M – migratory, Ma – marine.*
2. *NC Act status: CE – critically endangered, E – endangered, V – vulnerable, NT – near threatened, LC – least concern.*

Areas of Essential Habitat (mapped by DES) are mapped within the Project area, associated with records of King Bluegrass, are mapped on Lot 11 and Lot 2 (as shown in Figure 5.2).

i Protected plant trigger mapping

Informal searches for potentially occurring threatened flora species were undertaken across the Project area. High-risk trigger mapping exists at the eastern end of the Project area, associated with records of the threatened grass *Dichanthium queenslandicum* (endangered EPBC Act, vulnerable *Nature Conservation Act 1992* (Qld) (NC Act)). Mapping is shown on Figure 5.1.

5.8.2 Threatened fauna species

A total of 20 threatened fauna species and nine migratory species under the NC Act are considered to have potential to occur within the Project area based on desktop assessments.

The 20 NC Act threatened fauna species identified with potential to occur are described in Table 5.5.

Table 5.5 Threatened fauna species potentially occurring within Project area

Species	Common name	EPBC Act status[1]	NC Act status[2]	PMST search	Wildlife Online
Calidris ferruginea	Curlew Sandpiper	CE	CE	✓	×
Erythrotriorchis radiatus	Red Goshawk	V	V	✓	×
Falco hypoleucos	Grey Falcon	V	V	✓	×
Geophaps scripta scripta	Squatter Pigeon (southern)	V	V	✓	✓
Grantiella picta	Painted Honeyeater	V	V	✓	×
Neochmia ruficauda ruficauda	Star Finch (eastern)	E	E	✓	×
Poephila cincta cincta	Southern Black-throated Finch	E	E	✓	×
Rostratula australis	Australian Painted Snipe	E	E	✓	×
Tyto novahollandiae	Masked Owl (northern)	V	V	✓	×
Macroderma gigas	Ghost Bat	V	E	✓	×
Nyctophilus corbeni	Southeastern Long-eared Bat	V	V	✓	×
Petauroides volans	Greater Glider	E	E	✓	✓
Phascolarctos cinereus	Koala	E	E	✓	×
Tachyglossus aculeatus	Short-beaked Echidna	-	SLC	×	✓
Denisonia maculata	Ornamental Snake	V	V	✓	✓
Egernia rugosa	Yakka Skink	V	V	✓	×
Elysea albagula	White-throated Snapping Turtle	CE	CE	✓	×
Furina dunmalli	Dunmall's Snake	V	V	✓	×
Lerista allanae	Retro Slider	E	E	✓	×
Rheodytes leukops	Fitzroy River Turtle	V	V	✓	×

3. EPBC Act status: CE- critically endangered, E – endangered, V – vulnerable, M – migratory, Ma – marine

4. NC Act status: CE – critically endangered, E – endangered, V – vulnerable, NT – near threatened, LC – least concern

The nine migratory species under the EBPC Act and SLC under the NC Act, identified with potential to occur are:

- Fork-tailed Swift (*Apus pacificus*) (Migratory EPBC Act, SLC NC Act);
- Oriental Cuckoo (*Cuculus optatus*) (Migratory EPBC Act, SLC NC Act);
- Yellow Wagtail (*Motacilla flava*) (Migratory EPBC Act, SLC NC Act);
- Common Sandpiper (*Actitis hypoleucos*) (Critically Endangered, Migratory EPBC Act, SLC NC Act);
- Sharp-tailed Sandpiper (*Calidris acuminata*) (Migratory EPBC Act, SLC NC Act);
- Curlew Sandpiper (*Calidris ferruginea*) (Migratory EPBC Act, SLC NC Act);
- Pectoral Sandpiper (*Calidris melanotis*) (Migratory EPBC Act, SLC NC Act);
- Latham's Snipe (*Gallinago hardwickii*) (Migratory EPBC Act, SLC NC Act); and
- Osprey (*Pandion haliaetus*) (Migratory EPBC Act, SLC NC Act).

Desktop assessments identified numerous records of Ornamental Snake (vulnerable under EPBC Act and NC Act) occurring along the alignments of both the Newland System rail line and water pipeline, including in locations where the proposed QPM pipeline and existing infrastructure interact. It is likely that Ornamental Snake is also present in the preferred alignment; it can be found in both remnant and non-remnant areas, and essential habitat for the species was mapped within the proposed alignment.

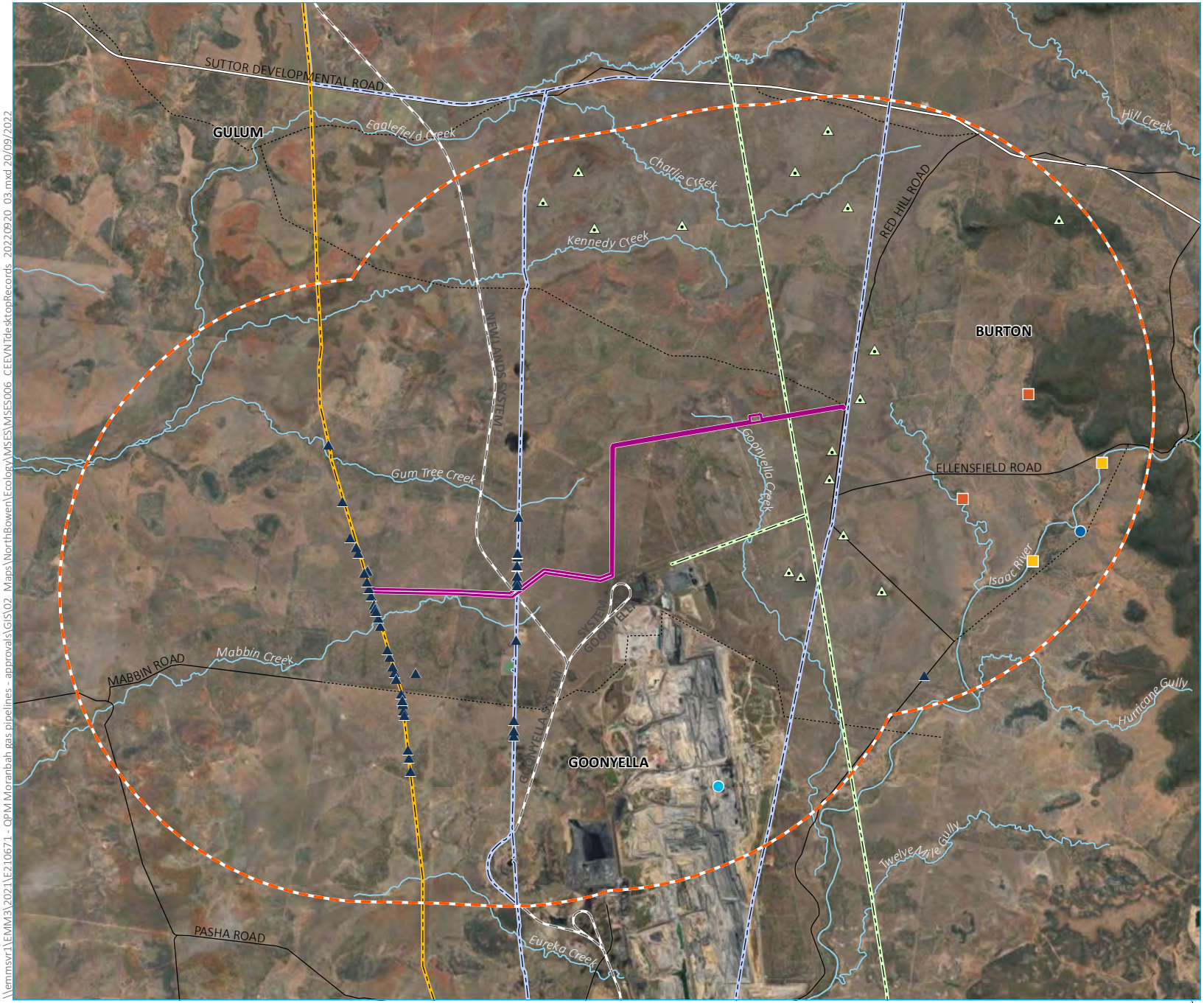
i Essential habitat

Several areas of essential habitat (mapped by DES) are mapped across the Project area, associated with record(s) of Ornamental Snake, as follows:

- areas of Essential Habitat (mapped by DES), associated with records of Ornamental Snake are mapped on Lot 11 and Lot 2 (as shown in Figure 5.2); and
- within mapped brigalow communities in the central portion of Lot 23.

Desktop assessments identified numerous records of Ornamental Snake (vulnerable under EPBC Act and NC Act) occurring along the alignments of both the Newland System rail line and water pipeline, including in locations where the proposed high-pressure and existing infrastructure interact. It is likely that Ornamental Snake is also present in the preferred alignment; it can be found in both remnant and non-remnant areas, and essential habitat for the species was mapped within the proposed alignment.

Mapped Essential Habitat within the Project area is shown in Figure 5.1.



KEY

- Ecology study area
- Project area
- Electrical transmission line
- North Queensland Gas Pipeline
- Water pipeline
- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse

Threatened species desktop records

- *Dichanthium queenslandicum*
- Ornamental Snake
- Black-faced Monarch
- Squatter Pigeon
- Greater Glider
- Short-beaked Echidna

Source: EMM (2022); DNRME (2021); DES (2021); GA (2011)

0 2.5 5 km

GDA 1994 MGA Zone 55

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Threatened species desktop records within the study area

QPM Energy Project
MSES
Figure 5.2

EMM creating opportunities

5.9 Pest flora and fauna

Results of the desktop assessment (Wildlife Online) identified 15 pest flora species and 16 pest fauna species associated with the Project area. These are summarised below in Table 5.6.

Under the *Biosecurity Act 2014*, a person who has control over a 'Restricted Matter' must not do the following:

- Category 3 – a person who has, or has a thing infested with, the 'Restricted Matter' in the person's possession or under the person's control must not distribute or dispose of the restricted matter unless the distribution or disposal is carried out via the methods set out in the Biosecurity Act.
- Category 4 – move the 'Restricted Matter', or cause or allow to be moved.
- Category 5 – keep in the person's possession or under the person' control.
- Category 6 – give food to the 'Restricted Matter.'

Table 5.6 Pest flora and fauna

Common name	Scientific name	Biosecurity Act Category
Plants		
Gomphrena Weed	*Gomphrena celosioides*	
Red-head Cottonbush	*Asclepias curassavica*	
Blue Billygoat Weed	*Ageratum houstonianum*	
Bipinnate Beggar's Ticks	*Bidens bipinnata*	
-	*Emilia sonchifolia*	
-	*Flaveria trinervia*	
Parthenium*	*Parthenium hysterophorus*	3
-	*Symphyotrichum subulatum*	
-	*Xanthium occidentale*	
-	*Harrisia martinii*	
Common Prickly Pear*	*Opuntia stricta*	3
Nutgrass	*Cyperus rotundus*	
Butterfly Pea	*Clitoria ternatea*	
Sunhemp	*Crotalaria juncea*	
-	*Macroptilium lathyroides var. semierectum*	
-	*Prosopis pallida*	
-	*Sida cordifolia*	
-	*Sida rhombifolia*	
-	*Sida spinosa*	

Table 5.6 Pest flora and fauna

Common name	Scientific name	Biosecurity Act Category
Scoparia	*Scoparia dulcis*	
-	*Bothriochloa pertusa*	
-	*Cenchrus ciliaris*	
Rhodes Grass	*Chloris gayana*	
Feathertop Rhodes Grass	*Chloris virgata*	
-	*Cynodon dactylon var. dactylon*	
Sheda Grass	*Dichanthium annulatum*	
Angleton Grass	*Dichanthium aristatum*	
Summer Grass	*Digitaria ciliaris*	
Awnless Barnyard Grass	*Echinochloa colona*	
-	*Hyparrhenia rufa subsp. rufa*	
-	*Megathyrsus maximus var. maximus*	
-	*Megathyrsus maximus var. pubiglumis*	
Red Natal Grass	*Melinis repens*	
-	*Moorochloa eruciformis*	
Paspalum	*Paspalum dilatatum*	
Johnson Grass	*Sorghum halepense*	
Grader Grass	*Themeda quadrivalvis*	
Sabi Grass	*Urochloa mosambicensis*	
-	*Physalis pubescens*	
Jamaica Snakeweed	*Stachytarpheta jamaicensis*	
Mammals		
Domestic Dog	*Canis lupis familiaris*	3, 4, 6
Cat	*Felis catus*	3, 4, 6
House Mouse	*Mus musculus*	
Rabbit	*Oryctolagus cuniculus*	3, 4, 5, 6
Pig	*Sus scrofa*	3, 4, 6
Amphibians		
Cane Toad	*Rhinella marina*	
Reptiles		
House Gecko	*Hemidactylus frenatus*	

1. ** = Weed of National Significance (WoNS)*

5.10 Watercourses and wetlands

Goonyella Creek, a stream order 1 mapped watercourse intersects the Project area on Lot 2. The western portion of the alignment runs between Mabbin Creek to the south and Gum Tree Creek to the north, these being small ephemeral watercourses. These watercourses reside on a relatively flat alluvial plain which likely undergoes minor seasonal inundation.

No mapped National or State significant wetlands occur in the Project area.

5.11 Groundwater dependent ecosystems

According to reviews of the Bureau of Meteorology Groundwater Dependent Ecosystems Atlas (BOM 2020) and WetlandMaps 2.0 (DES 2019a), there is a low confidence potential terrestrial groundwater dependent ecosystem (GDEs) mapped within the Project area. This is associated with a patch of RE 11.3.4 in the west of the Project area on Lot 23. This area is mapped as a surface ecosystem dependent on the sub-surface presence of groundwater.

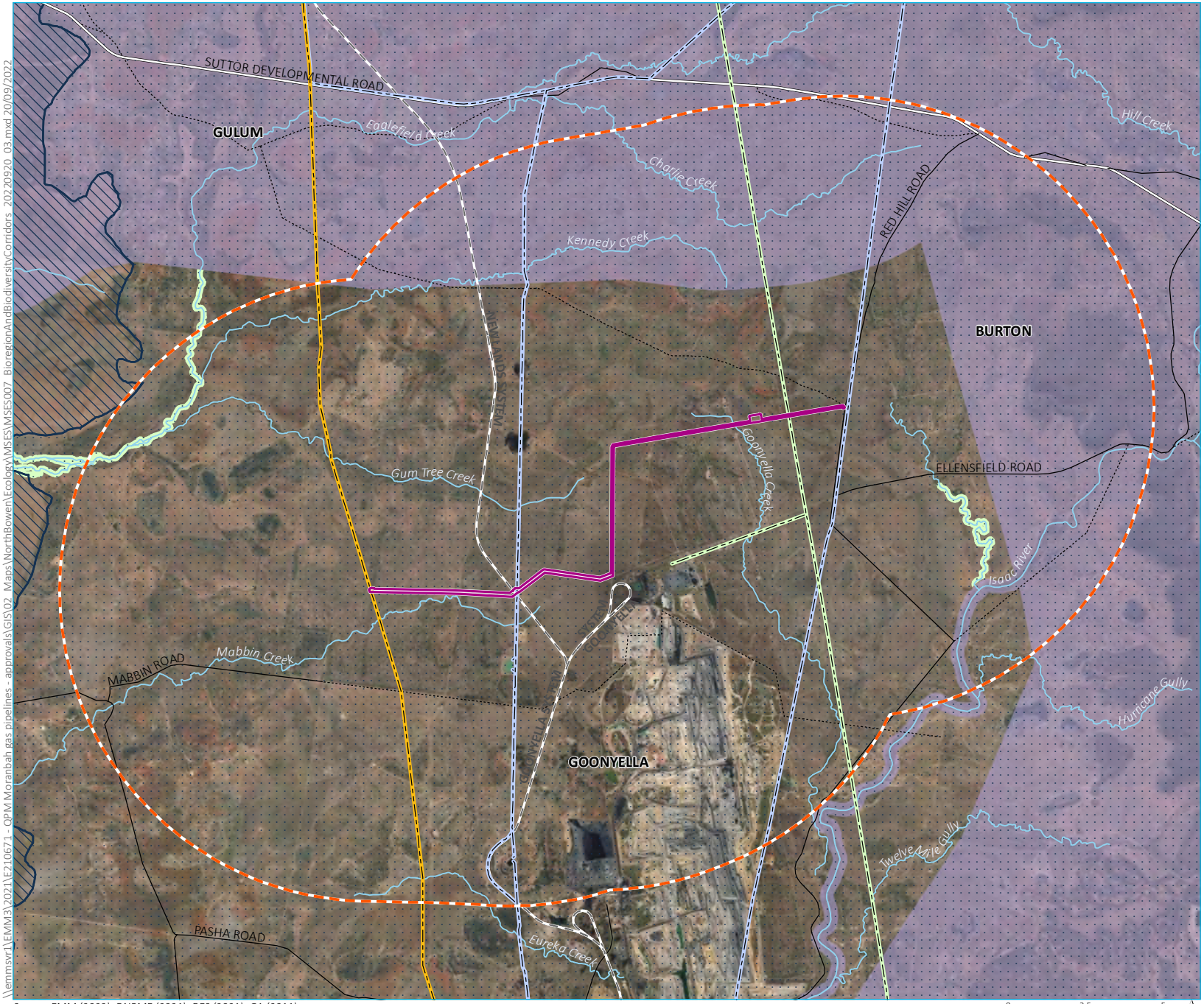
Additionally, small areas of high confidence potential terrestrial GDEs are mapped within the Project area on Lot 11 and Lot 2. These are associated with patches of RE 11.5.3/11.5.15 in the north of the Project area on Lot 11 and Lot 2. This area is mapped as a surface ecosystem dependent on the sub-surface presence of groundwater.

The Project will not have an impact on groundwater and is not expected to impact on GDEs. Management measures for water quality are discussed in Section 8.5.

5.12 Connectivity and biodiversity significance

A State significant biodiversity corridor is mapped approximately 4 km north of the Project area on Lot 11. This corridor is shown on Figure 5.3.

Proposed impacts to the extent and connectivity of remnant vegetation in the area will be analysed using the DES ‘landscape fragmentation and connectivity’ tool based on the proposed vegetation clearing footprint (see Section 9.2).



KEY

- Ecology study area
- Project area
- Electrical transmission line
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- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse

Brigalow Belt North bioregion

- Belyando Downs subregion
- Northern Bowen Basin subregion

Biodiversity corridors

- State
- Regional

Source: EMM (2022); DNRME (2021); DES (2021); GA (2011)

0 2.5 5 km

GDA 1994 MGA Zone 55

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Bioregion and biodiversity corridors

QPM Energy Project
MSES
Figure 5.3

EMM creating opportunities

5.13 Fish passage

Goonyella Creek is mapped as a green (low risk) waterway on the Waterway Barrier Works (WWBW) map. The proposed pipeline crosses this waterway at the eastern end of the Project area. Works proposed across waterways (eg access tracks) that may have an impact on fish passage need to be assessed.

There are no fish habitat areas in the Project area.

5.14 Legally secured offset areas

There are no legally secured offset areas in the Project area. A legally secured offset area occurs in the northeast of Lot 2 but is not within the Project footprint.

5.15 Marine MSES values

There are no areas of marine plants or State Marine Parks in the Project area.

5.16 Summary of MSES values

A full list of MSES, as listed under EO Reg, identified through desktop analysis and field survey is provided in Table 5.7 and those assessed to be present, or with potential to be present, in the Project footprint are summarised. Areas of endangered or of concern vegetation are based on the groundtruthed RE mapping from the fieldwork (described in Section 6). There are Property Maps of Assessable Vegetation (PMAVs) in place over large portions of the alignment.

Estimated area of impact to each MSES is also described. Desktop MSES reports are provided in Annexure A.

Table 5.7 Potential for residual impacts to MSES

Matter	Description of matter	Present/absent in Project area	Area within Project area (ha)
Endangered RE	Endangered remnant vegetation (VM Act status)	Present – see Section 6.2.1	3.04
Of Concern RE	Of Concern remnant vegetation (VM Act status)	Absent (although mapped)	0
Remnant vegetation associated with wetlands (vegetation management wetlands)	-	Absent	0
Essential Habitat	Essential habitat is defined under the VM Act as the habitat of endangered, vulnerable, or near-threatened wildlife prescribed under the NC Act. Essential habitat is mapped over areas of remnant vegetation that are likely to contain either three or more essential habitat factors or the relevant species for which the area is mapped at any stage of its life cycle.	Essential habitat associated with Ornamental Snake and King Bluegrass is present in the Project area.	7.66

Table 5.7 Potential for residual impacts to MSES

Matter	Description of matter	Present/absent in Project area	Area within Project area (ha)
Watercourse vegetation	Remnant vegetation that occurs within a set buffer distance of a stream order. Watercourse vegetation was mapped based on DoR stream order mapping and vegetation mapping of remnant areas and applying relevant buffer widths based on stream order.	Present – Goonyella Creek is mapped as a stream order 1 watercourse. Remnant vegetation in the vicinity has been mapped in the groundtruthed RE mapping (refer Section 6.2.1). This is outside of the Project footprint.	0
Connectivity	Impacts to connectivity have been assessed under the SRI Guideline.	The significant impact assessment is discussed in Section 9.2.	-
Wetlands	Wetlands in a wetland protection area or wetlands of high ecological significance shown on the map of referable wetlands under the *Environmental Protection Regulation 2008* (note this has been replaced with the map of Queensland wetland environmental values under the Environmental Protection Regulation 2019). Wetlands and watercourses in high ecological value waters identified in the *Environmental Protection (Water) Policy 2009*, schedule 1.	There are no wetlands of 'high ecological significance' (HES) or 'high ecological value waters' under the EP Act, which are prescribed as MSES, within the Project footprint.	0
Strategic Environmental Area	A designated precinct, in a strategic environmental area under the Regional Planning Interests Regulation 2014, schedule 2, part 5, s15(3)	There are no Strategic Environmental Areas (SEAs) within the Project footprint or study area. SEAs include Cape York Peninsula, the Gulf Country, the Chanel Country, Fraser Island and Hinchinbrook Island and will not require further consideration.	0
Protected Wildlife Habitat	Endangered, Vulnerable and SLC species listed under the *NC Act.* MSES species identified to occur in the Project area are described in Section 6.2.2.	A number of threatened flora and fauna species have potential to occur in the Project footprint, based on desktop assessments. These species and associated habitats are summarised in Section 6.	See Section 6.3
High-risk Trigger Mapping	High-risk areas identified in flora survey trigger mapping as described by the Environmental Offsets Regulation 2014, schedule 2, part 6(1).	Present	3.93
Protected Areas	Protected areas (including all classes of protected area except coordinated conservation areas) under the NC Act.	Absent	0
State Marine Park	Marine national park, conservation park, scientific research, preservation, or buffer zones under the *Marine Parks Act 2004.*	Absent	0

Table 5.7 Potential for residual impacts to MSES

Matter	Description of matter	Present/absent in Project area	Area within Project area (ha)
Declared Fish Habitat Areas	Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008.	Absent	0
Fish Passage	Goonyella Creek is mapped as a green (low risk) waterway on the Waterway Barrier Works (WWBW) map. The proposed pipeline crosses this waterway at the eastern end of the Project area. Works proposed across waterways (eg access tracks) that may have an impact on fish passage need to be assessed.	Present	N/A
Marine Plants	Marine plants under the *Fisheries Act 1994* (excluding marine plants in an urban area).	Absent	0
Legally secured offset area	Legally secured offset areas as defined under the *Environmental Offsets Act 2014.*	Absent	0

6 Field survey results

6.1 Site condition and summary

Generally, the site is heavily disturbed by current and historical land uses including clearing, livestock grazing and mining. A review of the aerial imagery indicates that the majority of areas exhibiting current impacts from vegetation clearing were initially disturbed prior to 1987. Vegetation across the proposed pipeline alignment on Lot 23 is predominantly non-remnant. Pre-clear vegetation consisted primarily of brigalow woodland, which has been broadscale cleared, raked, and seeded with the exotic pasture species, Buffel Grass. Minor areas of remnant and high-value regrowth remain within the central portions of the pipeline alignment on Lot 23, although are in a degraded condition due to incursion of weed grass species in the ground layer. Despite disturbance, the pipeline alignment on Lot 23 contains an abundance of gilgai habitat which transforms rapidly to freshwater wetlands after rain. These short-lived wetlands provide suitable habitat for a range of cryptic species that are difficult to detect when conditions are dry (eg burrowing frogs and ornamental snake).

The high-pressure pipeline alignment on Lot 411, now excluded from the Project, is also heavily disturbed and predominantly non-remnant within the Project area, with areas of remnant vegetation adjacent to the existing road towards the eastern end of the Project area. Land south of the former high-pressure pipeline alignment on Lot 411 has been largely developed for the North Goonyella/Riverside Mine, while areas to the north contain less disturbed, remnant woodland.

The vegetation through the north-south alignment of the high-pressure pipeline alignment on Lot 23 is predominantly non-remnant, however, contains extensive gilgai which is suitable habitat for ornamental snake. Many of these gilgai still held water in June 2022 but were in degraded condition through trampling by cattle. The northern end of the high-pressure pipeline alignment on Lot 11 is located within remnant woodland dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark), which in some areas contains Semi-evergreen Vine Thicket (SEVT) species in the understorey. Buffel Grass is generally sparse within this woodland area. Historical vegetation clearing has occurred on Lot 2, which contains the east-west alignment of the high-pressure pipeline alignment, the proposed compressor facility and the proposed access road linking to Red Hill Road. The high-pressure pipeline alignment contains areas of non-remnant vegetation, as well as remnant areas of Narrow-leaved Ironbark woodland, *Acacia harpophylla* (Brigalow)/*Eucalyptus cambageana* (Blackbutt) woodland and grassy open *Eucalyptus orgadophila* (Mountain Coolibah) woodland. The proposed compressor facility is located within entirely non-remnant vegetation with Buffel Grass dominant in the ground layer. The eastern end of the alignment is heavily infested with *Parthenium hysterophorus* (Parthenium weed) on heavy dark brown cracking clay soil.

6.2 Flora

6.2.1 Vegetation communities

A total of 43 quaternary assessments were completed in the field across the Project area in December 2021, as illustrated in Figure 4.1. Of these assessments, 17 were undertaken in mapped remnant vegetation, 9 in mapped HVR and the remaining 17 in non-remnant areas. The quaternary sites were completed in all polygons of mapped remnant and HVR vegetation, as well as routinely through the non-remnant areas, to confirm accuracy of the mapping in the field. These sites were all located in areas of the old alignment on Lot 411.

A total of 17 quaternary assessments were completed in the field across the Project area in March 2022, as illustrated in Figure 4.1. Of these assessments, three were undertaken in mapped remnant vegetation, one in mapped HVR and the remaining 13 in non-remnant areas. 14 of these sites were completed within the current alignment on Lot 23, and an additional three were completed on Lot 411, which is now removed from the Project area.

A total of 52 quaternary assessments were completed in the field across the Project area in June 2022, as illustrated in Figure 4.1. The pipeline alignment on Lot 23 had been revised to relocate the rail crossing, with the new alignment passing through previously unsurveyed remnant vegetation. Seven quaternary sites were completed in this area, to confirm the extent and condition of the mapped vegetation. Two sites were also completed at the revised rail crossing location, which is correctly mapped as non-remnant. The remaining quaternary sites were completed in the north-south alignment on Lot 11 and east-west alignment on Lot 2.

The majority of the Project area on Lot 23 is characterised by Brigalow regrowth with Buffel Grass understorey, with the exception of one region of remnant Brigalow. On Lot 11, vegetation is correctly mapped as predominantly non-remnant, with one area of remnant RE 11.5.3. Significant RE mapping errors are present on Lot 2. The majority of vegetation is mapped as remnant or HVR SEVT REs 11.5.15 or 11.8.13, which are not present. The actual vegetation present is predominantly Brigalow regrowth which has retained remnant status, but is heavily degraded with Buffel Grass in the understorey, and dense areas of Parthenium weed at the eastern end. Most of the RE codes are correct for mapped remnant polygons on Lot 411 (now excluded from the Project), however their extents were frequently inaccurate. Some areas of non-remnant vegetation were incorrectly mapped as remnant or HVR. All extant vegetation extents were mapped correctly in the field using polyline streaming. A description of the field-validated REs within the proposed pipeline and buffer areas, and compressor site Project area is provided in the following sections.

i Old pipeline alignment on Lot 411 (ground-truthed)

There is one heterogeneous polygon of mapped remnant 'Endangered' RE 11.4.9/11.4.8/11.5.3 which is intersected by the old pipeline alignment (see 'polygon 2' in Figure 6.2). The field survey confirmed that the vegetation within this patch contains areas consistent with all three REs, as well as non-remnant vegetation, as shown in Figure 6.1. A representative photograph of the vegetation on the southern side of the road, within RE 11.4.8, is provided in Photograph 6.1.

A combination of quaternary and BioCondition assessments, and review of historical aerial imagery was completed within this patch to accurately determine whether the extant vegetation meets the requisite criteria to be defined as remnant. The patch of vegetation south of the road is consistent in composition with RE 11.4.8, described as *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains. Partly within the pipeline extent, at the western end of the patch, mature *E. cambageana* of 18 m average height is present, with a shrub layer of currant bush (*Carissa ovata*) and peach bush (*Ehretia membranifolia*). Through the central and eastern portions of the patch, *A. harpophylla* is also present, as a shrub layer of approximately 3–6 m in height. The canopy within the polygon is sparse as many of the large trees have been removed, with cover around 15%. Buffel Grass is present within the ground layer and weed cover comprises around 30% cover in that stratum. Soils within the patch are characterised by red-brown cracking clay.

Historical aerial imagery demonstrates that the area has been subjected to previous disturbance, although the precise boundary of the clearing extent is uncertain but includes the southern portion of the patch, through which the old pipeline alignment and buffer areas traverse. The main Goonyella North Mine Access Road (also referred to as Mabbin Road) was in place by 2000, along with a channelised diversion of Goonyella Creek, and associated levee wall to the north of the road. An unsealed access road that bisects the patch was constructed sometime between 2004 and 2007. There is a fence and cleared maintenance access tracks on both sides of the unsealed road.

North of the road within the buffer area of the proposed pipeline, mature brigalow is present within remnant RE 11.4.9, and grades into RE 11.5.3 to the west.

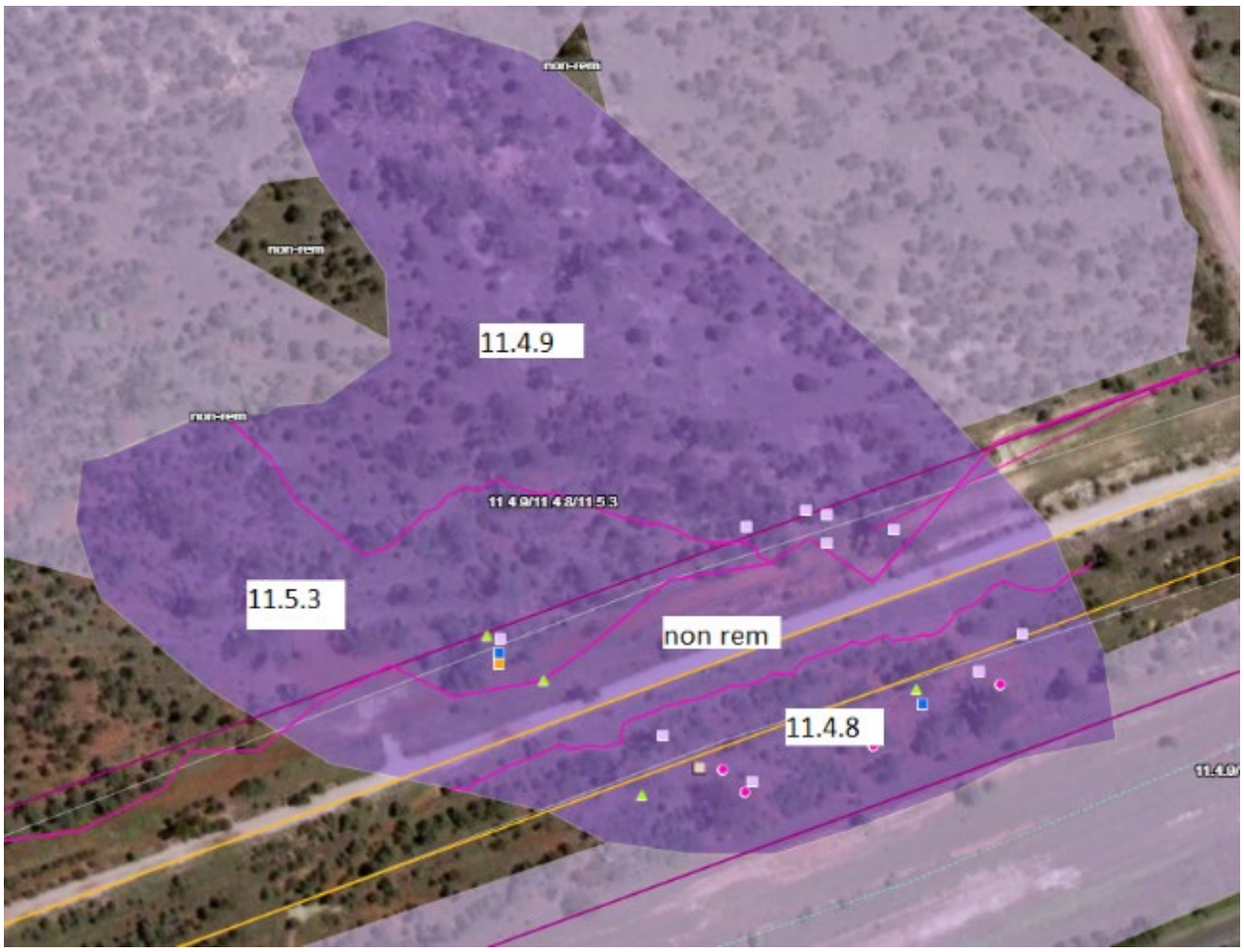


Figure 6.1 **Ground-truthed distribution of REs within heterogeneous 'polygon 2'**

Photograph 6.1 **Lot 411 (old alignment) – *Eucalyptus cambageana* woodland with brigalow understorey on Lot 411**

The old pipeline alignment traverses two other polygons of mapped regulated vegetation. These are located at the southern tip of a patch of HVR 'Endangered-dominant (E-dom)', RE 11.4.9/11.4.8/11.5.3 towards the eastern end of the alignment (see 'polygon 5' in Figure 6.2) and a patch of HVR 'Of Concern-dominant' (OC-dom) RE 11.8.11/11.8.5 mapped over Goonyella Creek, at the eastern end of the Project area (see 'polygon 11' in Figure 6.2). Both of these polygons are incorrectly mapped, within the Project area. The boundary of the E-dom patch was correctly mapped in the field and occurs within the northern part of the pipeline buffer. This patch is shown in Photograph 6.2 and Photograph 6.3.

Photograph 6.2 **Lot 411 (old alignment) – looking north in to mapped HVR E-dom RE 11.4.9/11.4.8/11.5.3**

Photograph 6.3 **Lot 411 (old alignment) – looking east along southern boundary of mapped HVR E-dom RE 11.4.9/11.4.8/11.5.3**

The OC-dom patch traverses a box culvert within Goonyella Creek and is characterised by mostly exotic vegetation, including Sabi Grass (*Urochloa mosambicensis*), Parthenium (*Parthenium hysterophorus*) and Buffel Grass, with scattered native knotweed (*Persicaria attenuata*) and Black Wattle (*Acacia leiocalyx*) (see Photograph 6.4).

Photograph 6.4 Lot 411 (old alignment – mapped HVR OC-dom RE 11.8.11/11.8.5 at Goonyella Creek

One area within the old pipeline alignment contained grassland comprised of a variety of grasses, including *Aristida, Eragrostis, Chloris, Bothriochloa* and/or *Dichanthium* species. A number of these were sampled and lodged with the Queensland Herbarium and were confirmed to be *Dichanthium sericeum subsp. humilis* (Queensland Bluegrass), *Aristida latifolia* (Feathertop Wiregrass), *Dichanthium aristatum* (Angleton Grass) and *Eriochloa procera* (Slender Cupgrass). Two of these (Queensland Bluegrass and Feathertop Wiregrass) are indicator species for the Grassland TEC.

Further detailed post-wet season surveys were undertaken in March 2022, to determine whether this patch meets the condition thresholds for the Grassland TEC. Two patches of natural grassland remained, with dominant species including *D. sericeum, A. latifolia, Panicum decompositum* (Native Millet), *Aristida calycina* (Dark Wiregrass) and *Cynodon Dactylon* (Couch Grass), three of which are indicator species for the TEC. In between these patches, Buffel Grass dominated, along with other weeds such as *Chloris gayana* (Rhodes Grass) and *Macroptilium lathyroides* (Phasey Bean). The extent of the native grassland patches were measured in the field via GPS polygon streaming. Patch 1 (western most) measured 1031 m^2 (~0.1 ha) and patch 2 was 894.4 m^2 (~0.08 ha). Both patches are too small to meet the minimum patch size to qualify as either remnant REs 11.8.11/11.8.5 or the Grassland TEC (1 ha).

Photograph 6.5 Lot 411 (old alignment) – grassland area too small in extent to qualify as Grassland TEC

The remaining areas were primarily represented by degraded, non-remnant areas varying from low open Brigalow regrowth woodland with a weedy ground layer dominated by Buffel Grass, to areas of exotic Buffel Grass grassland.

a Buffer areas

There is one heterogeneous polygon of mapped remnant 'Endangered' RE 11.4.9/11.4.8 which is intersected by the northern buffer area (see 'polygon 1' in Figure 6.2). The field survey confirmed that the vegetation within this patch contains areas consistent in composition with RE 11.4.9 and 11.4.8. Brigalow-dominated RE 11.4.9 is present towards the southern boundary (refer Photograph 6.6), and Blackbutt-dominated RE 11.4.8 occurs further towards the centre of the patch (refer Photograph 6.7). However, the boundary of the polygon is incorrectly mapped, being approximately 20 m north of the mapping. The boundary was correctly mapped in the field, using polyline mapping, as shown in Figure 6.2. The mapping error is also evident in Photograph 6.6, which was taken from within the mapped remnant polygon, but clearly shows the cleared area, presumably for the fence construction and maintenance.

Photograph 6.6 Lot 411 (old alignment) – Brigalow-dominated woodland (RE 11.4.9) at the southern edge of polygon 1

Photograph 6.7 Lot 411 (old alignment) – Blackbutt-dominated woodland (RE 11.4.8) within the central part of polygon 1

A patch of HVR of E-dom RE 11.4.9/11.4.8/11.5.3 (refer 'polygon 3' on Figure 6.2) is mapped to the east of polygon 2. The boundary of this patch was also incorrect and mapped accurately via polyline streaming. The southern boundary of the patch is defined by a comprehensively cleared track and fence line, as shown in Photograph 6.8. The vegetation to the south of this track is severely fragmented regrowth brigalow, interrupted by the unsealed access road and the channelised redirection of Goonyella Creek.

Photograph 6.8 **Lot 411 (old alignment) – cleared track which defines the southern boundary of polygon 3**

The channelised redirection of Goonyella Creek is buffered by 50 m and mapped as HVR of Endangered RE 11.4.9/11.4.8 at the western end, and E-dom 11.4.9/11.4.8/11.5.3 at the eastern end (see 'polygon 4' in Figure 6.2). Part of this mapped HVR, varying in width from 20 to 40 m, intersects the southern buffer area. The channel itself is almost entirely choked with Buffel Grass, and the mapped HVR within the buffer area contains Brigalow with an average height of 3–6 m and approximately 25% cover, and almost entirely Buffel Grass in the ground layer, as shown in Photograph 6.9. Aerial imagery indicates that this vegetation has not been cleared since before 2004 (ie more than 15 years ago), so the HVR mapping is correct where Brigalow regrowth is present.

Photograph 6.9 Lot 411 (old alignment) – Brigalow regrowth within polygon 4

In the northern buffer area, there is a patch of mapped 'Least Concern' RE 11.5.3, described as *Eucalyptus populnea* +/- *E.melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces (refer 'polygon 6' in Figure 6.2). The boundary of this vegetation community was difficult to discern, as the ecosystem is a sparsely vegetated, naturally open woodland. Field verification confirmed that, close to the southern boundary of the mapped polygon, the dominant canopy species is Mountain Coolibah (*Eucalyptus orgadophila*), with an average height of 15 m and canopy cover of 5% (refer Photograph 6.10). A sparse shrub layer containing *Acacia salicina* (Sally Wattle) and *Santalum lanceolatum* (Sandalwood) overlies a dense ground cover of Buffel Grass. The soil is dark brown cracking clay. This vegetation more closely aligns with RE 11.4.13, described as *E.orgadophila* open woodland on Cainozoic clay plains, which has a VM Act status of 'Least Concern'. The boundary of the remnant vegetation was accurately mapped in the field, utilising polyline streaming, and followed the extent of mature *E. orgadophila* trees, as shown in Figure 6.2.

Photograph 6.10 *Eucalyptus orgadophila* open woodland located within northern buffer area

To the east of polygon 6, a heterogeneous patch of 'Of Concern' RE 11.8.11/11.8.5 is mapped within the northern buffer area (see 'polygon 7' in Figure 6.2). This site is heavily disturbed, with no tree canopy and 5% cover of Sally Wattle, Sandalwood and Yellow wood (*Terminalia oblongata*). The ground cover is dominated by Buffel Grass, Native sensitive weed (*Neptunia gracilis*), and bluegrass (*Bothriochloa* spp.), as shown in Photograph 6.11.

This site was re-surveyed during the post-wet season survey and confirmed to contain majority non-native grasses and forbs. Given the abundance of non-native cover, it is considered unlikely to represent either the mapped grassland REs or the Natural Grassland TEC.

A further patch of heterogeneous 'Of Concern' RE 11.8.11/11.8.5 is mapped within the northern buffer area, to the east of polygon 7 (see 'polygon 8' in Figure 6.2). This site is heavily disturbed (see Photograph 6.12), with <1% low shrub cover and approximately 70% ground cover that had been heavily grazed by cattle to less than 10 cm (evidenced by pugging and abundant grass in adjacent fenced area). The ground cover is dominated by *Bothriochloa* spp. Native Sensitive Weed, Parthenium and Buffel Grass.

This site was re-surveyed during the post-wet season survey and confirmed to contain mostly weeds. Given the prominence of non-native cover, it is considered unlikely to represent either the mapped grassland REs or the Natural Grassland TEC.

Photograph 6.11 Lot 411 (old alignment) – non-remnant area within northern buffer, incorrectly mapped as grassland RE 11.8.11/11.8.5

Photograph 6.12 Lot 411 (old alignment) – heavily grazed grassland within northern buffer area, mapped as RE 11.8.11/11.8.5

b Compressor facility (old alignment)

The entirety of the GCF area is mapped as non-remnant vegetation, which was confirmed to be correct during the field investigation. The site is characterised by brigalow regrowth around 3–6 m in height and ranges from 5% cover in the heavily disturbed southwestern section (Photograph 6.13), to approximately 35% cover in the less disturbed northern portion (Photograph 6.14). There is a dam in the southeastern corner that was dry at the time of the December 2021 survey (Photograph 6.15).

This area was re-assessed post-wet season, to determine whether it holds any values for wetland-dependent species. The southwest corner has scattered tracks and small mounds of earth throughout. There is some infrastructure in this area (well heads etc).

Whilst the northern portion contains Brigalow regrowth, it provides very limited Ornamental Snake habitat with no gilgai seen, minor soil cracks, and is densely infested with Buffel Grass in the understorey.

Photograph 6.13 Lot 411 (old alignment) – proposed compressor facility site, southwest section

Photograph 6.14 Lot 411 (old alignment) Brigalow regrowth within the northern portion of the proposed compressor facility site

Photograph 6.15 Lot 411 (old alignment) – dam (dry) in the southeast portion of the proposed compressor facility site

There are several patches of mapped regulated vegetation within the buffer area of the proposed compressor facility Project area, however, this mapping is incorrect, as all of the above polygons were confirmed in the field to contain non-remnant vegetation, contiguous with the vegetation within the proposed compressor facility Project area. This vegetation within the compressor survey buffer area is characterised by Brigalow regrowth 3–6 m in height, with other associated shrub species including *Geijera parviflora, Lysiphyllum carroni, Terminalia oblongata and Acacia salicina.* The shrub layer is sparse, ranging in cover from 5% to 20% across the buffer areas. Dense Buffel Grass, Parthenium and Native Sensitive Weed dominate the ground stratum, with cover ranging from 75% to 100%.

ii Current pipeline alignment on Lot 23 (ground truthed)

The high-pressure pipeline alignment of Lot 23 passes through entirely non-remnant vegetation, with the exception of a small area in the eastern half containing mapped HVR of Endangered RE 11.4.9 *Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains.* Review of the aerial imagery indicates that the majority of the alignment was disturbed through vegetation clearing between 1987 and 2000 and clearing has continued since. Mapped vegetation on Lot 23 was ground-truthed in March 2022 and June 2022. Quaternary site assessments were completed at 10 locations within non-remnant vegetation across the proposed high-pressure pipeline alignment, to confirm the accuracy of the certified mapping. Survey locations are shown in Figure 4.1. Extant vegetation comprised disturbed grassland dominated by Buffel Grass, *Eragrostis* species (Wiregrass) and *Sida cordifolia* (Flannel Weed), as shown in Photograph 6.16. Gilgai occurred frequently, within which the dominant grass species was frequently *Leptochloa ligulata (syn Dinebra ligulata)* (Spangletop) (Photograph 6.17). Soils were uniformly brown heavy cracking clay.

Photograph 6.16 Disturbed grassland dominated by Buffel Grass within the pipeline alignment, Lot 23

Photograph 6.17 Inundated gilgai containing *Leptochloa ligulata* on Lot 23

Areas of brigalow regrowth occurred within mapped non-remnant vegetation, at sporadic locations along the alignment. These had been retained for shade, as reported by the landholder, and were characterised by low clumps of Brigalow 1–4 m in height, sometimes within gilgai, as shown in Photograph 6.18.

Photograph 6.18 Brigalow regrowth within gilgai habitat (also a fauna survey site)

The mapped polygon of HVR Endangered RE 11.4.9 that intersects the high-pressure pipeline alignment was surveyed in March 2022. This area is characterised by Brigalow regrowth 5–6 m in height with 30–40% cover as shown in Photograph 6.19. The technical description for RE 11.4.9, based on 10 reference sites indicates an average height of the canopy at 8.9 m and 21.5% cover. This does not qualify as remnant vegetation (70% height and 50% cover of the pre-clear vegetation), however is correctly mapped as HVR. To the north of this patch, within the high-pressure pipeline buffer is mapped OC RE 11.3.4, described as *Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains. This mapping is incorrect; the HVR Brigalow continues to the north beyond the high-pressure pipeline buffer for at least 100 m.

A map of the ground-truthed Regional Ecosystems (GTRE) within the Project Area is provided in Figure 6.2.

Photograph 6.19 Brigalow 5–6 m in height within mapped HVR RE 11.4.9

Photograph 6.20 Brigalow vegetation within pipeline buffer on Lot 23, incorrectly mapped as OC RE 11.3.5 (Eucalypt woodland)

Subsequent to the completion of ground-truthing in March 2022, the pipeline alignment on Lot 23 was relocated, due to constraints with the rail crossing location. The new alignment passes through one polygon of mapped remnant RE 11.4.9, one heterogeneous polygon of remnant RE 11.4.11/11.4.8/11.4.9 and one small section of mapped HVR RE 11.4.9. Non-remnant mapping surrounds a dam in this same area. The extent of the mapping is incorrect. Within the Project area, the vegetation is predominantly remnant 'Endangered' RE 11.4.9, described as *Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains. Here, Brigalow is 7–12 m in height with canopy cover of approximately 35%, as shown in Photograph 6.21. Some areas of mixed RE 11.4.9/11.4.8 occur in the easternmost mapped remnant polygon (see Photograph 6.22). These Brigalow-dominated communities would not qualify as the Brigalow TEC, however, as the understorey is heavily degraded by Buffel Grass (refer Section 6.2.3).

Photograph 6.21 Remnant Brigalow woodland on Lot 23, revised pipeline alignment

Photograph 6.22 Remnant Blackbutt woodland on Lot 23, revised pipeline alignment

iii Current pipeline alignment on Lot 11 and Lot 2 and new compressor facility location (groundtruthed)

The majority of vegetation within the new alignment on Lot 11 is mapped as non-remnant, with an area of 'Least Concern' Regional Ecosystem 11.5.3/11.5.15. The short description for these vegetation communities are as follows:

- 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces; and
- 11.5.15 – Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces.

The non-remnant vegetation mapping in the north-south alignment is correct. This area has been previously cleared with recent follow-up clearing of the shrub layer evident. The ground layer contains dense Buffel Grass varying in dominance of between 30% and 50%. The native bluegrass, *Dichanthium sericeum* dominates in some areas, particularly to the north of the fence which forms the Lot 11/Lot 23 property boundary. Low shrubs of approximately 1 m in height are scattered throughout the grassland, and comprised of species typical of Brigalow woodland, including *Terminalia oblongata* (Yellow Wood), *Ehretia membranifolia* (Peach Leaf), *Alectryon diversifolius* (Scrub Boonaree) and *Carissa ovata* (Currant Bush). Soils are dark brown heavy cracking clay soils, and gilgai are common. Some still contain water, however, were heavily degraded through trampling by cattle (see Photograph 6.23).

Photograph 6.23 Gilgai on Lot 11 (north-south alignment) degraded by cattle

The section mapped as remnant 'Of concern' RE 11.5.3/11.5.15 is characterised by *E. crebra/Corymbia clarksoniana* (Clarkson's Bloodwood) woodland approximately 14 m in height and 20–30% canopy cover, on red sand with minor clay content. An understorey of SEVT species is prominent in some areas, consisting of species such as *Bursaria incana (Prickly Pine), Brachychiton rupestris (Narrow-leaved Bottle Tree), Brachychiton* australis (Broad-leaved Bottle Tree) and *Denhamia oleaster* (Stiff Denhamia). However, the secondary tree and shrub layers frequently included species more commonly associated with RE 11.5.3 such as *Erythroxylum australe* (Cocaine Bush), *Ventilago viminalis* (Vine Tree), *Eremophila mitchellii* (False Sandalwood) and *Cassia brewsteri* (Bean Tree). RE 11.5.3 is the correct mapping for this area, and a representative photograph is provided in Photograph 6.24.

Photograph 6.24 *Eucalyptus crebra* woodland with SEVT understorey species on Lot 11

Regional Ecosystem mapping on Lot 2 is extensively incorrect. Three Property Maps of Assessable Vegetation exist over Lot 2:

- 2021/000753;
- 2017/001272; and
- 2014/004874.

These PMAVs 'lock in' the regulated vegetation, as mapped.

Areas mapped as HVR RE 11.5.3/11.5.15 are similar to the Narrow-leaved Ironbark woodland with SEVT understorey recorded on Lot 11, however is regrowth vegetation that has been previously cleared. Average height of the canopy is 11–12 m with 20–30% cover, on red sandy soil. This is consistent with remnant vegetation of RE 11.5.3, which is described as *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces. *Eucalyptus populnea* is not present, however *E. crebra* is noted in the RE description as being locally dominant in some areas.

Further east, regrowth Brigalow woodland (7–8 m tall) interspersed with Blackbutt-dominated woodland is present on red-brown sandy clay soils, as shown in Photograph 6.25. This is consistent with Endangered REs 11.4.9/11.4.8, however is mapped as HVR of Endangered RE 11.8.13, which is described as Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks. Exotic grasses are very sparse in the ground layer, comprising ~5% of cover. As such, this patch would qualify as the Brigalow TEC (refer Section 6.2.3).

Photograph 6.25 Remnant Brigalow/Blackbutt woodland on Lot 2

A section of HVR 11.4.9/11.4.8 (Brigalow 5–6 m tall with emergent, interspersed taller Blackbutt to 16 m) is present east of this patch, as shown in Photograph 6.26. This patch is incorrectly mapped as a heterogeneous polygon of 'Of Concern' RE 11.8.11/11.8.5, which are grassland-dominant REs, and are not present. To the east of the Brigalow community is open grassy woodland dominated by *Eucalyptus orgadophila* (Mountain Coolibah), with scattered *Corymbia clarksoniana* on dark brown cracking clay soil, consistent with 'Least Concern' RE 11.8.5. The canopy is very sparse (~10% cover) which is typical of the community, with an almost absent shrub layer (~1% cover) containing *Alectryon diversifolius* and *Santalum lanceolatum* (Sandalwood). Buffel Grass and Parthenium dominate the ground layer, particularly at the edges of the community along the road. A representative photograph of this patch is shown in Photograph 6.27.

Photograph 6.26 HVR Brigalow with interspersed taller Blackbutt on Lot 2

Photograph 6.27 *Eucalyptus orgadophila* grassy open woodland incorrectly mapped as SEVT on Lot 2

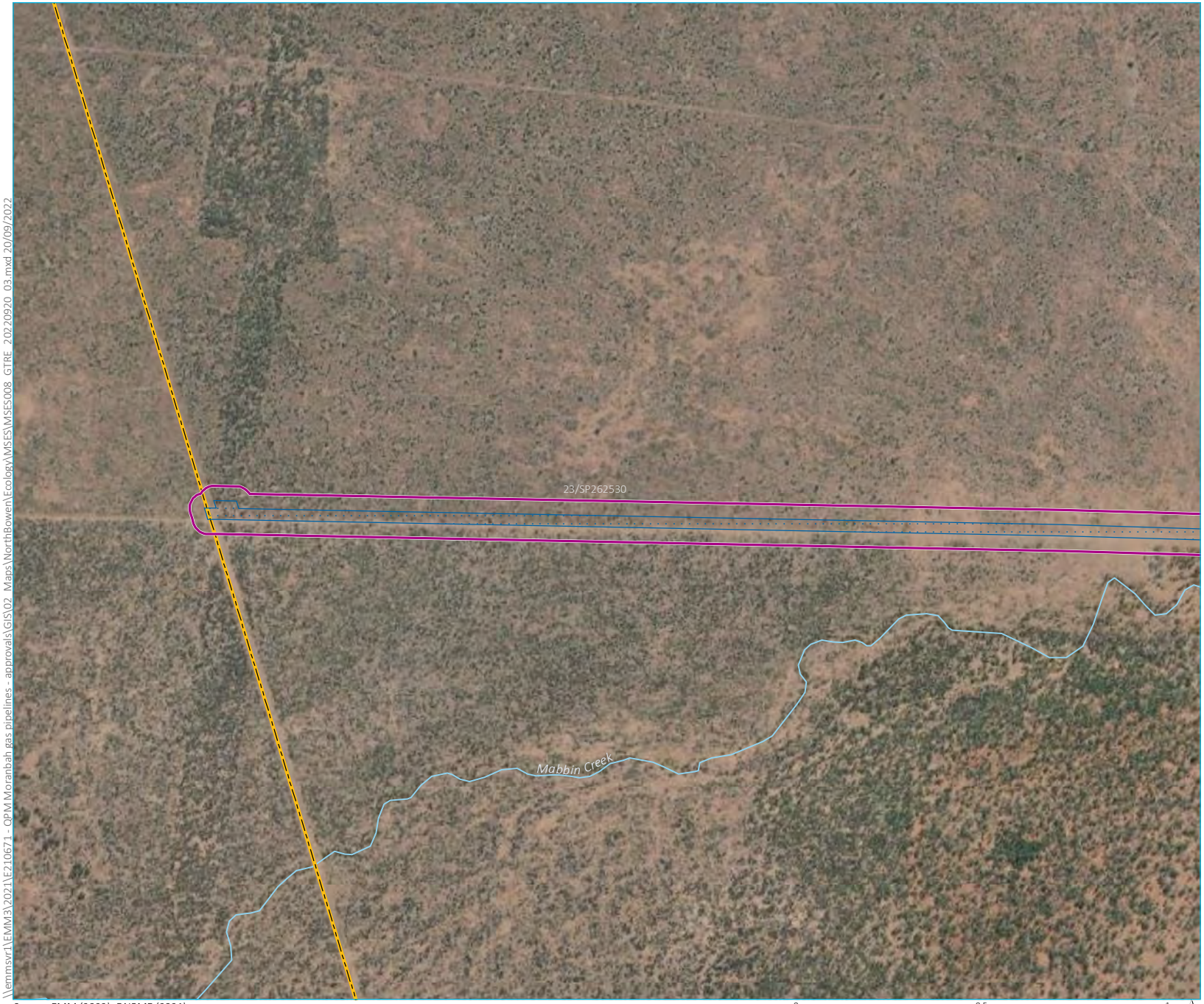
The proposed compressor facility location on Lot 2 is located within entirely non-remnant vegetation. Brigalow regrowth approximately 4 m in height and 5% cover is interspersed with lower shrubs 1–3 m high and 10% cover, such as *Santalum lanceolatum, Alectryon diversifolius* and *Atalaya hemiglauca.* The ground layer is heavily grazed and Buffel Grass dominates, with non-native species comprising approximately 95% of the ground cover. A representative image of the compressor location is provided in Photograph 6.28.

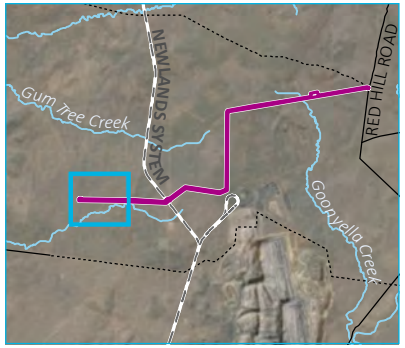
Photograph 6.28 Proposed compressor facility location

East of the compressor facility is a small patch of HVR Brigalow 11.4.9 approximately 4–6 m high and 15% canopy cover, with scattered low shrubs comprising 10% cover. The ground layer contains 70% Buffel Grass and is heavily grazed. From this patch through to the eastern extent of the Project area, the vegetation is consistent with Brigalow RE 11.4.9, which has been previously disturbed but regained remnant status, according to the extant height and cover characteristics. The vegetation is comprised of *Acacia harpophylla* 8–12 m in height and 25% cover, with a secondary tree layer and/or tall shrub layer of species such as *Atalaya hemiglauca* and *Lysiphyllum carroni* (Queensland Ebony). A lower shrub layer, frequently dominated by *Carissa ovata* and *Alectryon diversifolius* provided approximately 15% cover. The understorey of these Brigalow patches was heavily invaded by Buffel Grass and Parthenium, with 60–90% exotic cover in most areas. As such, they would not qualify as the Brigalow TEC. A representative photograph of the Brigalow vegetation community at the eastern end of the Project area on Lot 2 is provided in Photograph 6.29.

Photograph 6.29 Remnant Brigalow community at eastern end of Lot 2

The eastern section of the realignment, within the proposed access road is mapped within the Protected Plants High Risk Trigger Mapping.





KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

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GDA 1994 MGA Zone 55

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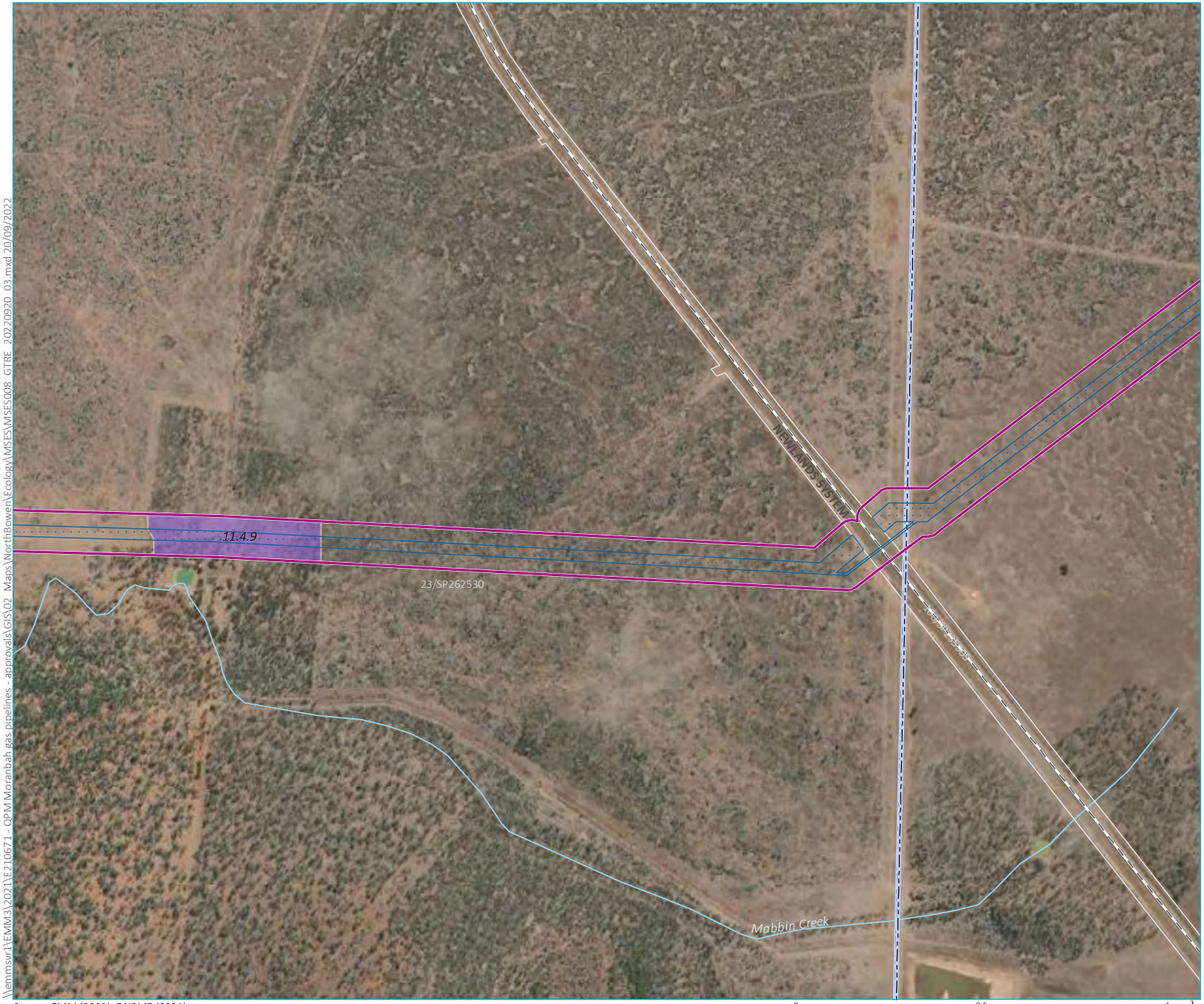
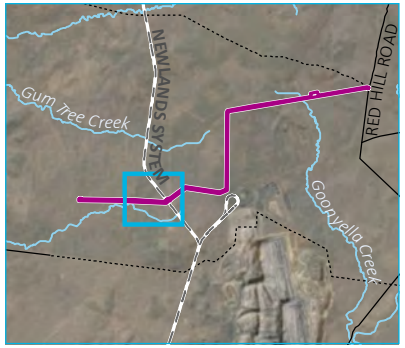
Ground-truthed regional ecosystems and TECs - Map 1 of 6

QPM Energy Project
MSES
Figure 6.2

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Ground-truthed regional ecosystems

- Remnant - endangered

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

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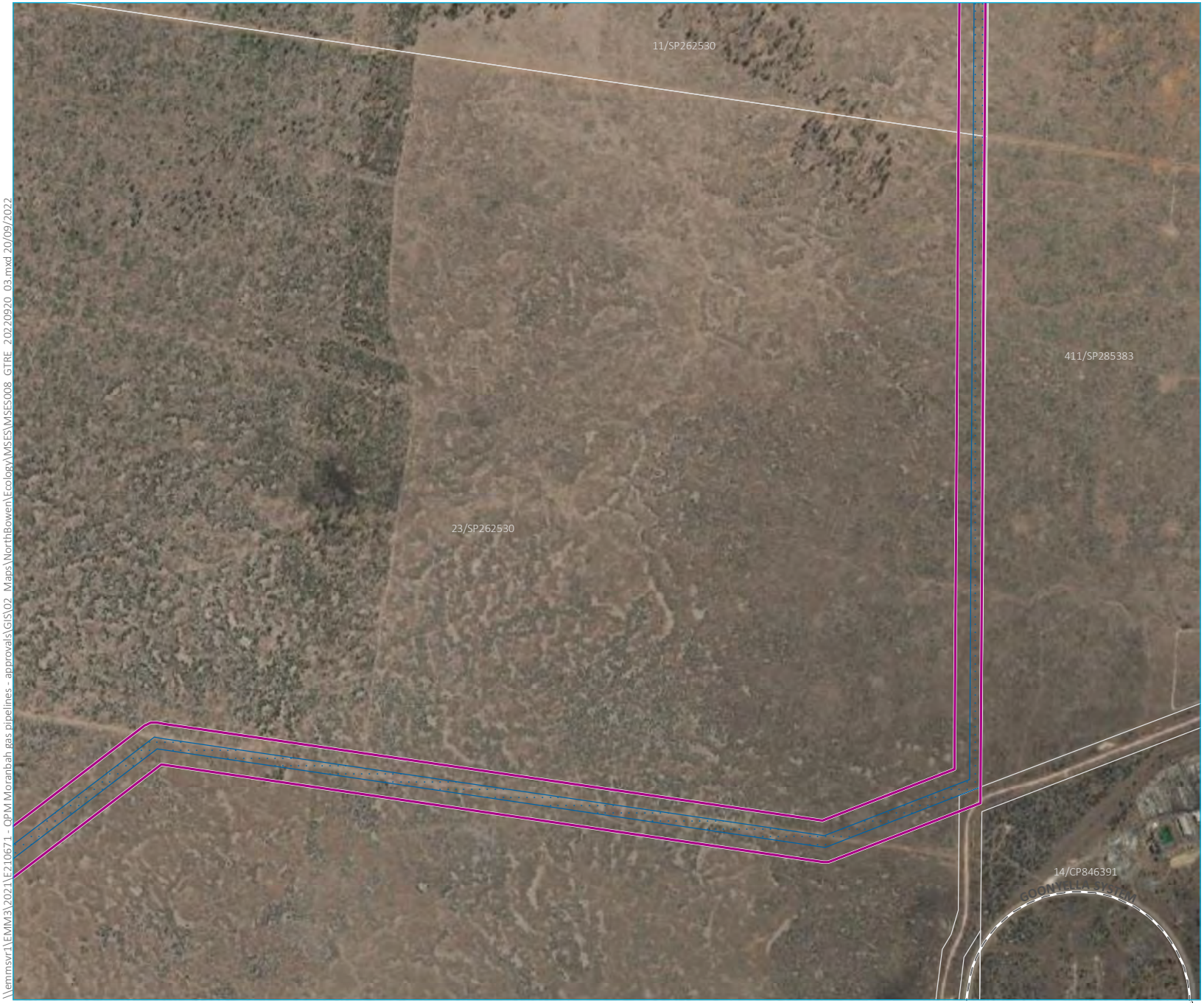
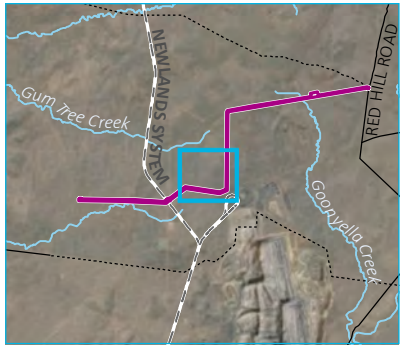
Ground-truthed regional ecosystems and TECs - Map 2 of 6

QPM Energy Project
MSES
Figure 6.2

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

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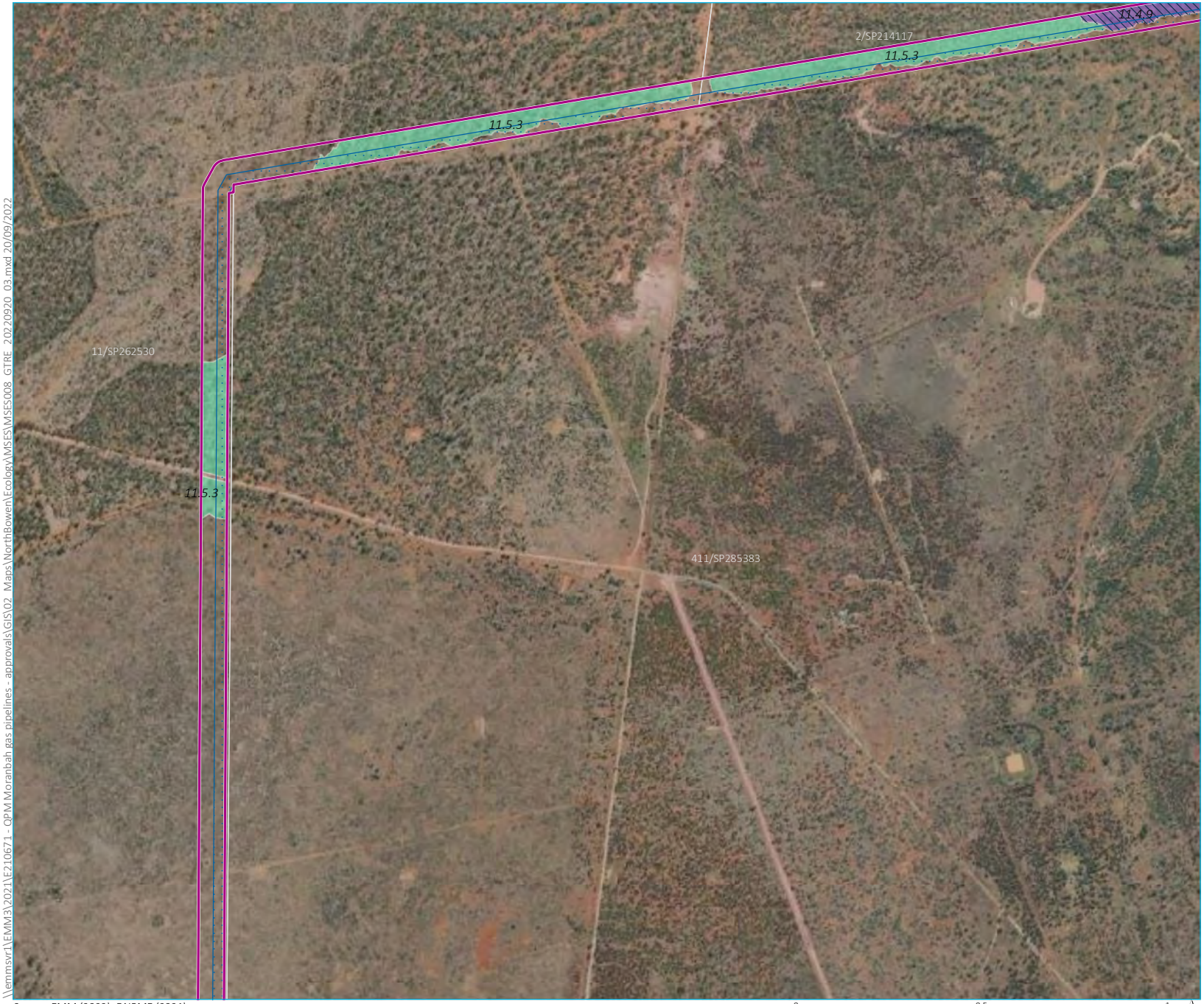
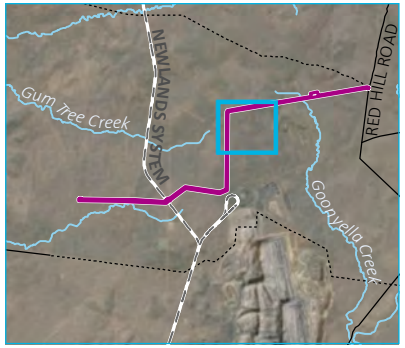
Ground-truthed regional ecosystems and TECs - Map 3 of 6

QPM Energy Project
MSES
Figure 6.2

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary
- Brigalow TEC

Ground-truthed regional ecosystems

- Remnant - endangered
- Remnant - least concern

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Source: EMM (2022); DNRME (2021)

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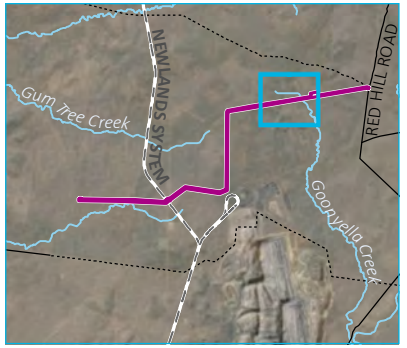
Ground-truthed regional ecosystems and TECs - Map 4 of 6

QPM Energy Project
MSES
Figure 6.2

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Brigalow TEC

Ground-truthed regional ecosystems

- Remnant - endangered
- High value regrowth - endangered
- Remnant - least concern

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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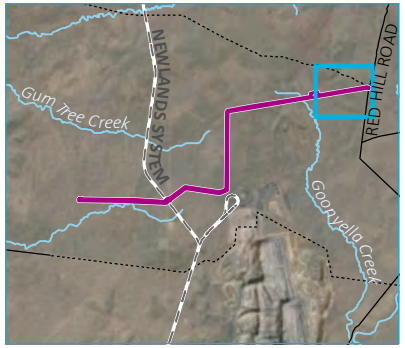
Ground-truthed regional ecosystems and TECs - Map 5 of 6

QPM Energy Project
MSES
Figure 6.2

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Ground-truthed regional ecosystems

- Remnant - endangered
- High value regrowth - endangered

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

Ground-truthed regional ecosystems and TECs - Map 6 of 6

QPM Energy Project
MSES
Figure 6.2

EMM creating opportunities

6.2.2 Threatened flora species

Threatened flora species were informally searched for across the Project area. No threatened species were recorded during these surveys. *Eucalyptus raveretiana* (Black Ironbox), which is a tree, occurs in riparian (river) habitats, which is not present in the Project area, and this species was confirmed to be absent. Likewise, *Samadera bidwillii* (Quassia), a shrub, grows in dry rainforest and vine thicket. This habitat is also absent, and Quassia was not present in the Project area.

Two species of threatened grass, *Dichanthium queenslandicum* (King Bluegrass) and *Digitaria porrecta* (Finger Panic Grass) were identified in database searches or the PMST as potentially occurring within the Project area. The December 2021 surveys of Lot 411 confirmed that the majority of the grassed extents within Lot 411 are dominated by introduced grasses and forbs. Several grasses were sampled and lodged with the Queensland Herbarium from a patch of grassland immediately west of Goonyella Creek. These samples were confirmed as not belonging to these threatened species.

Targeted searches for these grasses were completed during the post-wet season March 2022 survey on Lot 411 and Lot 23. On Lot 411, meanders were completed through the natural grassland patches described in Section 6.2.1, as well as the mapped grassland RE (11.8.11/11.8.5) in close proximity. No threatened species were located, and the majority of grassland patches were in degraded condition, with Buffel Grass in abundance. Significant rain had fallen prior to the March 2022 survey, and grasses were in flower at the time of survey, including species of *Dichanthium* and *Digitaria* genera.

During the June/July 2022 survey, on Lot 23, Lot 11 and Lot 2, meanders for the target threatened grasses were completed whilst undertaking quaternary assessments, as well as in transit through the high-pressure pipeline alignment between sites. On Lot 11 and Lot 2, the high-pressure pipeline alignment was searched thoroughly on foot by two ecologists for the threatened grasses wherever suitable habitat was present (ie heavy clay soils and/or stony red-brown loam). Due to preceding rains, the majority of grasses were flowering at the time, including *Dichanthium* and *Digitaria* species, so there was a high level of confidence in the detectability of these species. A total of 43 quaternary sites were completed within suitable habitat on Dabin Station and Denham Park, and no threatened grasses were recorded. Flora survey effort is shown in Figure 4.1. Grazing, clearing and weed invasion are known threats to all three species (DAWE, 2022i; DAWE, 2022t; DoE, 2008a; DoE, 2013c), and all are significant ecological drivers within the Project area. As such, it is considered unlikely that any occur within the Project area.

6.2.3 Threatened ecological communities

The site walkover confirmed that the Poplar Box and SEVT TECs are not present on Lot 23 or Lot 411.

REs that are analogous with the Brigalow, SEVT and Grassland TECs are mapped within the Project area on Lot 23 and Lot 2 and are discussed in more detail in the following sections.

i Brigalow TEC

The Approved Conservation Advice for the Brigalow (Acacia harpophylla) dominant and co-dominant ecological community (DAWE 2013b) identifies key diagnostic characteristics of the Brigalow TEC. These include:

- *Acacia harpophylla* is present as dominant or co-dominant in the tree layer;
- occurs in one of 16 listed REs; and
- the vegetation is brigalow regrowth with species composition and structural elements broadly typical of one of the identified Qld REs (assumed to be the case if not comprehensively cleared in the last 15 years).

Condition thresholds also apply for the Brigalow TEC. These are:

- the patch is 0.5 ha or more in size; and
- exotic perennial plants comprise less than 50% of the total vegetation cover of the patch, as assessed over a representative minimum sample area of 0.5 ha.

Seven mapped polygons of remnant or regrowth REs that are included in the Brigalow TEC description (RE 11.4.8 and 11.4.9), are mapped within the Project area. Five of these occur on Lot 411, as described in Section 6.2.1, which are now excluded from the Project area. One patch of HVR RE 11.4.9 occurs on the original high-pressure pipeline on Lot 23, which has also now been superseded. One patch of remnant RE 11.4.8/11.4.9 occurs on Lot 23, within the current high-pressure pipeline alignment. On Lot 2, several patches of Brigalow community are present that are not mapped correctly in the RE mapping.

An assessment of all extant patches against the Brigalow TEC criteria is provided in Table 7.1. Regrowth vegetation qualifies as the Brigalow TEC, provided it meets the condition thresholds listed above. One of the five patches on Lot 411 qualify as the Brigalow TEC, as the cover of Buffel Grass is less than 50%; within the extent of the Project (buffer only, not the high-pressure pipeline), the other four patches are too degraded through Buffel Grass invasion to meet the TEC definition. However, this area has now been superseded by the revised high-pressure pipeline alignment and will not be impacted.

The Brigalow patch on Lot 23 in the superseded alignment meets the definition of the Brigalow TEC, as Brigalow is dominant in the canopy, the vegetation is consistent with regrowth of an analogous RE (11.4.9), the patch is approximately 2.36 ha in size, and exotic perennial cover is around 35%. Further, the historical aerial imagery indicates that the patch has not been cleared since at least 2000 (possibly earlier), so also meets the disturbance criterion (not comprehensively cleared for at least 15 years). A representative photograph of the Brigalow patch on Lot 23 is provided in Photograph 6.21. However, the Brigalow patch on Lot 23 through which the revised alignment passes is heavily invaded by Buffel Grass and other exotic species, with an average cover assessed over the entire patch (approximately 5 ha) of between 60–100%. Therefore, this patch does not need the condition threshold to qualify as the Brigalow TEC.

On Lot 2, ground-truthing of vegetation identified errors in the certified Regional Ecosystem mapping. Whilst no Brigalow REs are mapped, remnant and HVR of RE 11.4.9/11.4.8, which is analogous to the Brigalow TEC is present, as shown in Figure 6.2. Areas within the Project area that qualify as the Brigalow TEC are shown in Figure 6.2 and described in Table 6.1.

Table 6.1 Assessment of Brigalow TEC within Project area

Polygon number	Lot Number	Mapped RE	Ground-truthed RE	Size of patch (within disturbance footprint)	% cover of exotic perennial plants	Meets TEC?
1	411	Remnant 11.4.9/11.4.8	Mapped patch not within pipeline extent. Small sections of RE 11.4.9 and 11.4.8 in northern buffer area. Boundary of patch incorrectly mapped.	7.68 ha	50–80% (within Project area	No. Dominance of Buffel Grass in understorey excludes the TEC.
2	411	Remnant 11.4.9/11.4.8 /11.5.3	All three REs are present within the patch.	11.4.9–3.17 ha 11.4.8–1.15 ha 11.5.3–1.53 ha	30%	Yes
3	411	Regrowth 11.4.9/11.4.8 /11.5.3	Mostly outside of Project area. Small sections of HVR of RE 11.4.9 are present within the northern buffer (southern boundary of the larger patch).	4.44 ha	90% (within Project area)	No. Dominance of Buffel Grass in understorey excludes the TEC.
4	411	Regrowth 11.4.9/11.4.8 /11.5.3	Within the pipeline extent, HVR of RE 11.4.9 is present.	2.55 ha	85%	No. Dominance of Buffel Grass in understorey excludes the TEC.
5	411	Regrowth 11.4.9/11.4.8 /11.5.3	Part of northern buffer area contains HVR of RE 11.4.9.	9.65 ha	90% (within Project area.	No. Dominance of Buffel Grass in understorey excludes the TEC.
6	23 (superseded alignment)	Regrowth 11.4.9	HVR 11.4.9 is present, and more extensive than mapped.	~2.36 ha	35%	Yes
7	23 (current alignment)	Remnant 11.4.9, non-remnant and Remnant 11.4.11/ 11.4.8/11.4.9	Remnant 11.4.9 is present, with *E. cambageana* (mixed 11.4.9/11.4.8) at eastern end.	1.37 ha	60-100%	No. Dominance of Buffel Grass and other weeds in the understorey excludes the TEC.
8	2	Regrowth 11.8.13/ 11.5.15/ non-remnant	Remnant 11.4.9	18 ha (0.51 ha)	5%	Yes
9	2	Regrowth 11.8.11/ 11.8.5	HVR 11.4.9	42 ha (0.29 ha)	5%	Yes

Table 6.1 Assessment of Brigalow TEC within Project area

Polygon number	Lot Number	Mapped RE	Ground-truthed RE	Size of patch (within disturbance footprint)	% cover of exotic perennial plants	Meets TEC?
10	2	Regrowth 11.8.11/ 11.8.5	HVR 11.4.9	16 ha (0.07 ha)	70%	No. Dominance of Buffel Grass in the understorey excludes the TEC.
11	2	Remnant 11.8.13 and 11.8.11/ 11.8.5	Remnant 11.4.9	22 ha (1.16 ha)	60-80%	No. Dominance of Buffel Grass and other weeds in the understorey excludes the TEC.

ii Grassland TEC

The Commonwealth Listing Advice on Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin. (DSEWPaC, 2008) identifies key diagnostic characteristics of the Grassland TEC. These include:

- it occurs within one of six subregions in the Brigalow Belt North Bioregion, or one of two subregions in the Brigalow Belt South Bioregion;
- tree canopy is absent or less than 10% projective crown cover, and not derived from cleared woodland; and
- the ground layer is dominated by perennial native grasses and contains at least three of the indicator native species.

Areas within the Project area containing grassland were assessed against the Grassland TEC conditions in a preliminary manner during the December 2021 survey, and in detail during the post-wet season survey in March 2022. A site walkover of the revised alignment on Lot 23, Lot 11 and Lot 2 was completed in June 2022.

As described in Section 6.2.1, two patches of natural grassland on Lot 411 met the composition criteria for the Grassland TEC, however they were too small (less than 1 ha) to qualify as the TEC. These patches occurred amongst a hostile matrix of invasive, non-native grasses and forbs, and is likely they these patches will be lost to the more competitive weed species over time. There were no areas representing the Grassland TEC on Lot 23, as this property has been extensively modified as grazing pasture.

In the north-south alignment on Lot 11, significant areas of *Dichanthium sericeum* grassland are present, however this vegetation is derived from a cleared woodland, and does not qualify as the natural grassland TEC.

On Lot 2, two patches of REs that are analogous to the natural grassland TEC are mapped within the Project area – a patch of 11.8.11/11.8.5 to the west of the compressor facility and another of the same heterogeneous RE mix (11.8.11/11.8.5) at the eastern extent, within the proposed access road. Both are incorrect, and the natural grassland TEC does not occur within the Project area. The mapped patch to the west of the compressor facility is cleared (non-remnant) within the existing fence line track. Adjacent to the track, vegetation is comprised of *E. cambageana* approximately 16 m high, with *A. harpophylla* regrowth as a secondary tree layer around 6–8 m in height. Soil is red clayey sand with surface stones, as shown in Photograph 6.30.

Photograph 6.30 Brigalow/Blackbutt woodland incorrectly mapped as Grassland TEC on Lot 2

Within the mapped patch of RE 11.8.11/11.8.5 in the proposed access road alignment, vegetation is comprised of dense grassland (100% cover away from the cleared fence line track) with scattered regrowing shrubs of about 15% canopy cover. Within the disturbance footprint is Brigalow woodland 8–12 m high with 30–40% cover, as shown in Photograph 6.31. Areas of grassland close to the road are dominated by Buffel Grass and Parthenium Weed, however one patch did contain predominantly native grasses (*Dichanthium, Bothriochloa* and *Heteropogon* species). This area was too small (approximately 0.1 ha) to qualify as the Grassland TEC.

Photograph 6.31 Brigalow woodland incorrectly mapped as Grassland TEC within proposed road access on Lot 2

iii SEVT TEC

As described in Section 6.2.1, several patches of REs that are analogous to the SEVT TEC as mapped within the Project area, on Lot 11 and Lot 2. These include:

- 11.5.15 – Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces; and
- 11.8.13 – Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks.

The polygon on Lot 11 mapped as remnant 'Of concern' RE 11.5.3 / 11.5.15 is characterised by *E. crebra/ Corymbia clarksoniana* (Clarkson's Bloodwood) woodland approximately 14 m in height and 20–30% canopy cover, on red sand with minor clay content. An understorey of SEVT species is prominent in some areas, however, they are not present as dominant species in the canopy, which defines the RE. The secondary tree and shrub layers frequently included species more commonly associated with RE 11.5.3, so this RE is the correct mapping for this polygon. In accordance with the *Commonwealth Listing Advice on Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions* (TSSC, 2001), the SEVT TEC is analogous with particular Queensland REs, which are not present. Therefore, the SEVT TEC is absent.

Several polygons on Lot 2 are mapped as remnant or HVR 'Endangered' RE 11.8.13. However these are mapped incorrectly, and correct REs include:

- 'Endangered' RE 11.4.9 – *Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains;
- 'Endangered' RE 11.4.8 – *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains;
- 'Least Concern' RE 11.8.5 – *Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks; and
- areas of non-remnant vegetation.

Certified RE mapping and ground-truthed Regional Ecosystem mapping is shown in Figure 5.1 and Figure 6.2 respectively.

6.2.4 Pest flora species

Due to the highly disturbed nature of the Project area a number of weed species were recorded. Open (non-remnant) areas were dominated by groundcover weeds, primarily Parthenium (*Parthenium hysterophorus*) and Buffel Grass (*Cenchrus ciliaris*). Parthenium is a category 3 restricted invasive plant under the *Biosecurity Act 2014* and was recorded on all subject Lots within the Project area. It is particularly dense in the black soil sections of Lot 23 (Denham Park Station) and Lot 2 (Dabin Station). It must not be given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical steps to minimise the risks associated with invasive plants under their control. This is called a general biosecurity obligation (GBO). Parthenium is also a Weed of National Significance (WoNS) at Commonwealth level.

Care should be taken to ensure vehicle and machinery hygiene protocols are adopted, to prevent the spread of Parthenium and rats tail grasses off-property and into areas that are clean of the species.

6.3 Fauna

Incidental sightings of all vertebrate fauna species during surveys were recorded totalling 114 species. This included ten reptile species, eight amphibian species, 72 bird species, 16 bat species and eight terrestrial mammals. A consolidated vertebrate fauna species list is provided in Annexure E.

6.3.1 Recorded EVNT or migratory species

Two threatened fauna species were recorded over the three survey periods – Squatter Pigeon and Ornamental Snake, with White-throated Needletail recorded close by (within 3 km) along the old alignment.

These are summarised below. Locations of MSES species are displayed in Figure 6.3.

i Ornamental Snake

This species is well-known from the Moranbah area, and occupies Brigalow woodland, particularly in areas with gilgai (melon hole) habitat. Suitable habitat for the species is present in all areas mapped as RE 11.4.8 or 11.4.9 within the Project area. On Lot 411, gilgai was only present in the Project area at the western end of the property, in a patch of 20 year-old Brigalow regrowth, which is not currently mapped as regulated vegetation. Minor gilgai are also present within other patches of Brigalow on this Lot.

Gilgai habitat is more developed and abundant on Lot 23, which was not accessible during the December 2021 survey but was targeted in March 2022 surveys.

No Ornamental Snake were captured in funnel or pitfall traps during the March 2022 surveys. Initially, conditions were dry, and none were recorded during spotlighting between 7–9 March. After heavy rain on 10 March, a total of nine individuals were recorded on Lot 23 and on the following night, a total of 30 individuals were recorded in the same area. All individuals were in the gilgai on the eastern part of the property, although it is likely individuals would have been recorded in the western part of the alignment too if this area had been accessed (was not possible due to flooding). Additionally, the species has potential to occur in parts of Lot 11 and Lot 2 where Brigalow communities on clay soils are present adjacent to extensive areas of gilgai. These areas are mapped as potential dispersal habitat.

Habitat mapping criteria is provided in Section 6.6.

A photograph of an Ornamental Snake from 11 March 2022 is provided as Photograph 6.32.

Photograph 6.32 Ornamental Snake

ii Squatter Pigeon

Squatter Pigeons were observed on four different occasions while traversing the Project area in March 2022, and once in June 2022. This comprised groups of one, two, five and eight individuals all in the same vicinity around the dam on Lot 23 during March 2022. A group of four birds were seen in the same area in June 2022. Pigeon have been consistently observed.

Squatter Pigeons are typically found in remnant or regrowth habitats dominated by *Eucalyptus, Corymbia, Acacia* or *Callitris* species within 3 km of available surface water (DAWE 2022b). Breeding habitat is within 1 km of a water source (DAWE 2022b). Permanent or temporary water is available across the Project area in the form of the above-named farm dam, as well as other small dams in the vicinity of the Project area. Additionally, mildly-disturbed or cleared habitats along vehicle tracks or on the peripheries of the Project area represent ideal habitat for this species.

Utilised habitat in these areas have low ground layer cover, typically below 33%. Given that the majority of the Project area is characterised by brigalow regrowth with a dense grassy understorey of Buffel Grass, with limited availability of permanent water, the alignment generally does not provide suitable habitat for Squatter Pigeon. Suitable habitat is associated with the open woodland adjacent to the farm dam and similar habitats away from the alignment.

Habitat mapping criteria is provided in Section 6.6.

iii White-throated Needletail

White-throated Needletail was recorded close to the Project area (within 3 km) along the old alignment. Twelve individuals were recorded on 9 December 2021, to the east of Goonyella Creek, at a height of approximately 300 m (refer location in Figure 6.3). They were observed foraging ahead of a storm front and moved off to eastwards.

White-throated Needletails migrate north and have largely left Australia by April to breed in the Northern Hemisphere. As this species is strictly an aerial feeder it would use the entire area as foraging habitat.

Habitat mapping criteria is provided in Section 6.6.

6.3.2 Other potential EVNT or migratory species

The following additional species are considered likely to occur in the Project area or have been assessed conservatively due to being high-priority species (Koala).

i Koala

Although assessed as having a low potential to occur in the Project area this species has been conservatively assessed. DCCEEW has identified this species as being on a high priority list due to the extensive bushfires which occurred in 2019–2020 in southern and eastern Australia and although they are not considered likely to occur in the Project area, are scarce in the Moranbah region and have not been recorded to date, assessments have been carried out based on their potential presence.

No individuals were recorded, and no scratches or scats associated with the species were recorded. If present in the region, the species is likely to be restricted to riparian areas of major watercourses. The Project area is largely cleared and dominated by dense weedy groundcover.

However, conservatively and following DCCEEW current expectations, any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees (following EPBC Act referral guidelines for the vulnerable Koala (DoE 2014)) is considered potential Koala habitat. This includes mixed Eucalypt regrowth or modified vegetation communities, or shrubland containing emergent Koala food trees. Koala food trees typically consist of the following genera in order of general preference:

- *Eucalyptus;*
- *Corymbia;*
- *Angophora;*

- *Lophostemon;* and
- *Melaleuca.*

The Project area is dominated by weedy regrowth, although a number of patches of vegetation were ground-truthed where emergent food trees did occur, typically Blackbutt (*Eucalyptus cambageana).*

On Lot 2, a patch of *Eucalyptus orgadophila* open grassy woodland may provide suitable habitat for Koala. However, this habitat is marginal, as it characterised by a dense grassy understorey dominated by exotic species (Buffel Grass and Parthenium Weed). On Lot 11 and Lot 2, areas of RE 11.5.3 may also provide suitable habitat for koala, although no signs (scats, scratches) were observed, and no live animals were recorded. These areas should be subject to targeted surveys at a later date.

Although food trees are present and therefore potential habitat occurs, the disturbance footprint does not contain contiguous eucalypt woodland, or retain connectivity to such areas. As such, the habitat mapped has been assessed as marginal for the species as it is highly fragmented and limited in extent, and the likelihood of the species occurring on a regular basis is low.

An assessment of potential Koala habitat in the Project area following the '*referral guidelines for the vulnerable Koala'* (DoE 2014) under the EPBC Act is summarised in Table 6.2. These guidelines are now out of date since the species has been up-listed to Endangered, but regardless the critical habitat assessment provides a valuable evaluation of habitat based on a number of criteria.

Habitat mapping criteria is provided in Section 6.6.

Table 6.2 Koala critical habitat assessment

Attribute	Score (coastal)	Status within Project area
Koala occurrence	+2 (high) – evidence of one or more Koalas in the last 2 years.	Status within Project area
	+1 (medium) – evidence of one or more Koalas within 2 km of the edge of the impact area within the last 5 years.	No sightings of scat, scratches, or the Koala itself were recorded in the Project area. Database searches (ALA and Biomaps) found no Koala records within 20 km of the Project area. The closest record is from Moranbah in 1996 and approximately 35 km to the southwest, with another record 40 km to the east from Hail Creek in 2014. **Therefore, the Project area scores +0 for this attribute.**
	0 (low) – none of the above.	
Vegetation composition	• +2 (high) – has forest or woodland with 2 or more known koala food tree species; or • 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	The Project area is dominated by weedy regrowth, although a number of patches of vegetation were ground-truthed where emergent food trees did occur, typically Blackbutt (*Eucalyptus cambageana*) or Mountain Coolibah (*Eucalyptus orgadophila*). However, high quality habitat (ie riparian woodland) is not present within the Project area. **The Project area scores +2 for this attribute due to presence of *Eucalyptus* species.**
	+1 (medium) – has forest or woodland with only 1 species of known koala food tree present.	
	0 (low) – none of the above.	

Table 6.2 Koala critical habitat assessment

Attribute	Score (coastal)	Status within Project area
Habitat connectivity	+2 (high) – area is part of a contiguous landscape ≥ 500 ha.	The Project area is mostly cleared, and suitable vegetation is sparse. **The Project area scores 0 for this attribute**.
	+1 (medium) – area is part of a contiguous landscape < 500 ha, but ≥ 300 ha.	
	0 (low) – none of the above.	
Key existing threats	+2 (high) – little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present.	There were no signs of Koalas during surveys and no desktop Koala records within 20 km of the Project area. If Koalas are present within the Project area, there is a low risk of vehicle strike as no major highways are adjacent. Additionally, Wild Dog are a threat around the region. **The Project area therefore scores +1 for this attribute.**
	• +1 (medium) – evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence; or • areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	
	• 0 (low) – evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present; or • areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	

Table 6.2 Koala critical habitat assessment

Attribute	Score (coastal)	Status within Project area
Recovery value	+2 (high) – habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of the guidelines.	The Project area is dominated by weedy regrowth, although a number of patches of vegetation were ground-truthed where emergent food trees did occur, typically Blackbutt (*Eucalyptus cambageana*). However, high quality habitat (ie riparian woodland) is not present within the Project area. The Project area is unlikely to be important in achieving interim recovery objectives. **The Project area therefore scores +0 for this attribute.**
	+1 (medium) – uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of the guidelines.	
	0 (low) – habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of the guidelines.	
Total score	**A total score of three (3) has been recorded using the criteria above. A habitat score of 5 or greater is the trigger at which a site may be considered as 'critical habitat' and a score of 8 triggers the requirement of a referral. No Koalas or secondary signs, such as scat or scratches, were identified during surveys across the Project area and no Koalas were identified within 35 km during desktop assessments. Koala habitat is very limited in the Project area.**	

ii Greater Glider

This species utilises eucalypt forest and woodland with mature trees containing abundant hollows, which it uses for shelter. There are some isolated mature trees (*E. cambageana*) with hollows within the pipeline and buffer areas of the Project area however these do not form part of a contiguous woodland and habitat is not suitable for this species.

There is a small section of the alignment on Lot 11 that contains RE 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces. This woodland is mapped correctly and contains *E. crebra* and *C. clarksoniana* trees around 14 m high. Some hollows are present, but they are relatively scarce (approximately five per hectare) and small in size, as the woodland appears to have been subject to selective clearing in the past. Due to the open nature of the canopy, small numbers of hollows and lack of connectivity to more optimal Greater Glider habitat, this area is conservatively considered marginal habitat for Greater Glider and should be confirmed through nocturnal spotlighting surveys at a later date.

Two areas of RE 11.5.3 on Lot 2 provide potential foraging habitat for Greater Glider, as they have been cleared in the past and have now regrown to achieve remnant status. However, hollows have not yet developed in the canopy trees, so no denning habitat for the glider is present. These areas have been conservatively mapped as potential foraging habitat for Greater Glider until targeted surveys are completed to confirm the presence of the species.

iii Australian Painted Snipe

This species occurs in shallow freshwater wetlands, of both an ephemeral and permanent nature across all states of Australia, but most commonly in eastern Australia. It is widespread and thought to be dispersive or migratory with dispersive movements attributed to local conditions (moving to flooded areas or permanent wetlands from drying areas or away from areas affected by drought). They are thought to breed in response to climatic conditions rather than during a particular season, with breeding recorded in all months (DAWE 2022c).

Australian Painted Snipe may utilise gilgai habitats in the Project area during seasonably suitable conditions when gilgai are inundated and potentially as suitable habitats further inland dry out.

iv Latham's Snipe

Extensive suitable habitat is present within the Project area in the form of gilgai habitats. This species is listed as Migratory under the EPBC Act. It is a shorebird species that breeds primarily in Japan during the Austral winter and spends the Austral summer in eastern Australia. It is most commonly associated with wetlands, creeks, or moist grasslands. It is a secretive, well-camouflaged species and is usually only revealed to an observer when disturbed into flight (DoE 2019).

This species is likely to regularly occur in any wetland habitat across the Project area during summer months, when wetland areas contain water.

v Migratory species

An assessment of the potential habitat for listed migratory species within the Project area is provided below.

- **Fork-tailed Swift** – this species is almost exclusively aerial and occurs mainly over inland plains. Habitats include riparian woodland, heathland, and low scrub areas. They also occur in coastal areas over cliffs and beaches. The species breeds in northern Asia and spends the non-breeding season (typically October–March, inclusive) in Australia, moving further south as the summer progresses. No habitat mapping has been undertaken for Fork-tailed Swift as this species could occur in any airspace over the Project area. It is a migratory species that occurs in Australia only during the summer months but is highly aerial.

- **Oriental Cuckoo** – this species occurs in a wide range of woodlands, particularly in the ecotones of denser riparian communities. The species does not breed in Australia. The species generally occurs in more denser woodlands closer to the coast and it is unlikely to occur in the Project area.

- **Yellow Wagtail** – this is a rare vagrant species, occupying open country near swamps, salt marshes, sewage ponds and mangroves. No suitable habitat for this species is present within the Project area.

- **Osprey** – a large coastal raptor, that also utilises large inland rivers. There are no significant wetlands within the Project area and this species is considered unlikely to occur.

- **Latham's Snipe –** is a non-breeding migrant, occupying shallow wetland habitat with dense cover. No records of this species exist within the study area although areas of potentially suitable habitat in the form gilgai occur within the Project area. Such habitats may be utilised on a sporadic basis if the species is present in the region.

A number of migratory wader species were identified via desktop searches as potentially occurring in the Project area. These include **Curlew Sandpiper, Common Sandpiper, Sharp-tailed Sandpiper** and **Pectoral Sandpiper**. These species utilise shorelines of coastal areas, and inland water bodies. Suitable wetland habitat for these birds is unlikely to be present in the Project area.

6.3.3 Low potential or unlikely EVNT or migratory species

The remaining threatened fauna species identified as potentially occurring within the Project area, that are considered unlikely to occur based on ground-truthing of available habitat include the following species – further discussion around all candidate species in Section 6.5 is provided in the Likelihood of Occurrence assessment provided as Annexure C.

- **Curlew Sandpiper** – a migratory shorebird that utilises shorelines of coastal areas, and inland water bodies. Suitable wetland habitat for this species is not present in the Project area.
- **Red Goshawk** – utilises coastal and sub-coastal tall open forests and woodlands, tropical savannas traversed by wooded or forested rivers, and the edges of rainforest. This habitat is not present within the Project area.
- **Grey Falcon** – occupies the arid and semi-arid zones, further inland from the Project area, extremely rare.
- **Star Finch (eastern)** – utilises seasonally damp habitat near permanent waterholes. Known only from a small population of less than 50 birds, however the eastern subspecies may be extinct. The dominance of Buffel Grass and other exotic species and lack of permanent water renders the Project area unsuitable for this species.
- **Southern Black-throated Finch** – utilises savannah grasslands and riverine wetlands dominated by eucalypts, paperbarks or acacias and is known from localities close to Townsville. This habitat is not present in the Project area.
- **Australian Painted Snipe** – utilises shallow freshwater wetlands with good coverage of grasses, rushes or reeds, lignum, open timber, or samphire. Permanent water in the Project area is limited to Goonyella Creek, which is heavily degraded, and lacks the cover preferred by this species.
- **Masked Owl (northern)** – utilises woodland habitats with well-developed tree hollows for roosting and hunting, as well as open grasslands and grassy woodlands. The southern limit of the species is not precisely known, but likely to be further north than the Project area.
- **Ghost Bat** – roosts in large sandstone and limestone caves. This habitat is not present in the Project area, and the nearest known population is at Cape Hillsborough, north of Mackay.
- **Southeastern Long-eared Bat –** inhabits inland woodland habitats on the western slopes and plains of southern Queensland and is likely to occur further south of the Project area.
- **Yakka Skink –** this large skink utilises Brigalow habitats and in particular, hollow ground logs for denning. Ground timber throughout the Project area is predominantly recently felled trees with a paucity of hollows. The presence of this species is often detected via its conspicuous latrine sites. None were observed within the Project area, and this species is considered unlikely to occur.
- **White-throated snapping turtle** – this species utilises riverine habitats within the Fitzroy, Mary, and Burnett River catchment. This habitat is not present within the Project area.
- **Dunmall's Snake** – utilises open forest and woodlands (particularly Brigalow) on floodplains. This habitat is not present in the Project area.
- **Allan's Lerista** – known only from a small area near Clermont/Capella, south of the Project area, in open grasslands and grassy woodland, on black and red soil.

- **Fitzroy River Turtle** – only found in the Fitzroy River and its tributaries, in flowing rivers with deep pools. This habitat is not present in the Project area.

6.3.4 Non-EVNT fauna observations

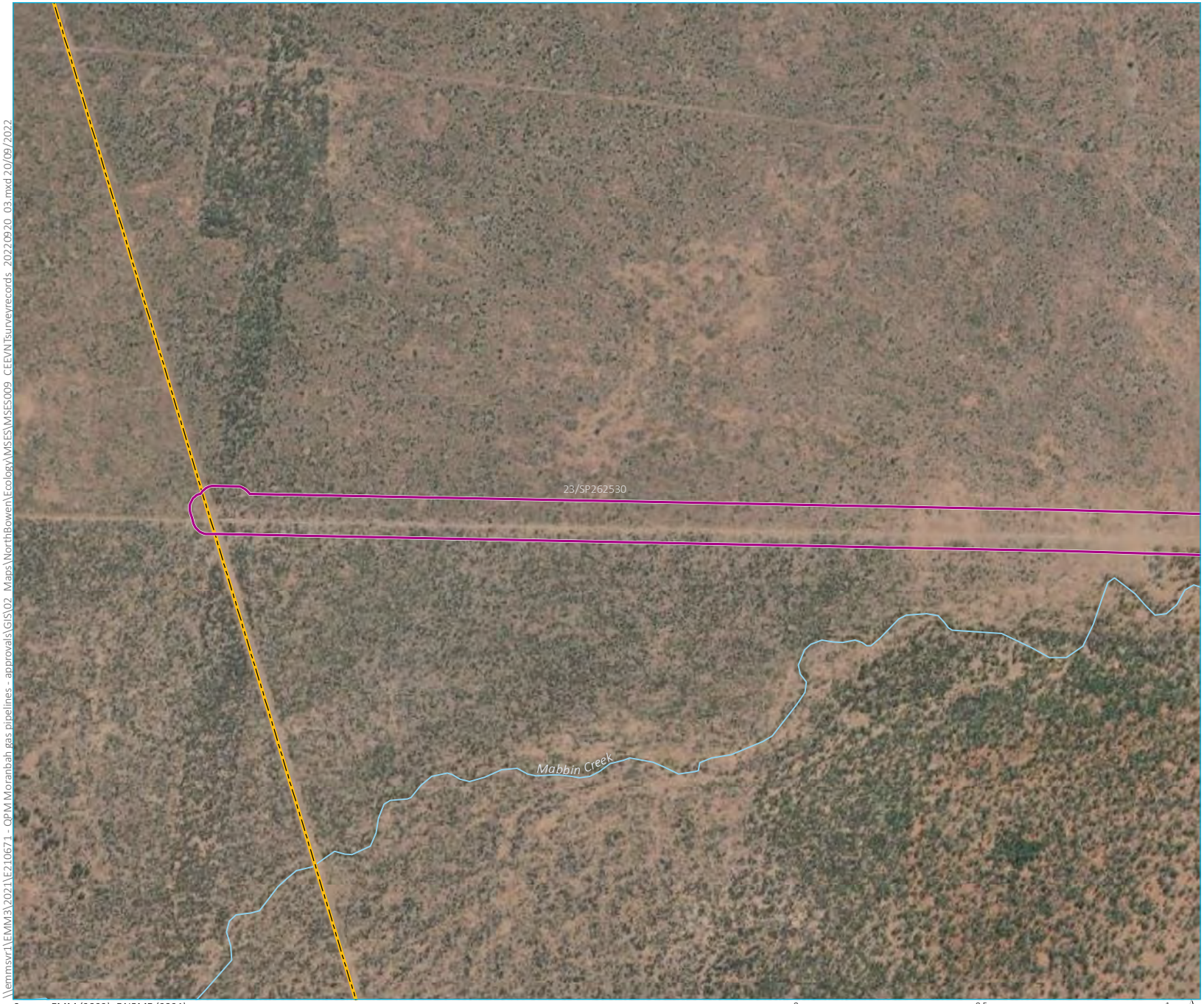
Incidental sightings of non-EVNT fauna were recorded throughout the Project area during surveys. These species are listed in Annexure E. Of note were multiple occurrences of *Notaden bennettii* after heavy rains on 10 March 2022, at the north-eastern extent of their range (Photograph 6.33).

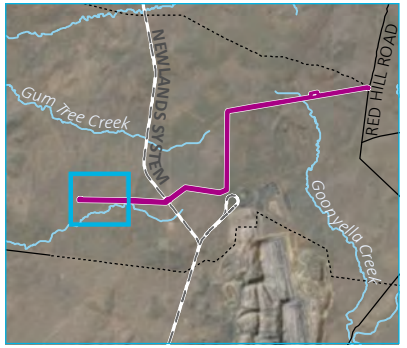
Numerous microbat species were observed incidentally during nocturnal surveys. Analysis of Anabat data was prepared by Balance Environmental and results have been incorporated into this technical report. The Anabat results are provided in Annexure F.

Photograph 6.33 ***Notaden bennettii***

6.3.5 Pest fauna species

Four terrestrial vertebrate pest species were recorded within the Project area – the Cane Toad (*Rhinella marina*). Rabbit (*Oryctolagus cuniculus*), Common Myna (*Acridotheres tristis*) and Brown Hare (*Lepus europaeus*). Wild Dog (*Canis lupus familiaris*) and Feral Cat (*Felis catus*) are both likely to occur along with a number of introduced bird species. Three of these species (Feral Cat, Rabbit, and Wild Dog) are listed as 'restricted matters' under the *Biosecurity Act 2014*.





KEY

- Project area
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 km

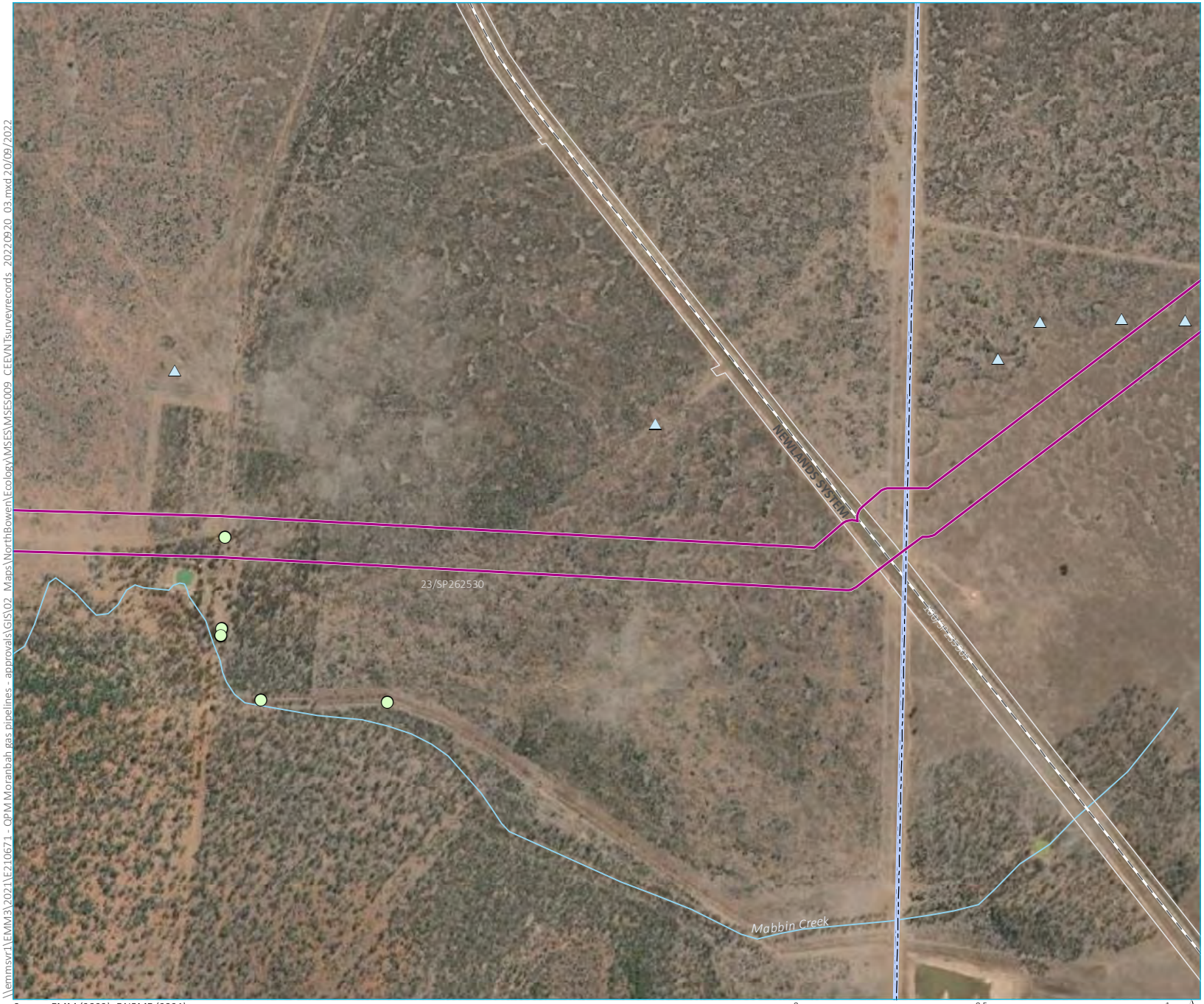
GDA 1994 MGA Zone 55

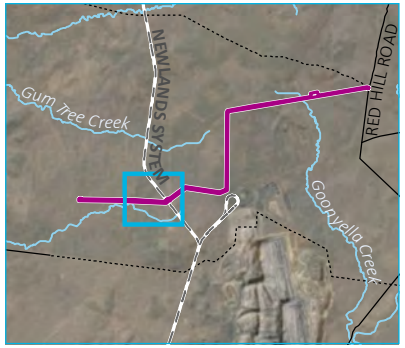
N

EMM threatened species records within the project area
Map 1 of 6

QPM Energy Project
MSES
Figure 6.3

EMM creating opportunities





KEY

- Project area
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Threatened species records (EMM, 2022)

- Ornamental Snake
- Squatter Pigeon

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

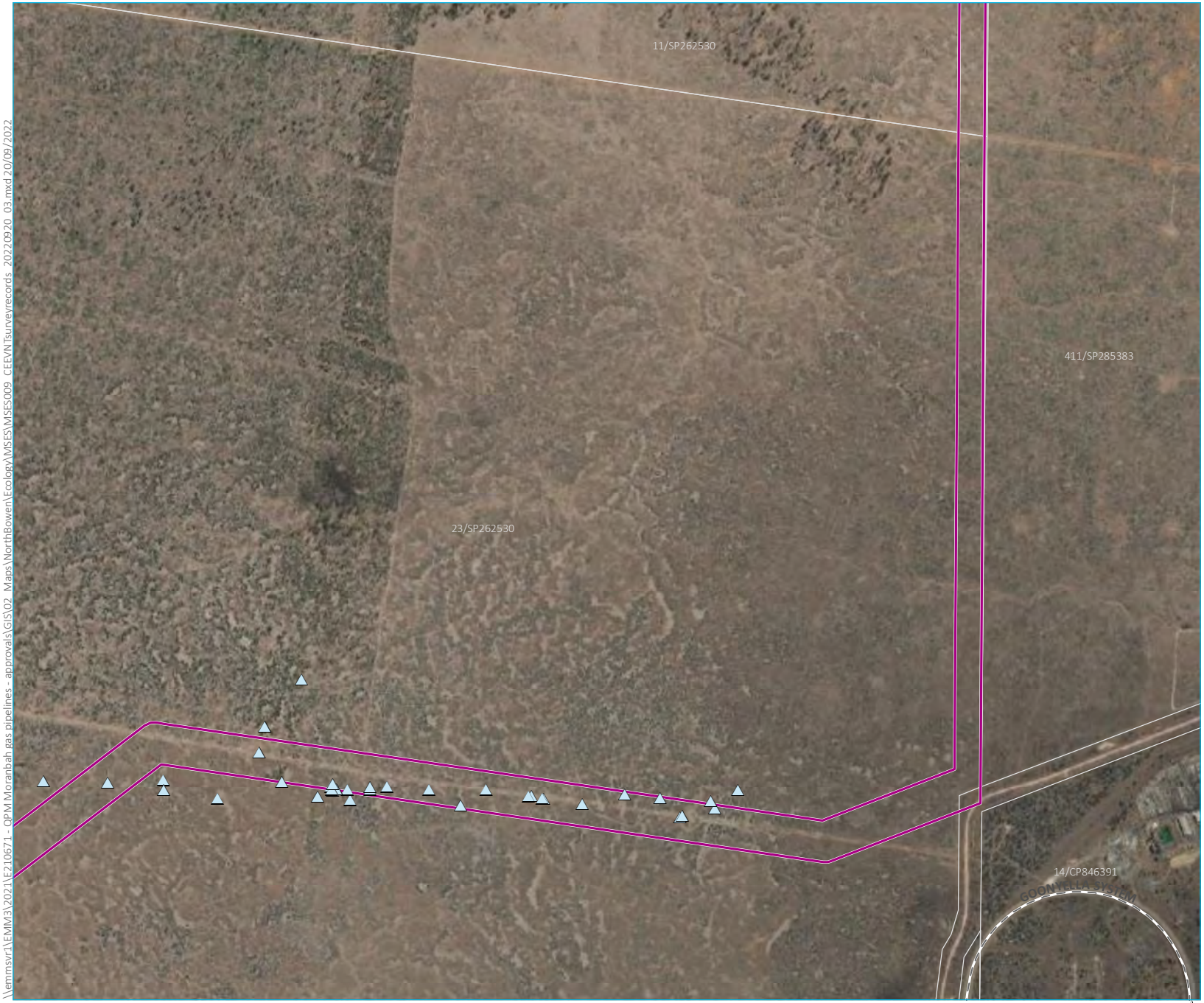
GDA 1994 MGA Zone 55

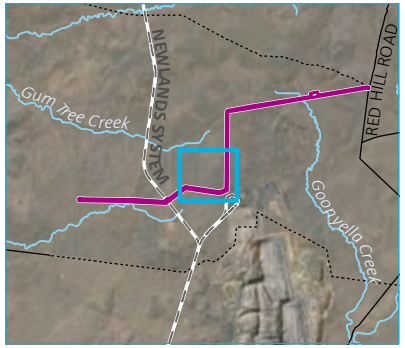
N

EMM threatened species records within the project area
Map 2 of 6

QPM Energy Project
MSES
Figure 6.3

EMM creating opportunities





KEY

- Project area
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Threatened species records (EMM, 2022)

- Ornamental Snake

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

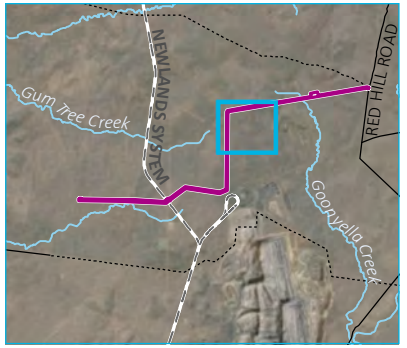
GDA 1994 MGA Zone 55

N

EMM threatened species records within the project area
Map 3 of 6

QPM Energy Project
MSES
Figure 6.3

EMM creating opportunities



KEY

- Project area
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

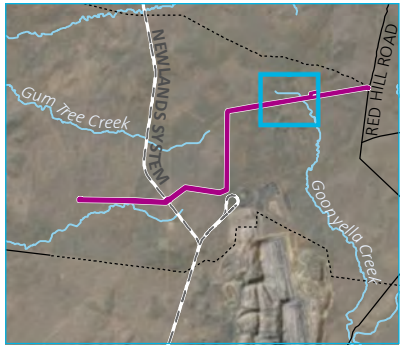
GDA 1994 MGA Zone 55

N

EMM threatened species records within the project area
Map 4 of 6

QPM Energy Project
MSES
Figure 6.3

EMM creating opportunities



KEY

- Project area
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 km

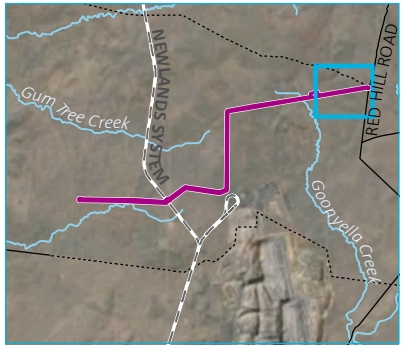
GDA 1994 MGA Zone 55

N

EMM threatened species records within the project area
Map 5 of 6

QPM Energy Project
MSES
Figure 6.3

EMM creating opportunities



KEY

- Project area
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

EMM threatened species records within the project area
Map 6 of 6

QPM Energy Project
MSES
Figure 6.3

EMM
creating opportunities

6.4 General habitat assessments

A general habitat assessment was collected at each quaternary flora site, with a total of 78 undertaken across the Project area over both survey periods (Figure 4.1).

Specific habitat attributes were assessed at each site to confirm suitable habitat features for particular EVNT species and provide justification for the potential occurrence of a species due to the presence or absence of suitable microhabitats. In general, hollow bearing trees were sparse within the Project area.

Most habitat observed across the Project area is considered of relatively low quality due to previous broad-scale vegetation clearing, weed encroachment and grazing activity.

6.5 Candidate species and communities

A refined likelihood of occurrence was prepared for the potential MSES associated with the Project based on EMM's desktop assessment and findings (see full likelihood of occurrence table in Appendix C). This assessment was informed by the results of the background research, database searches and field work conducted by EMM between December 2021, March 2022, and June 2022.

Definitions used for the refined likelihood of occurrence are described below:

1. **Known** – records of the species exist in the Project area or within 1 km of the Project area and suitable habitat is present in the Project area.

2. **Likely** – species records exist within the study area and suitable habitat is present within the Project area.

3. **Potential** – species records exist within the study area, suitable habitat for the species exists within study area, but there is insufficient information to categorise the species as likely, or unlikely to occur, in the Project area.

4. **Unlikely** – no records in study area and a low to very low probability that a species will occur in the Project area due to the lack of suitable habitat or is outside the species known geographical range.

The refined likelihood of occurrence assessments are provided in Annexure C and those species identified as 'known', 'likely' or have 'potential' to occur in the Project area are summarised in following sections.

6.5.1 List of candidate TECs

A refined likelihood of occurrence assessment was completed for the four TECs identified from the results of the desktop analysis and field surveys in December 2021, March 2022, and June 2022 (Table 6.3). As a result, this refined assessment determined that one is known to occur and a further one TEC was assessed as having potential to occur.

Table 6.3 TECs with potential to occur in Project area

TEC	EPBC Act status	Likelihood of occurrence	Rationale
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	Known	Recorded on Lot 23 – see Section 6.2.3.

Further rationale behind remaining TECs identified in the desktop analysis being classified as unlikely to occur is provided in Annexure C.

6.5.2 List of candidate flora species

A refined likelihood of occurrence assessment was completed for the six threatened flora species based on results of the desktop analysis and field surveys in December 2021, March 2022, and June 2022.

Further detail behind known and likely species is provided in Section 6.6. Further rationale behind remaining species identified in the desktop analysis being classified as unlikely to occur is provided in Annexure C.

6.5.3 List of candidate fauna species

A refined likelihood of occurrence assessment was completed for the 20 threatened fauna species identified from the results of the desktop analysis and field surveys in December 2021, March 2022, and June 2022 (Table 6.3). As a result, this refined assessment determined that three threatened species is known to occur and a further three species were assessed as having potential to occur. Candidate fauna species are listed in Table 6.3.

Further detail behind known and likely species is provided in Section 6.6 and in significant residual impact assessments for these species in Section 9. Further rationale behind remaining species identified in the desktop analysis being classified as unlikely to occur is provided in Annexure C.

Table 6.4 Candidate threatened fauna species

Species name	Common name	EPBC Act[1]	NC Act[2]	Likelihood of occurrence	Rationale
Birds					
Denisonia maculata	Ornamental Snake	V	V	Known	Multiple records of this species exist within the study area (66 records), and essential habitat is mapped for the species. Field surveys identified this species as being present in the Project area and as such the species is considered known to occur.
Geophaps scripta scripta	Squatter Pigeon (southern)	V	V	Known	Multiple records of this species exist within the study area (12 records). Field surveys identified this species as being present in the Project area and as such the species is considered known to occur.
Hirundapus caudacutus	White-throated Needletail	V Mi	V	Likely	Field surveys identified this species as being present close to the Project area and as such the species is considered likely to occur.
Rostratula australis	Australian Painted Snipe	E	E	Potential	No records of this species exist within the study area although areas of potentially suitable habitat in the form gilgai occur within the Project area. Such habitats may be utilised on a sporadic basis if the species is present in the region. The Australian Painted Snipe is a predominately crepuscular and nocturnal shorebird species. It is most common in south-eastern Australia but can exhibit dispersive characteristics and has been known to turn up far from its usual range when conditions are suitable post rain events. The species was not recorded during field surveys. Also, due to its nomadic nature this species is considered to have the low potential to occur during suitably wet conditions, although any occurrence is likely to be sporadic.

Table 6.4 Candidate threatened fauna species

Species name	Common name	EPBC Act[1]	NC Act[2]	Likelihood of occurrence	Rationale
Mammals					
Phascolarctos cinereus	Koala	E	E	Potential (low)	No records of Koala exist within the study area. The species is not considered likely to occur in the Project area and is scarce in the Moranbah region and has not been recorded to date. No individuals were recorded, and no scratches or scats associated with the species were recorded. If present in the region, the species is likely to be restricted to riparian areas of major watercourses. The Project area is largely cleared and dominated by dense weedy groundcover. Koala is considered to have a low potential to occur in the Project area.
Petauroides volans volans	Greater Glider	E	E	Potential (low)	There are seven records within the study area. There is a small section of the alignment on Lot 11 which has low potential for this species to occur, relating to a patch of RE 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces. Conservatively potential presence has been assumed for the purpose of this assessment until spotlighting can take place.

1. EPBC Act status: E – endangered, V – vulnerable, Mi – migratory
2. NC Act status: E – endangered, V – vulnerable

6.5.4 List of candidate migratory species

A refined likelihood of occurrence assessment was completed for the nine listed migratory species based on results of the desktop analysis and field surveys in December 2021, March 2022, and June 2022 (Table 6.4). The assessment determined that one migratory species is known to occur, and two migratory species are likely to occur.

Further detail behind known and likely species is provided in Section 6.6 and in significant residual impact assessments for these species in Section 9.

Further rationale behind remaining species identified in the desktop analysis being classified as unlikely to occur is provided in Annexure C.

Table 6.5 Candidate migratory species

Species name	Common name	EPBC Act[1]	NC Act[2]	Likelihood of occurrence	Rationale
Migratory aerial birds					
Apus pacificus	Fork-tailed Swift	Ma	SLC (Mi)	Likely	Multiple records of this species are represented within the study area and habitat is present within the Project area. During surveys this species was identified adjacent to the Project area over Burton Dam; approximately 18 km to the east therefore, it is considered as likely to occur.
Hirundapus caudacutus	White-throated Needletail	V Mi	V	Likely	Multiple records of this species occur within the study area. Field surveys identified this species as being present close to the Project area and as such the species is considered likely to occur.
Migratory wetland birds					
Gallinago hardwickii	Latham's Snipe	Mi	SLC (Mi)	Likely	No records of this species exist within the study area although areas of potentially suitable habitat in the form gilgai occur within the Project area. Such habitats may be utilised on a sporadic basis if the species is present in the region.

1. EPBC Act status: M – migratory, Ma – marine
2. NC Act status: SLC – special least concern, Mi – migratory

6.6 Threatened and migratory species habitat mapping

Habitat constraints mapping has been prepared for those MSES that have been identified (post consideration of desktop assessments and field ecology surveys results) as being 'known' or 'likely' to occur in the Project area.

This also includes mapping of habitats for Koala and Greater Glider which were assigned a likelihood of 'low potential. DCCEEW has identified this species as being on a high priority list due to the extensive bushfires which occurred in 2019–20 summer in southern and eastern Australia. The latest high priority list was released by DAWE on 20 March 2020 and identified species requiring urgent management intervention. The fires covered an unusually large area and, in many places, they have burnt with unusually high intensity. The priority animals were identified based on the extent to which their range has potentially been burnt, how imperilled they were before the fires (for example, whether they were already listed as vulnerable, endangered or critically endangered), and the physical, behavioural and ecological traits which influence their vulnerability to fire (DAWE 2020). Although Koala and Greater Glider are considered a low potential likelihood to occur, a conservative assessment of the potential for significant residual impact is provided.

Habitat mapping is based on EMM's site assessments, spatial datasets, and best available information about a species' habitat requirements. Vegetation community mapping combined with required habitat features and other environmental attributes (such as distance to permanent water or land zones) has been applied to model potential habitats. Relevant habitat suitability information was also used where available such as SPRAT profiles, Recovery Plans and Conservation Advice Statements.

The habitat modelling is conservative. Whilst certain habitat types and likely distributions across the Project area can be extrapolated from survey findings (eg potential occurrence of Squatter Pigeon close to water sources and/or areas dominated by more alluvial sandy soils) other potential species distributions that were not detected are more difficult to accurately predict based purely on the field survey results. Specific habitat attributes according to species preferences as well as habitat mapping methods and field survey results are summarised in subsequent sections.

6.6.1 Brigalow TEC

The Project area on Lot 23, 411, 11 and 2 has been surveyed for the Brigalow TEC. Three patches are present on Lot 2, as described in Section 6.2.3.

Within the Project area, patches of Brigalow that qualify as the TEC, as well as those that do not, are shown on Figure 6.2.

6.6.2 *Dichanthium queenslandicum*

The Project area on Lot 23 and Lot 11 (Denham Park), Lot 411 (Peabody) and Lot 2 (Dabin Station) have been surveyed for this species, and it was not present in the alignment at time of survey.

On Lot 11 and Lot 2, meanders for target threatened grasses were completed whilst undertaking quaternary assessments, as well as in transit through the high-pressure pipeline alignment between sites, and none were found. Due to the preceding rains, including red-breaking, unseasonal rain in May 2022, grasses were flowering during March and June 2022 so detectability of these species would have been optimal. The native bluegrass, *Dichanthium sericeum* dominates in some areas, particularly to the north of the fence which forms the Lot 11/Lot 23 property boundary and in small patches at the eastern end of Dabin Station near Red Hill Road. Several records of *D. queenslandicum* have been collected from within 5 km of the Project area near Dabin Station, however the Project area in proximity to these records was searched thoroughly by two ecologists when the grasslands were in flower, and *D. queenslandicum* was not present.

Due to a lack of suitable native grasslands, extensive areas of Buffel Grass and other exotic species, heavy cattle grazing, and previous clearing activity, the species is considered unlikely to occur in the Project area. No habitat mapping has been prepared for this species. No SRI assessment has also been prepared.

The eastern end of the alignment is mapped as high risk for protected plants. This is due to records of *Dichanthium queenslandicum*. Although none were recorded in the June 2022 survey, and most grasses were flowering, a formal protected plant survey will be undertaken in areas of high-risk trigger mapping within 12 months of clearing (a requirement under Queensland legislative framework). Should the species be found, efforts will be made to avoid during clearing. If the species cannot be avoided, a suitable mitigation will be determined in consultation with DCCEEW/DoR.

6.6.3 *Digitaria porrecta*

The Project area on Lot 23 and Lot 411 have been surveyed for this species, and it was not present.

Due to a lack of suitable native grasslands and extensive areas of Buffel Grass along with cattle grazing, the species is considered unlikely to occur in much of the alignment. However, in areas of the alignment with natural grassland, a conservative approach due to the difficulties in detecting this species is to state it is potential to occur. Due to the lack of nearby database records, there is a low potential to occur.

For example, on Lot 11 and Lot 2, meanders for target threatened grasses were completed whilst undertaking quaternary assessments, as well as in transit through the pipeline alignment between sites, and none were found. Due to the preceding rains grasses were flowering at the time so detectability of these species would have been optimal. The native bluegrass, *Dichanthium sericeum* dominates in some areas, particularly to the north of the fence which forms the Lot 11/Lot 23 property boundary.

There is potential habitat in black soil areas at the eastern end of the alignment and in the north-south section, however these areas were ground-truthed thoroughly and *D. porrecta* was not recorded. *Digitaria brownii* was present and flowering in June 2022, which is reported to flower in summer (https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Digitaria~brownii). Due to unseasonably wet conditions and the presence of fertile material on grasses, there is a high level of confidence in the detection of *D. porrecta,* if present. Similar to the Dichanthium species, invasion by exotic species has degraded potential habitat for the species.

6.6.4 Ornamental Snake

Preferred habitat comprises habitat of a size capable of supporting one or more breeding units, and/or important resources (such as major food sources), or the area is proximal to populations, or may act as a potentially important corridor. General habitat comprises habitat potentially used by transient individuals and may include areas of sub-optimal habitat (DoE 2019b). Preferred habitat constitutes seasonally inundated gilgai depressions on cracking clay soils where microhabitat features (deep soil cracks or woody debris) are present (Kerswell et al, 2020).

The species has been shown to occur in cleared areas of gilgai. The Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPC 2011) include cleared areas of gilgai for this species.

All areas of gilgai within the Project area have been mapped as preferred habitat for this species, based on the number of records during the March 2022 survey. This primarily occurs on Lot 23 in the western part of the alignment, and additional areas of gilgai habitat occur on Lot 11.

Additionally, the species has potential to occur in parts of Lot 11 and Lot 2 where Brigalow communities on clay soils are present adjacent to extensive areas of gilgai. These areas are mapped as potential connectivity/dispersal habitat.

On Lot 411, habitat is generally lacking. Gilgai was only present in the former Project area at the western end of the property, in a patch of 20 year-old Brigalow regrowth, which is not currently mapped as regulated vegetation. Additionally, the area around the dam at the old proposed compression facility location at the east end of the alignment is conservatively mapped as potential habitat.

Areas of connectivity/dispersal habitat have also been mapped between areas of preferred habitat (known or possible) on the basis that movement between these areas is likely, and these areas will act as connective habitat. This connectivity/dispersal habitat includes Brigalow communities away from areas of gilgai. This is consistent with the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPC 2011) which includes connective habitat as being important for the species. Areas of connectivity/dispersal habitat relate to the area of RE 11.5.3/11.5.15 located between the two large gilgai expanses in the Project area on Lot 11, as well as the black soil areas on the east-west alignment of Lot 2. Gilgai and soil cracks in this section are absent, or at best very shallow and minor, and unlikely to be preferred habitat of Ornamental Snake, but may be utilised for dispersal into areas of better gilgai habitat.

Comparison with the Agnew (2010, pers. comms.) criteria for habitat characteristics where this species has been found to be abundant, is provided below:

- They are located within the lowest part of the catchment – areas of gilgai habitat that are mapped as being preferred habitat are in lower lying areas.
- They have diversity of gilgai size and depth (if deep, then broad with gently sloping gradients at the sides) – areas that have been mapped as preferred habitat include a diverse range of gilgai sizes and profiles.
- There are soils of high clay content and deep-cracking characteristics – areas mapped as preferred habitat have clay-based soils, with cracking characteristics, which offers refugia for this species.

- Ground timber is usually relatively common (especially piles adjacent to or close by to gilgai) – ground timber is not abundant in any of the gilgai areas of the Project area however it is present sporadically throughout.

- Where burrowing frogs (*Cyclorana* species) are abundant – Green-striped Frog (*Cyclorana alboguttata*) and other frog species were recorded frequently in the gilgai habitats during the March 2022 surveys.

- Habitat patches are typically greater than 10 ha in area and are within, or connected, to larger areas of remnant vegetation – the areas of gilgai mapped as preferred habitat are large expanses of gilgai, close to areas of remnant Brigalow vegetation in some instances. The gilgai is widely distributed throughout the study area.

A total of 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat between areas of preferred habitat is mapped in the Project area. Although gilgai habitat is not present in these connectivity habitat areas, the species could move across these areas between gilgai patches. This is consistent with the Draft Referral Guidelines for nationally listed Brigalow Belt reptiles as stated above. Mapping is based on aerial imagery and in-field observations.

Habitat mapping for this species is shown on Figure 6.4.

6.6.5 Squatter Pigeon

Squatter Pigeon can utilise a broad range of habitats including remnant, regrowth, non-remnant, and modified vegetation communities with nearby access to permanent surface water (typically within 1–3 km). Generally, they are recorded in open *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* dominated communities, and occur in their highest densities in those habitats with abundant and diverse native grasses (primary foraging resource).

The species also shows soil and landscape associations with foraging and breeding primarily recorded from flat alluvial plains, gently sloping and undulating plains, as well as low hilly terrain with well-drained, sandy, or loamy soils. Breeding in these areas only generally occurs within 1 km of a permanent water source (artificial or natural) (Squatter Pigeon Workshop 2011).

Soil landscapes are good indicators of where natural, foraging and breeding habitats for the Squatter Pigeon (southern) occur (Squatter Pigeon Workshop 2011). Well-draining, gravelly, sandy, or loamy soils support the open-forest to woodland communities with patchy, tussock-grassy understories that support the subspecies' foraging and breeding requirements. Given that the subspecies nests in shallow depressions on the ground, it requires well-draining soils. The species foraging and breeding habitats are known to be associated with landzones 3, 5 and 7 of which only landzones 3 and 5 occurs in the Project area.

As such, the following criteria provided by DCCEEW is used to map Squatter Pigeon habitat in the Project area (DCCEEW criteria provided in italics with further commentary in non-italic text):

- **Breeding habitat** – *any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils (including but not limited to areas mapped as Queensland land zones 3, 5, 7) and within 1 km of a suitable, permanent, or seasonal waterbody*.

  Waterbodies have been mapped to include stream order 1 and above as well as dams identified on site and through aerial imagery.

- **Foraging habitat** – *any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils (including but not limited to areas mapped as Queensland land zones 3, 5, 7) and within 3 km of a suitable, permanent, or seasonal waterbody*.

  Waterbodies have been mapped to include stream order 1 and above as well as dams identified on site and through aerial imagery. Areas considered unsuitable for the species (dense weedy groundcover) have been excluded from mapping entirely. Therefore some foraging areas have been added additionally to the potential breeding habitat to capture the cleared tracks that the species has been observed foraging on or is likely to forage on but does not form breeding habitat (open tracks with little ground cover).

- **Dispersal habitat** – *any forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies, and areas of cleared land less than 100 m wide linking areas of suitable breeding and/or foraging habitat.*

  As well as mapped remnant and regrowth vegetation communities (using ground-truthed mapping in the Project area) some non-remnant areas have been mapped as dispersal habitat for this species, as scrub is present, and the species could move through these areas between patches of breeding or foraging habitat.

Once the above habitat was initially mapped, it was further refined based on observations made in the field as much of the Project area is considered too weedy and densely vegetated for the species to occur (eg areas of dense Buffel Grass) or areas on heavy clay soils (landzone 4). Particularly within areas of Project infrastructure in the centre of the Project area, the habitat is typically unsuitable for the species. Much of the Project area is dominated by areas of dense Buffel Grass groundcover, which differs from the patchy tussock grassy understories of open woodland favoured by the species. Feeding opportunities are restricted in such dense weedy understoreys, and the potential for predation is increased. Therefore, dense Buffel Grass areas have been excluded from mapping.

Other habitat factors described above restrict the suitability for the species. Squatter Pigeon are unlikely to move far from woodland trees which provide shelter (Squatter Pigeon Workshop 2011). Where scattered trees occur, and the distance of cleared land between patches of habitat does not exceed 100 m, individuals may be found foraging or dispersing across modified environments (Squatter Pigeon Workshop 2011).

A total of 9.55 ha of breeding habitat, 19.98 ha of foraging habitat and 2.15 ha of dispersal habitat is mapped within the Project area.

Habitat mapping for this species is shown on Figure 6.5.

6.6.6 Koala

Although assessed as having a low potential to occur in the Project area this species has been conservatively assessed in the significant residual impact assessments. DCCEEW has identified this species as being on a high priority list due to the extensive bushfires which occurred in 2019–20 in southern and eastern Australia and although they are not considered likely to occur on site, and have not been recorded to date, assessments have been carried out based on their potential presence.

No individuals were recorded, and no scratches or scats associated with the species were recorded. If present, the species is likely to be restricted to areas where sparse *Eucalyptus cambageana* are present, or the patch of RE 11.5.3/11.5.15 on Lot 11 or a patch of *Eucalyptus orgadophila* open grassy woodland on Lot 2. However, this habitat is marginal. The remainder of the Project area is largely cleared and dominated by regrowth Acacia.

Conservatively, any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees (following EPBC Act referral guidelines for the vulnerable Koala (DoE 2014)) is considered potential Koala habitat. This includes mixed Eucalypt regrowth or modified vegetation communities, or shrubland containing emergent Koala food trees. Koala food trees typically consist of the following genera in order of general preference:

- *Eucalyptus;*
- *Corymbia;*
- *Angophora;*
- *Lophostemon; and*
- *Melaleuca.*

The DCCEEW guideline provides a 'koala habitat assessment tool' to assist in the determining the sensitivity, value and quality of lands potentially impacted under development proposals. Formal assessments of Koala habitat in the Project area are provided in Table G.5.

Low quality and low potential Koala habitat in the Project area includes areas of vegetation (including remnant, regrowth, and areas of non-remnant) that contain eucalypt species. For the purposes of this assessment, all potential Koala habitat is combined and assessed.

A total of 5.0 ha of low potential habitat is mapped within the Project area.

Habitat mapping for this species is shown on Figure 6.6.

6.6.7 Greater Glider

This species utilises eucalypt forest and woodland with mature trees containing abundant hollows, which it uses for shelter. There are some isolated mature trees (*E. cambageana*) with hollows within the pipeline and buffer areas of the Project area however these do not form part of a contiguous woodland and habitat is not suitable for this species.

There is a small section of the alignment on Lot 11 that contains RE 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces. This woodland is mapped correctly and contains *E. crebra* and *C. clarksoniana* trees around 14 m high. Some hollows are present, but they are relatively scarce (approximately five per hectare) and small in size, as the woodland appears to have been subject to selective clearing in the past. Due to the open nature of the canopy, small numbers of hollows and lack of connectivity to more optimal Greater Glider habitat, this area is conservatively considered marginal habitat for Greater Glider and should be confirmed through nocturnal spotlighting surveys at a later date.

Areas of RE 11.5.3 on Lot 2 are unsuitable for Greater Glider, as they have been cleared in the past and have now regrown to achieve remnant status. However, hollows have not yet developed in the canopy trees, so no denning habitat for the glider is present.

Habitat is typically mapped as either denning habitat or foraging habitat. Denning habitat (as informed by the Draft Consultation on Species Listing Eligibility and Conservation Actions *Petauroides volans* (Greater Glider (southern)) (DAWE 2021) is present if suitable large hollow bearing trees containing hollows greater than 8 cm (Gibbons & Lindenmayer 2002) are present.

Large parts of the Project area are considered unsuitable as denning habitat for Greater Glider due to the dominant vegetation communities of small statured woodlands with a lack of hollows, sparse canopy cover, low canopy height and small DBH. This small stature is likely due to previous large-scale clearing activities which have essentially reduced the age of the dominant vegetation species across the Project area below that necessary to produce the large hollows (typically >100 years required for this species).

The small section of the alignment on Lot 11 that contains RE 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces is mapped as low potential denning habitat due to the presence of hollow bearing trees. Additionally, a patch of *Eucalyptus orgadophila* open grassy woodland in the eastern portion of the alignment on Lot 2 is mapped as potential foraging habitat due to the lack of suitable hollows.

A total of 3.16 ha of low potential denning habitat is mapped within the Project area and 1.84 ha of low potential foraging habitat.

Habitat mapping for this species is shown on Figure 6.7.

6.6.8 White-throated Needletail

No habitat map has been prepared for this species as it is an aerial insectivore that spends most of its time aloft, and could occur anywhere over the Project area, therefore the whole Project area is considered potential foraging habitat.

The species does not breed in Australia, and as a wide-ranging nomadic species, foraging habitat also provides a surrogate for dispersal habitat.

There is limited potential for roosting habitat in the Project area as there is generally a lack of mature woodland in which the species may roost. It is thought that the number of references to Needletails roosting in trees possibly over-emphasizes such occurrences (DAWE 2021d).

6.6.9 Fork-tailed Swift

No habitat map has been prepared for this species as it is an aerial insectivore that spend most of their time aloft, and could occur anywhere over the Project area, therefore the whole Project area is considered potential foraging habitat. The species does not breed in Australia, and as a wide-ranging nomadic species, foraging habitat also provides a surrogate for dispersal habitat.

6.6.10 Latham's Snipe

This species occurs in shallow freshwater wetlands, of both an ephemeral and permanent nature across eastern Australia. Habitat includes a variety of wetland types, both ephemeral and permanent, such as lakes, swamps, claypans, inundated or waterlogged grassland/saltmarsh, dams, rice crops, sewage farms and bore drains, generally with a good cover of grasses, rushes and reeds, low scrub.

Habitat is present within the Project area within areas of gilgai. A total of 36.05 ha of potential habitat is mapped within the Project area.

Habitat mapping for this species is shown on Figure 6.8.

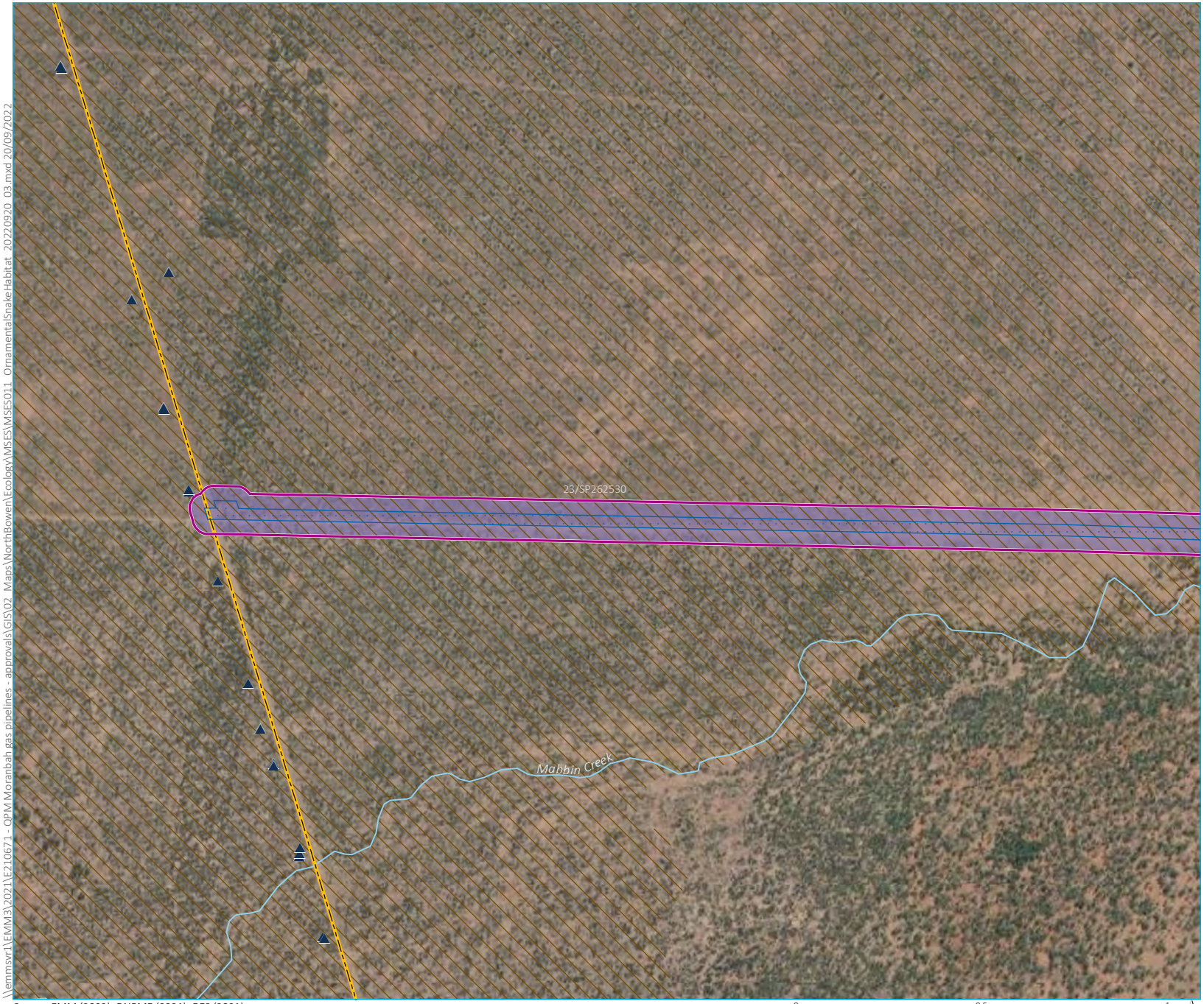
6.6.11 Short-beaked Echidna

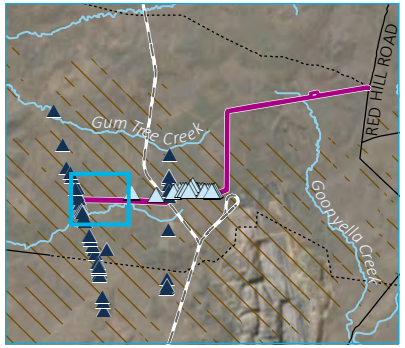
The species has a widespread distribution throughout Australia (Australian Museum 2020). The species breeds in the cooler months between June and September. A single egg is laid which is incubated in a pouch and hatches after ten days. The juvenile Echidna is then carried in the pouch for three months although during this time the female will sometimes leave the animal in a burrow.

The species has a widespread distribution throughout Australia, inhabiting forests, woodlands, heath, grasslands, and arid environments (Australian Museum 2020).

The primary threat to the species is habitat loss. Vehicle strike is another risk for the species. The species is also susceptible to predation from feral cats, foxes, domestic dogs, and goannas.

No mapping has been undertaken for Short-beaked Echidna as the species could occur throughout the Project area. As Australia's most widespread mammal, the species utilises a variety of habitats including woodlands, grasslands and gilgai areas.





KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Preclear land zone 4

Ornamental Snake records

- EMM
- Wildnet

Ornamental Snake habitat

- Preferred

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Source: EMM (2022); DNRME (2021); DES (2021)

0 0.5 1 km

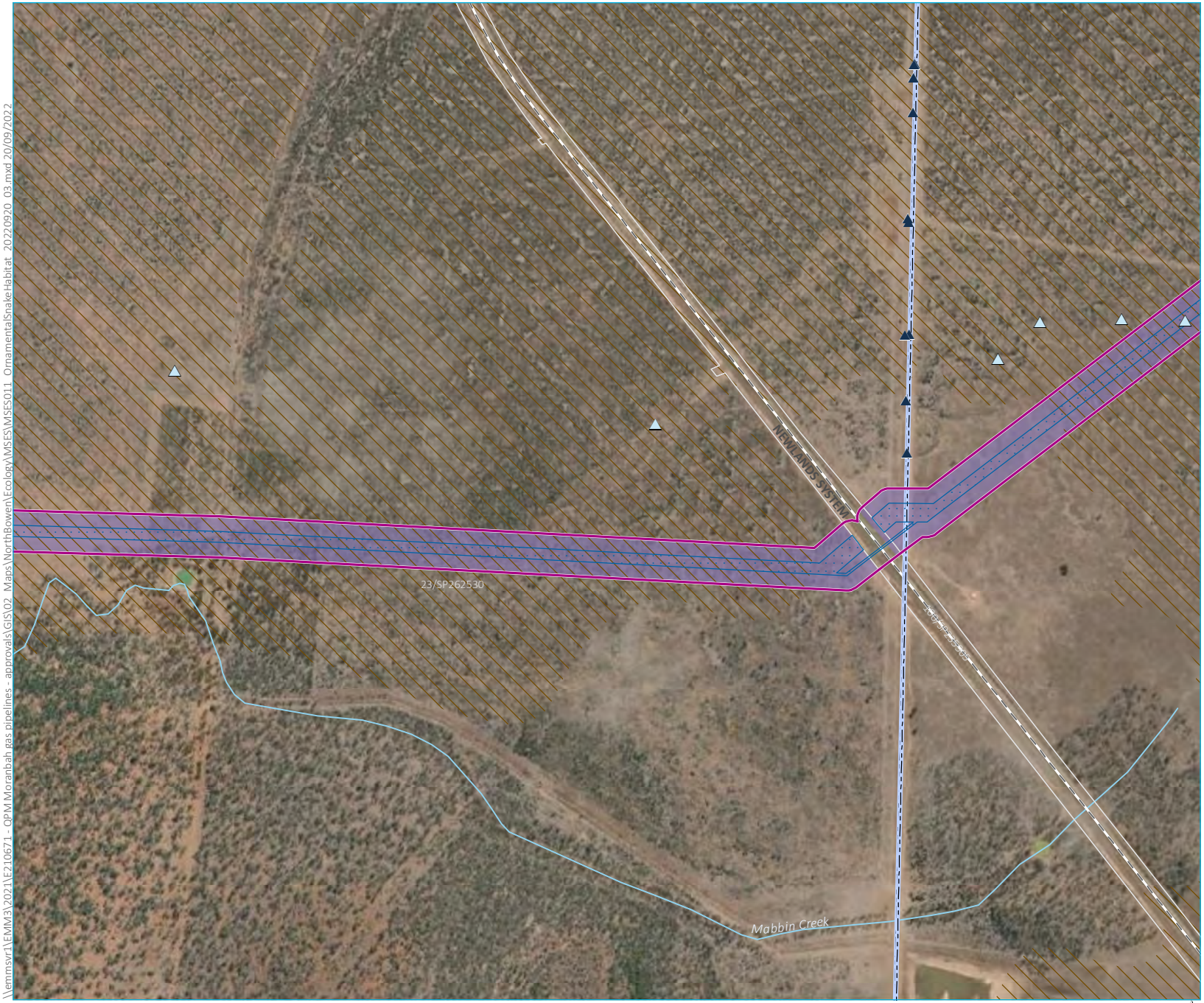
GDA 1994 MGA Zone 55

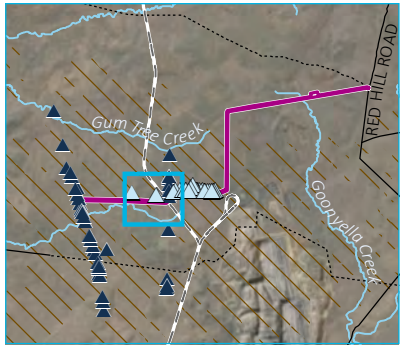
N

Ornamental Snake habitat within the project area Map 1 of 6

QPM Energy Project
MSES
Figure 6.4

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Preclear land zone 4

Ornamental Snake records

- EMM
- Wildnet

Ornamental Snake habitat

- Preferred

Source: EMM (2022); DNRME (2021); DES (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

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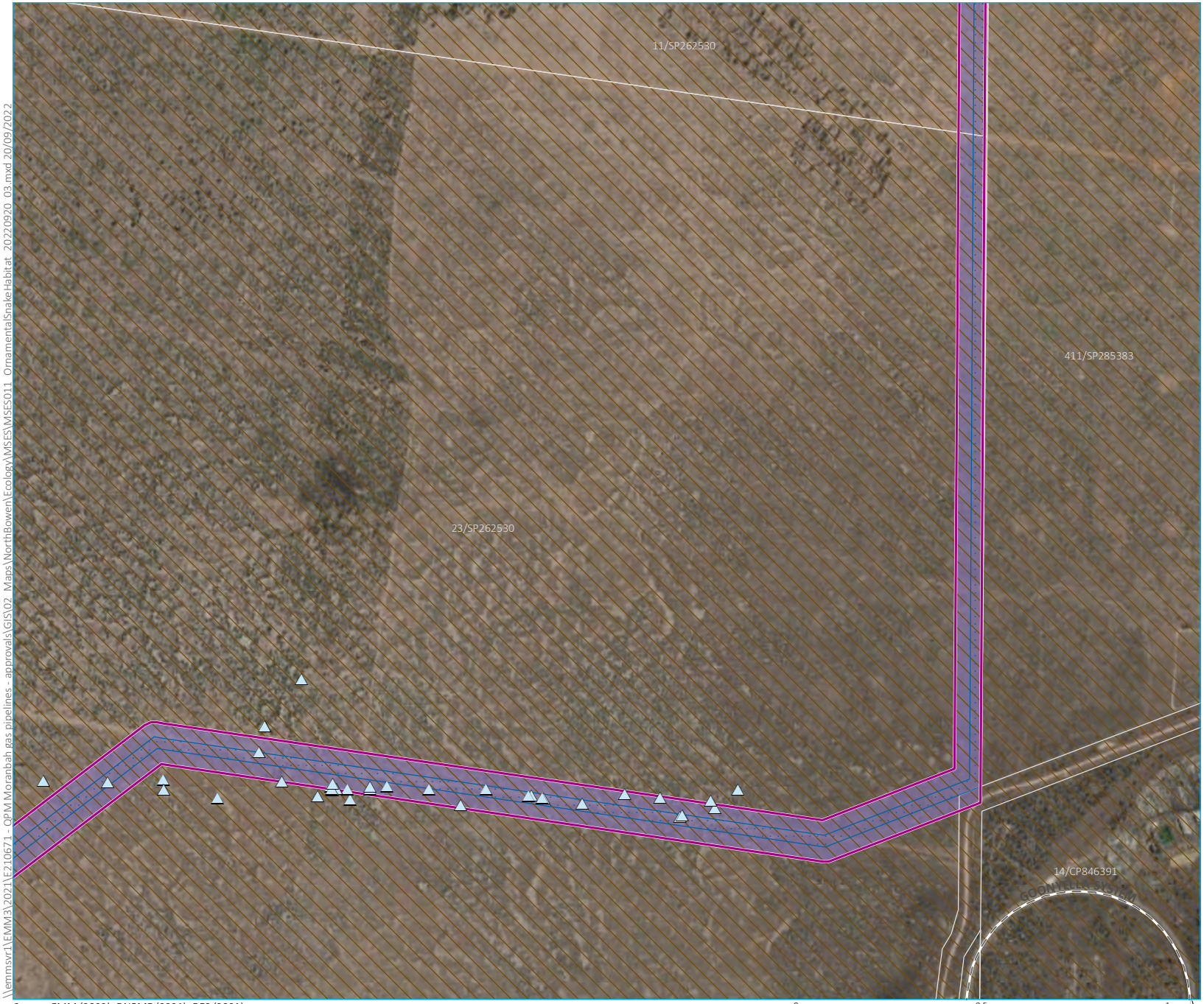
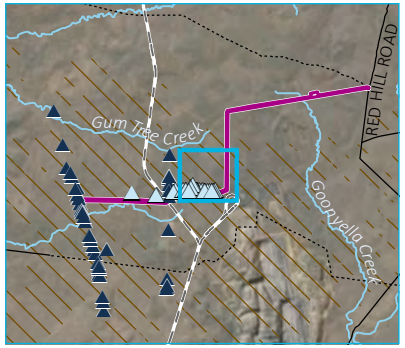
Ornamental Snake habitat within the project area Map 2 of 6

QPM Energy Project
MSES
Figure 6.4

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary
- Preclear land zone 4

Ornamental Snake records

- EMM
- Wildnet

Ornamental Snake habitat

- Preferred

Ornamental Snake habitat
within the project area
Map 3 of 6

QPM Energy Project
MSES
Figure 6.4

EMM
creating opportunities

Source: EMM (2022); DNRME (2021); DES (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

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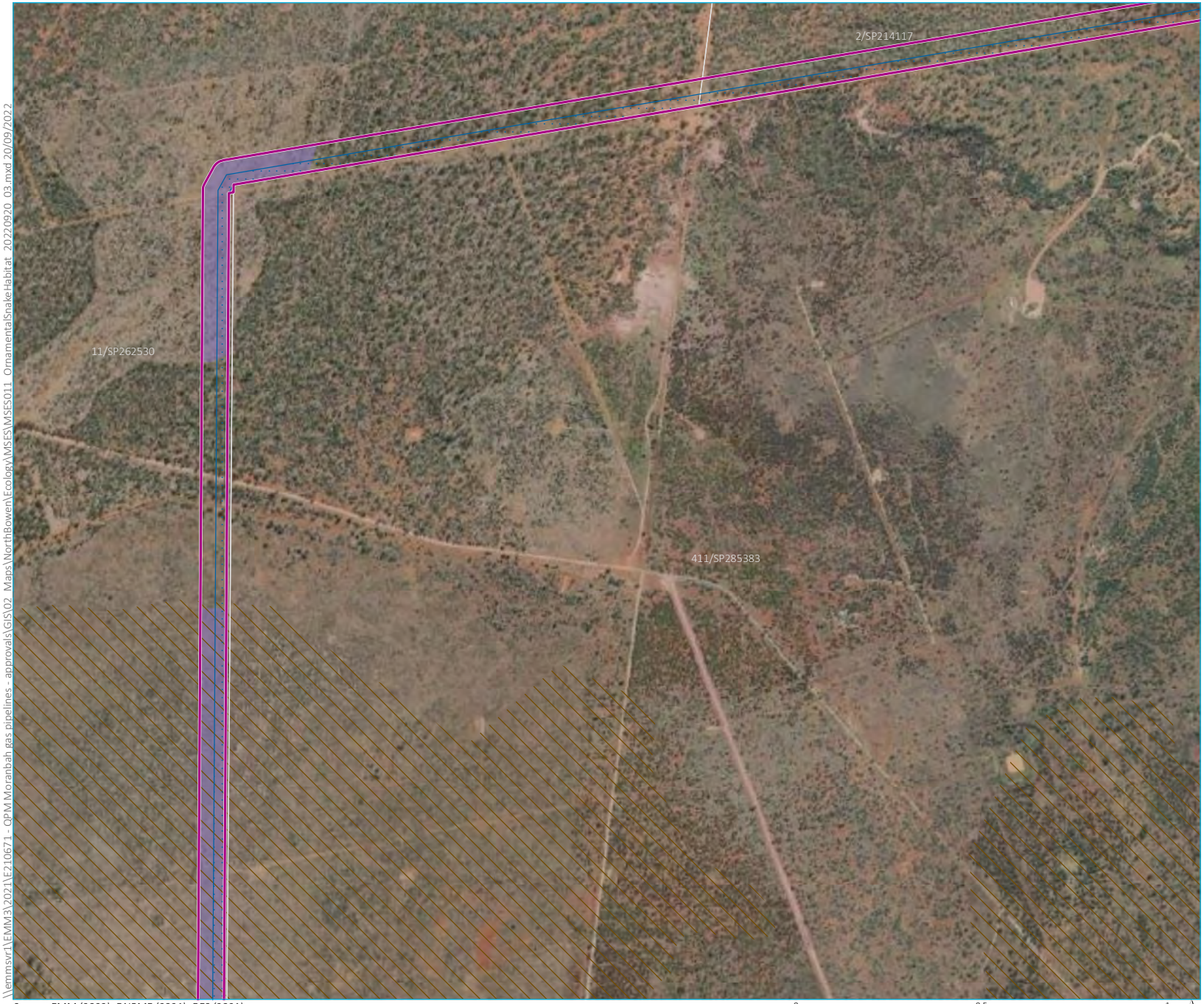

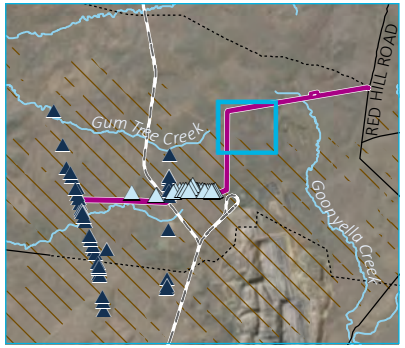

KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary
- Preclear land zone 4

Ornamental Snake records

- EMM
- Wildnet

Ornamental Snake habitat

- Preferred
- Connectivity

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Source: EMM (2022); DNRME (2021); DES (2021)

0 0.5 1 m

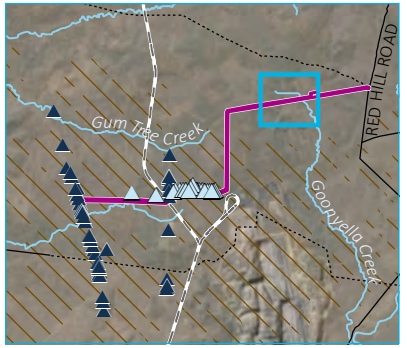
GDA 1994 MGA Zone 55

N

Ornamental Snake habitat within the project area Map 4 of 6

QPM Energy Project
MSES
Figure 6.4

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Preclear land zone 4

Ornamental Snake records

- EMM
- Wildnet

Ornamental Snake habitat

- Connectivity

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Source: EMM (2022); DNRME (2021); DES (2021)

0 0.5 1 m

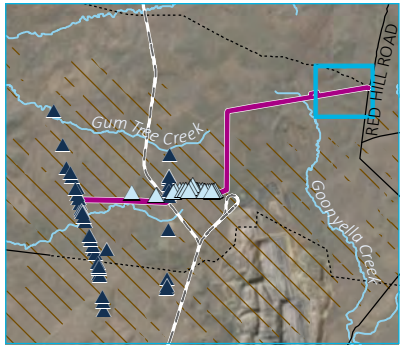
GDA 1994 MGA Zone 55

N

Ornamental Snake habitat within the project area Map 5 of 6

QPM Energy Project
MSES
Figure 6.4

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Preclear land zone 4

Ornamental Snake records

- EMM
- Wildnet

Ornamental Snake habitat

- Connectivity

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Source: EMM (2022); DNRME (2021); DES (2021)

0 0.5 1 m

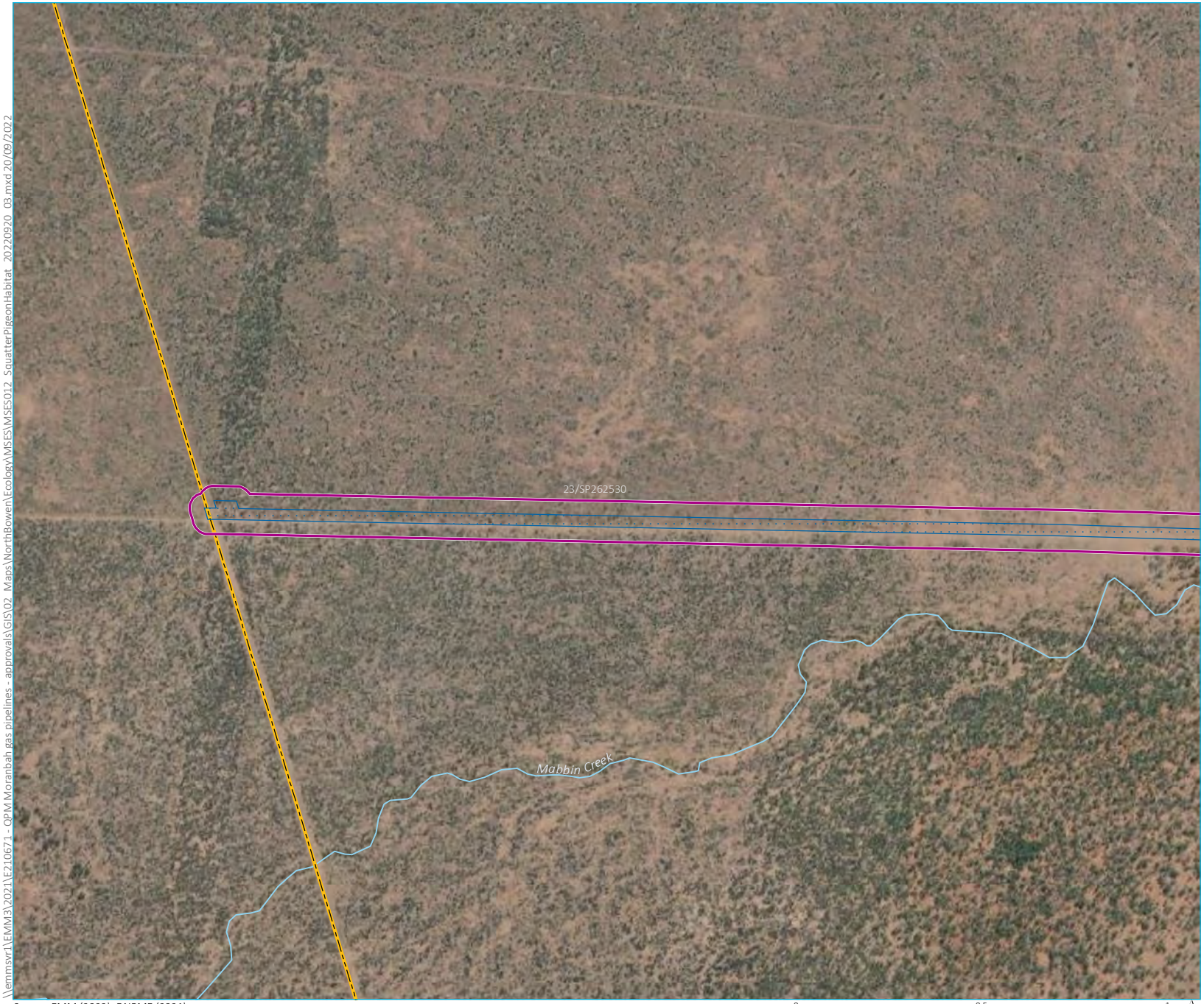
GDA 1994 MGA Zone 55

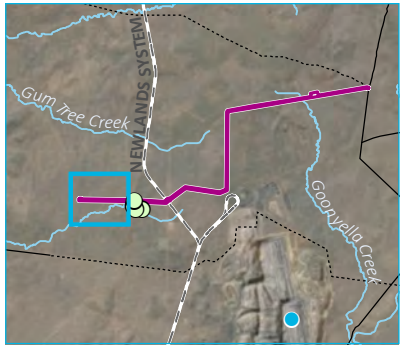
N

Ornamental Snake habitat within the project area Map 6 of 6

QPM Energy Project
MSES
Figure 6.4

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Squatter Pigeon records

- EMM
- Wildnet

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Source: EMM (2022); DNRME (2021)

0 0.5 1 km

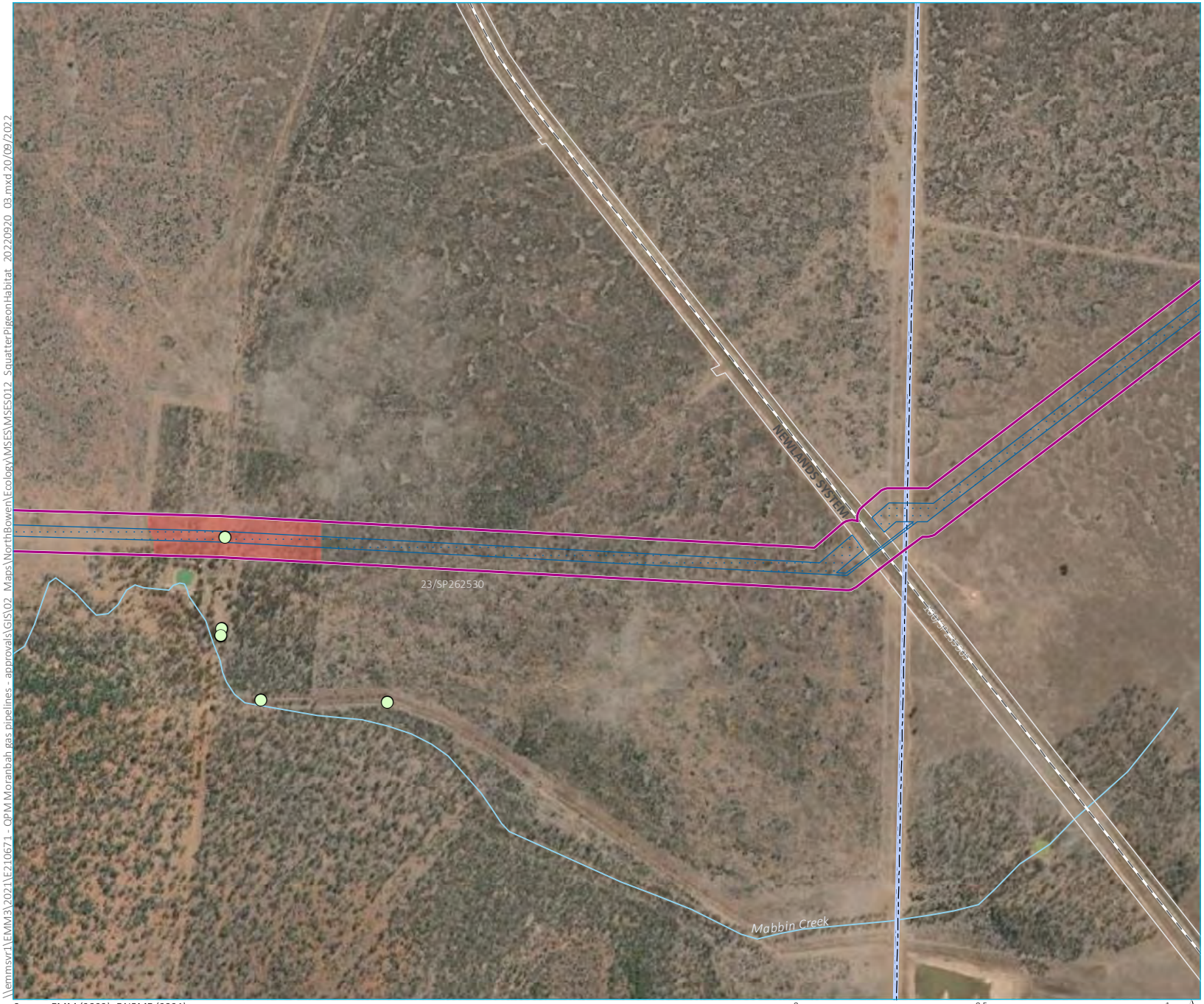
GDA 1994 MGA Zone 55

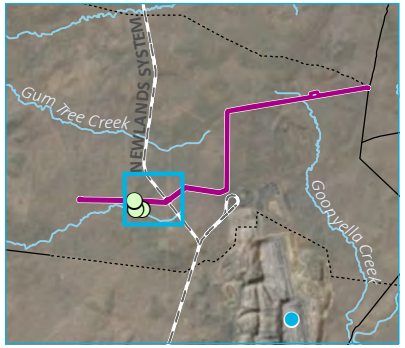
N

Squatter Pigeon habitat within the project area Map 1 of 6

QPM Energy Project
MSES
Figure 6.5

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Squatter Pigeon records

- EMM
- Wildnet

Squatter Pigeon habitat

- Breeding

Squatter Pigeon habitat
within the project area
Map 2 of 6

QPM Energy Project
MSES
Figure 6.5

Source: EMM (2022); DNRME (2021)

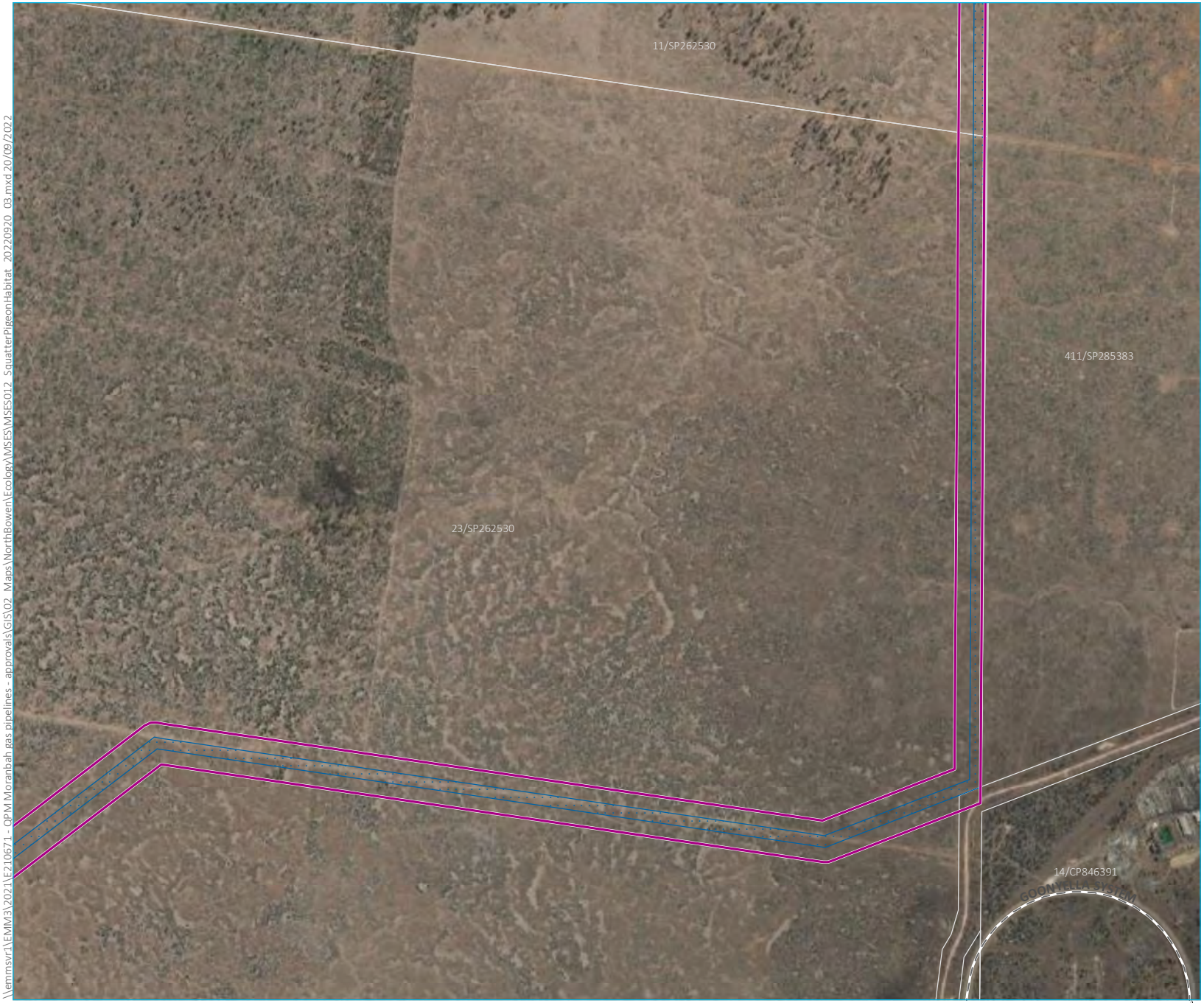
0 0.5 1 m

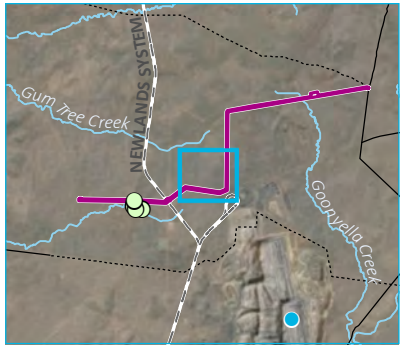
GDA 1994 MGA Zone 55

N

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES012 SquatterPigeonHabitat 20220920 03.mxd 20/09/2022

creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Squatter Pigeon records

- EMM
- Wildnet

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES012_SquatterPigeonHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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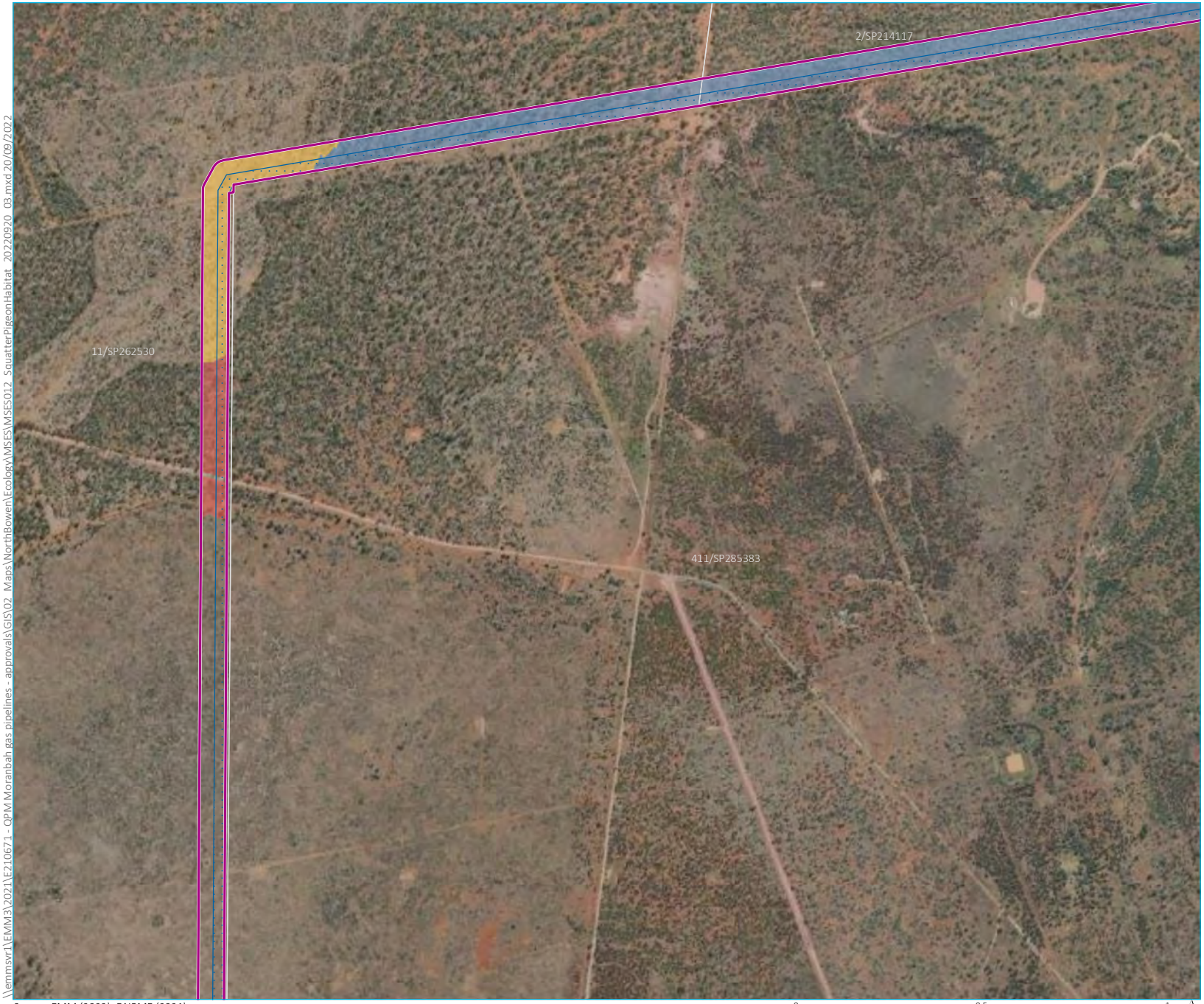
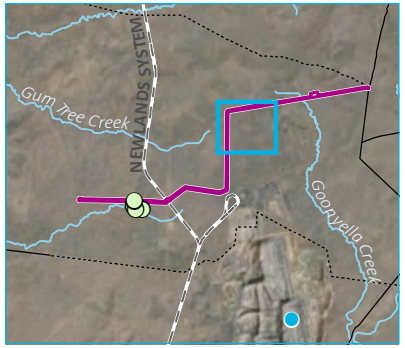
Squatter Pigeon habitat
within the project area
Map 3 of 6

QPM Energy Project
MSES
Figure 6.5

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Squatter Pigeon records

- EMM
- Wildnet

Squatter Pigeon habitat

- Breeding
- Foraging
- Dispersal

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

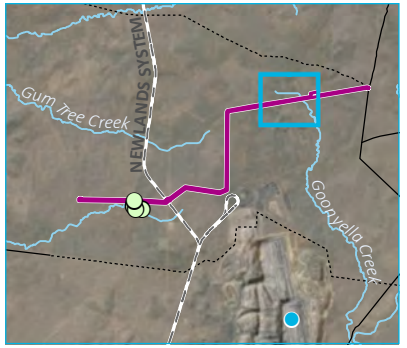
N

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES012 SquatterPigeonHabitat 20220920 03.mxd 20/09/2022

Squatter Pigeon habitat within the project area Map 4 of 6

QPM Energy Project
MSES
Figure 6.5

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Squatter Pigeon records

- EMM
- Wildnet

Squatter Pigeon habitat

- Breeding
- Foraging

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES012_SquatterPigeonHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

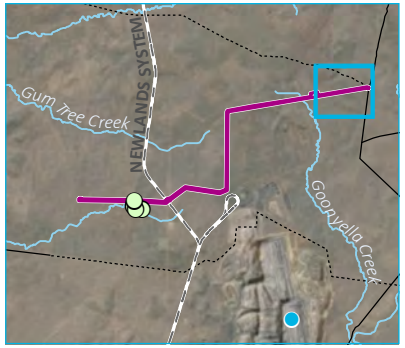
GDA 1994 MGA Zone 55

N

Squatter Pigeon habitat
within the project area
Map 5 of 6

QPM Energy Project
MSES
Figure 6.5

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Squatter Pigeon records

- EMM
- Wildnet

Squatter Pigeon habitat

- Breeding
- Foraging

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES012_SquatterPigeonHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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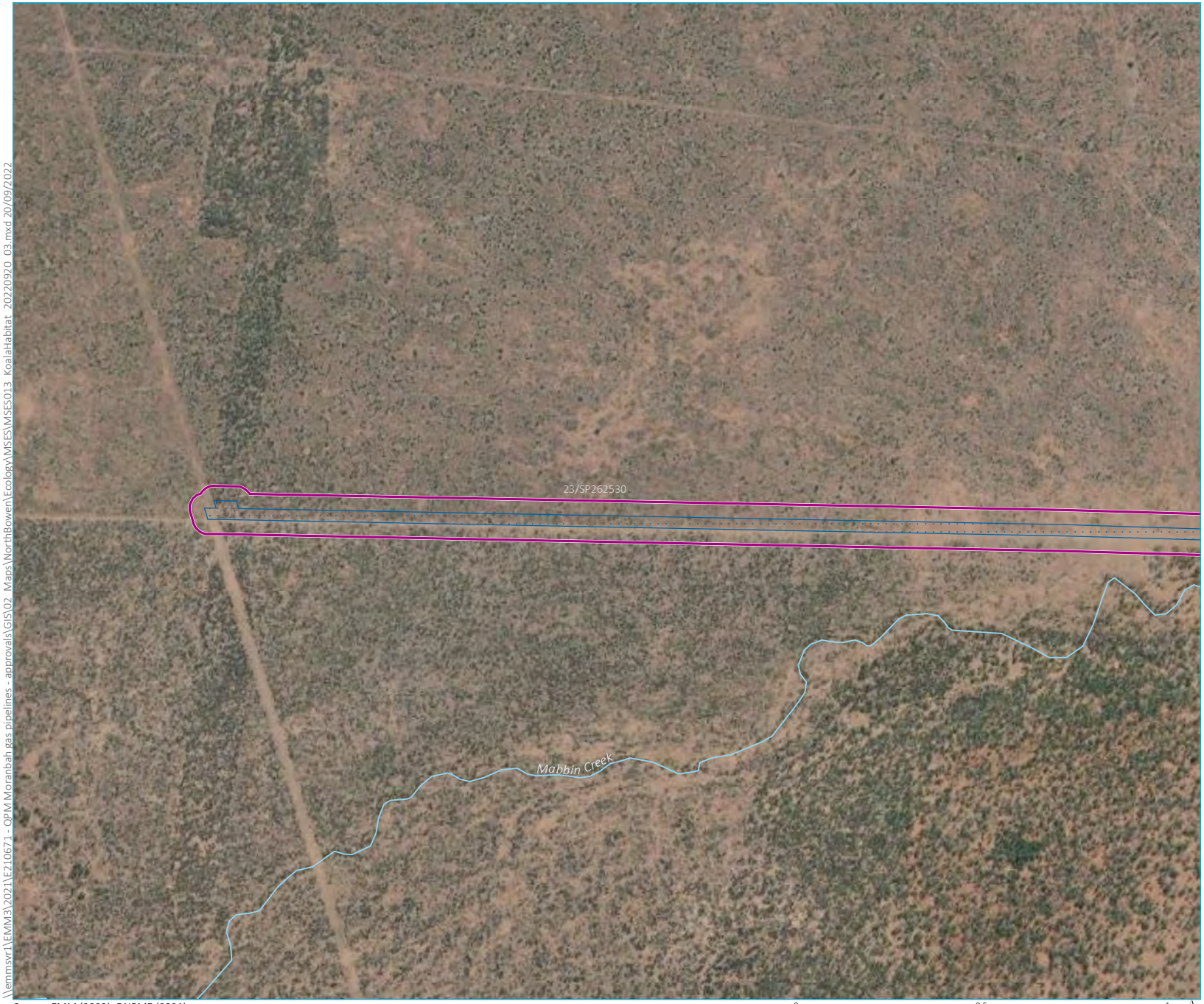
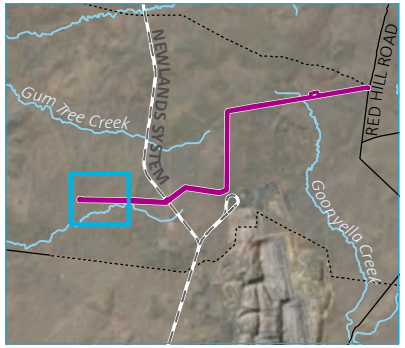
Squatter Pigeon habitat within the project area
Map 6 of 6

QPM Energy Project
MSES
Figure 6.5

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES013_KoalaHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 km

GDA 1994 MGA Zone 55

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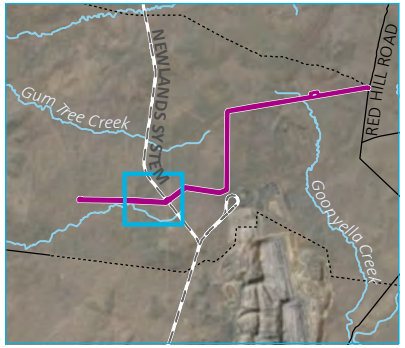
Koala habitat within the project area Map 1 of 6

QPM Energy Project
MSES
Figure 6.6

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Koala habitat
within the project area
Map 2 of 6

QPM Energy Project
MSES
Figure 6.6

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

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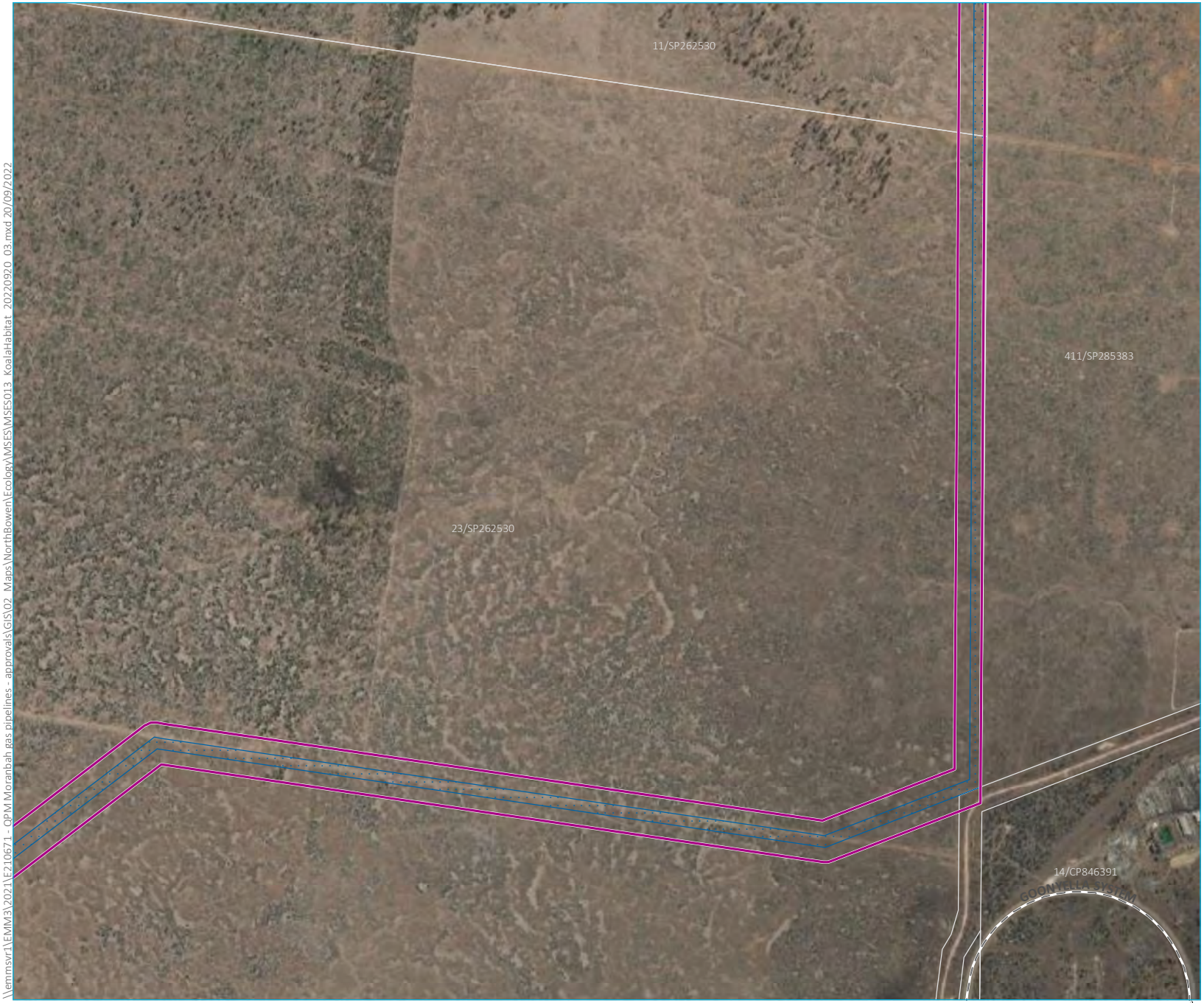
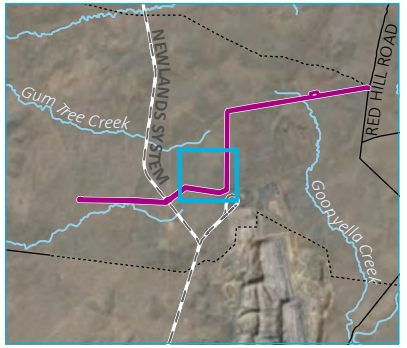
\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES013 KoalaHabitat 20220920 03.mxd 20/09/2022

creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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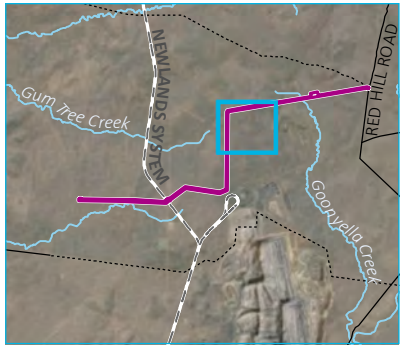
Koala habitat
within the project area
Map 3 of 6

QPM Energy Project
MSES
Figure 6.6

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary
- Potential Koala habitat

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES013 KoalaHabitat 20220920 03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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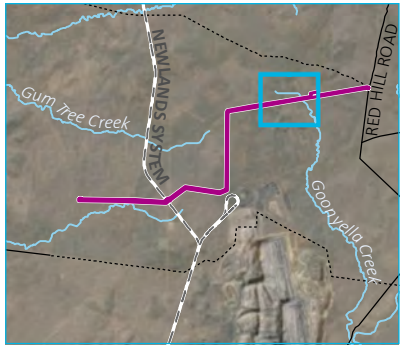
Koala habitat
within the project area
Map 4 of 6

QPM Energy Project
MSES
Figure 6.6

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Potential Koala habitat

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES013_KoalaHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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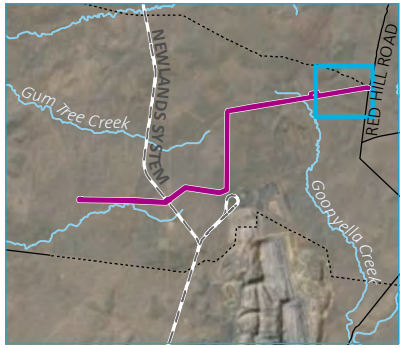
Koala habitat within the project area Map 5 of 6

QPM Energy Project
MSES
Figure 6.6

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES013_KoalaHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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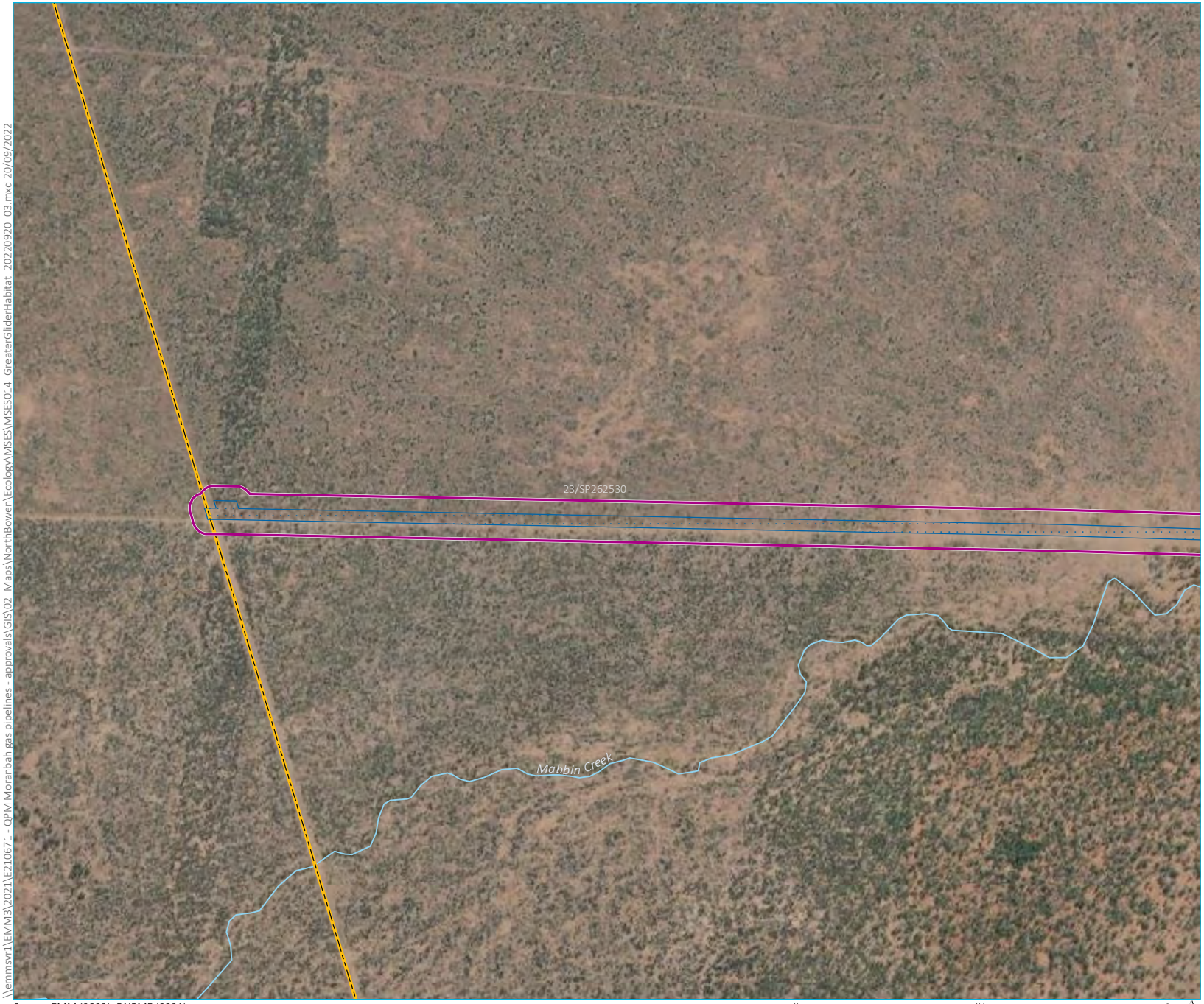
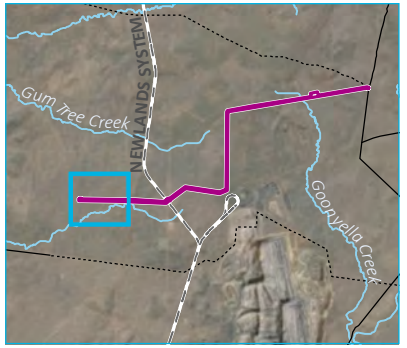
Koala habitat within the project area Map 6 of 6

QPM Energy Project
MSES
Figure 6.6

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES014_GreaterGliderHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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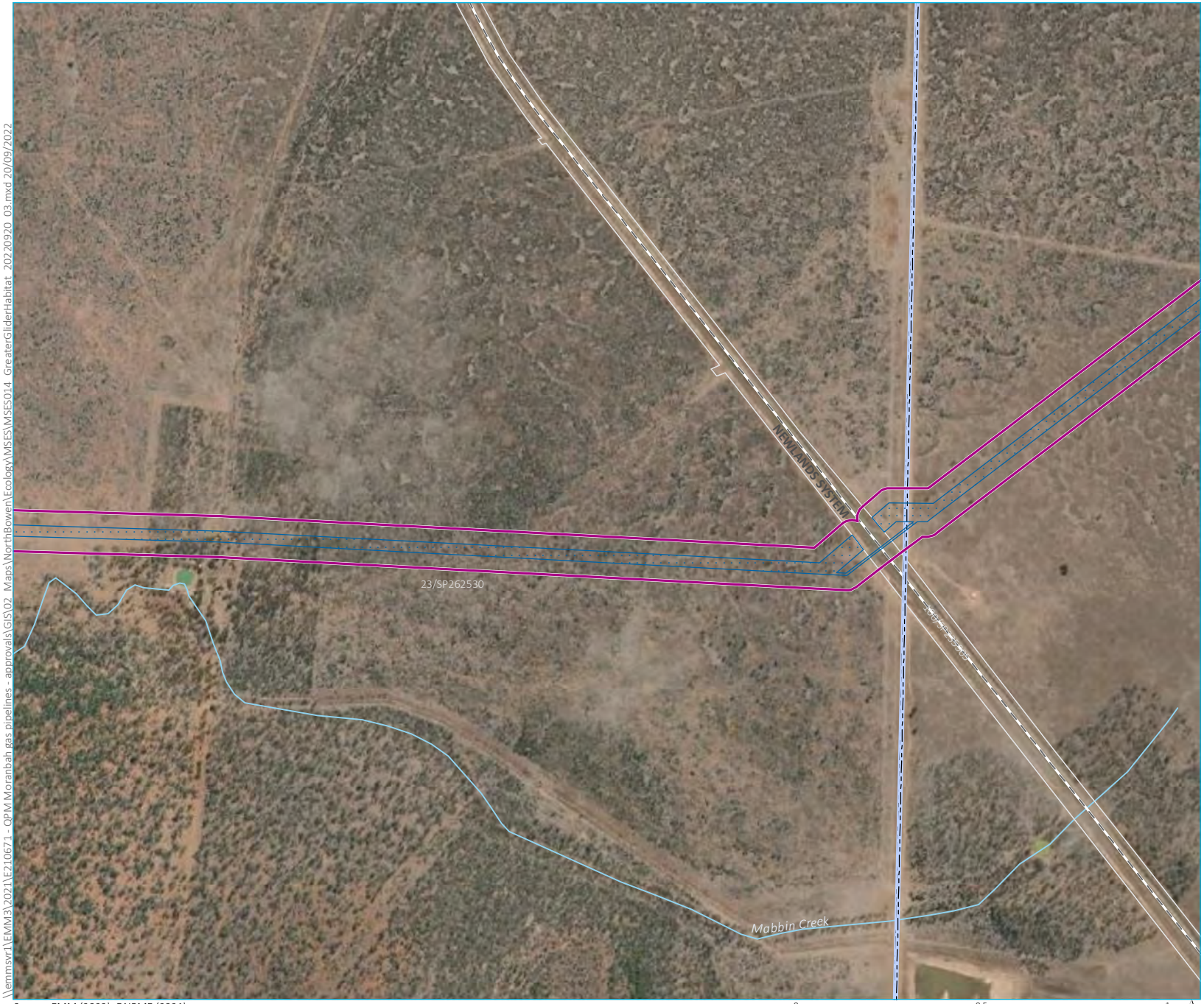
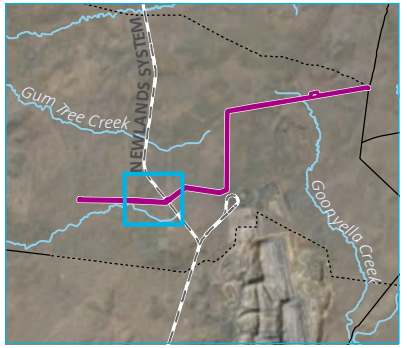
Greater Glider habitat
within the project area
Map 1 of 6

QPM Energy Project
MSES
Figure 6.7

EMM
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Greater Glider habitat
within the project area
Map 2 of 6

QPM Energy Project
MSES
Figure 6.7

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

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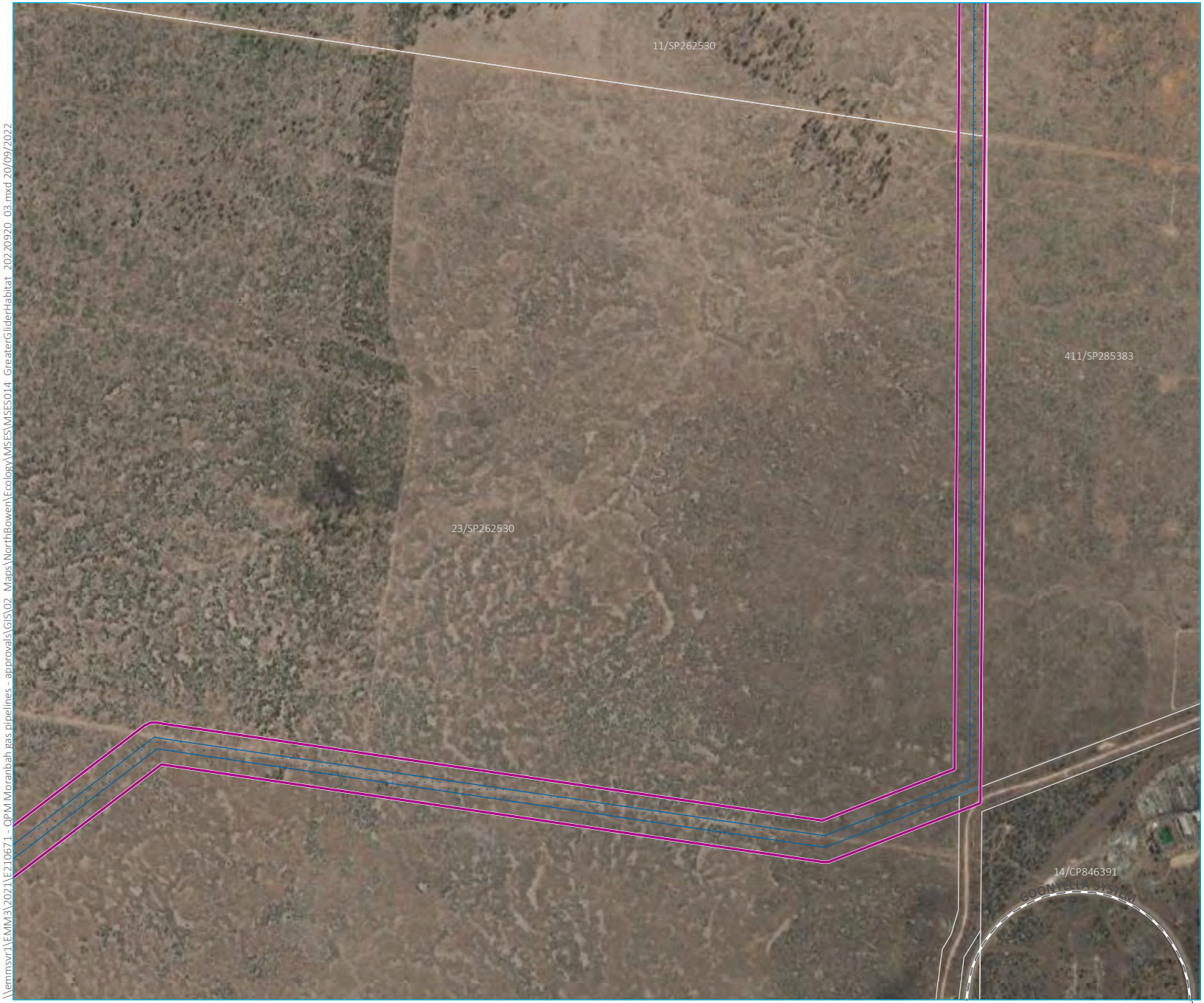
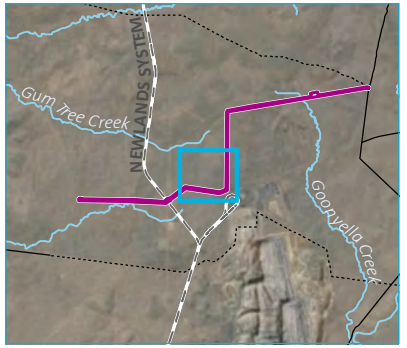
creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

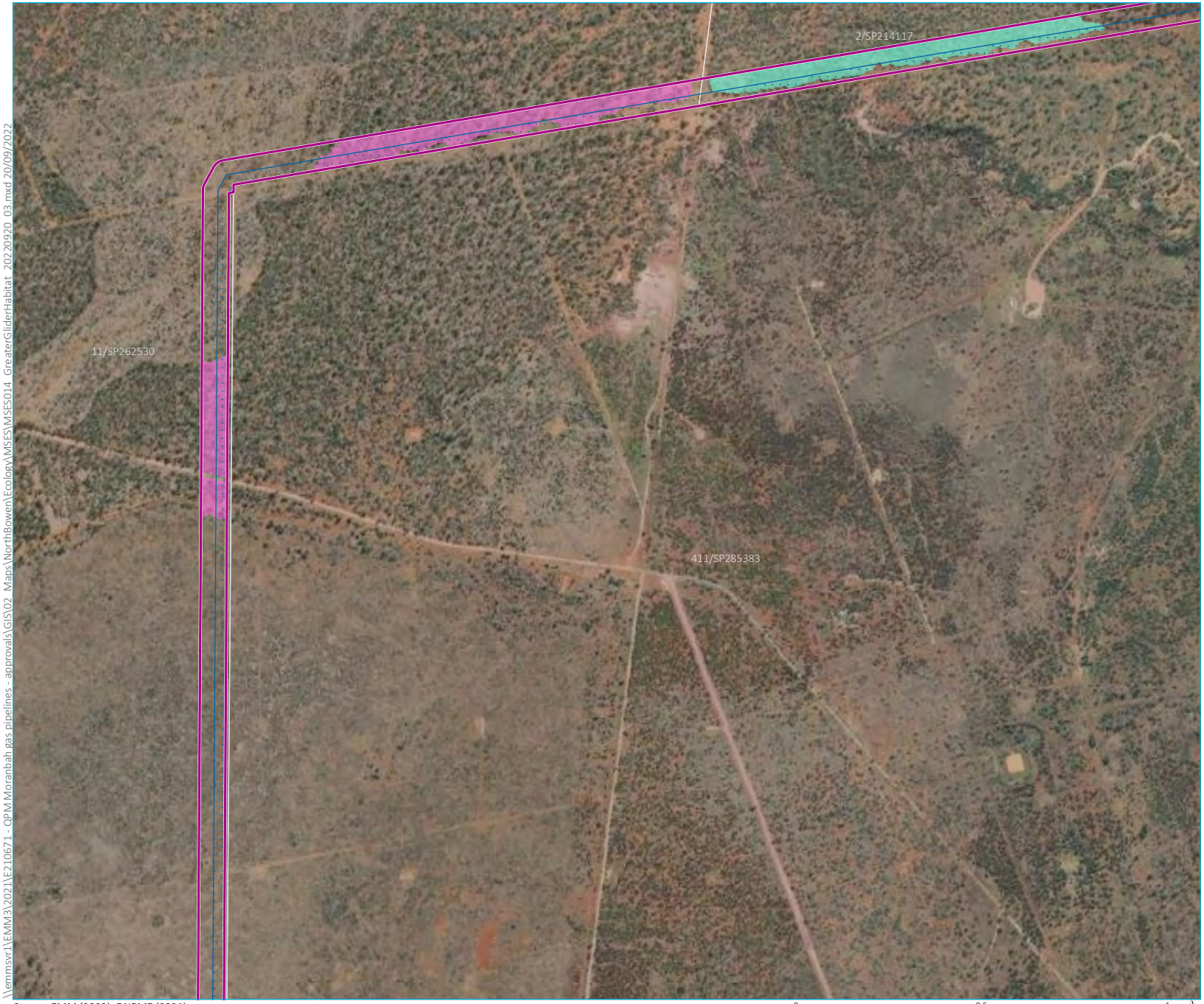
GDA 1994 MGA Zone 55

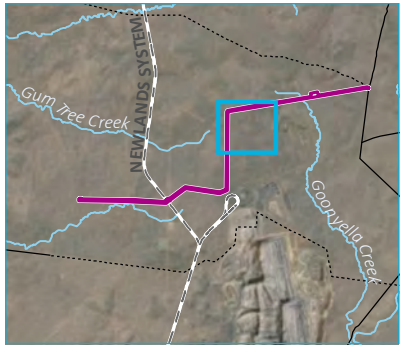
N

Greater Glider habitat within the project area Map 3 of 6

QPM Energy Project
MSES
Figure 6.7

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary

Greater Glider habitat

- Potential denning
- Potential foraging

Source: EMM (2022); DNRME (2021)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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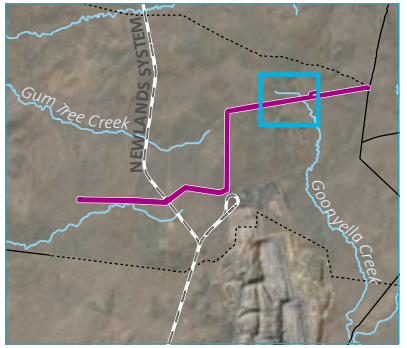
Greater Glider habitat within the project area Map 4 of 6

QPM Energy Project
MSES
Figure 6.7

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Greater Glider habitat

- Potential foraging

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES014_GreaterGliderHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

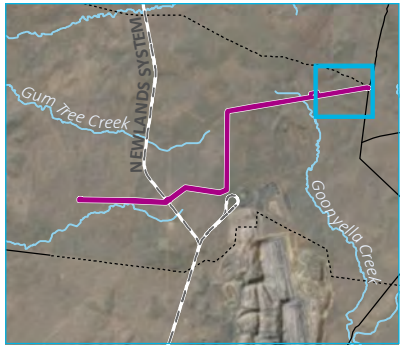
GDA 1994 MGA Zone 55

N

Greater Glider habitat within the project area
Map 5 of 6

QPM Energy Project
MSES
Figure 6.7

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES014_GreaterGliderHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

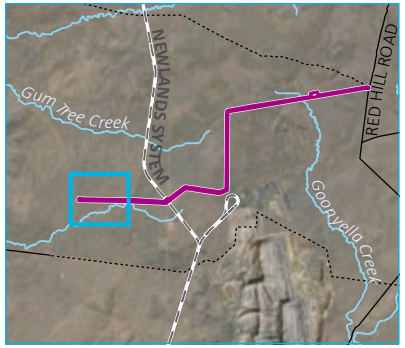
GDA 1994 MGA Zone 55

N

Greater Glider habitat within the project area
Map 6 of 6

QPM Energy Project
MSES
Figure 6.7

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- North Queensland Gas Pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Potential Latham's Snipe habitat

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02_Maps\NorthBowen\Ecology\MSES\MSES015_LathamsSnipeHabitat_20220920_03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 km

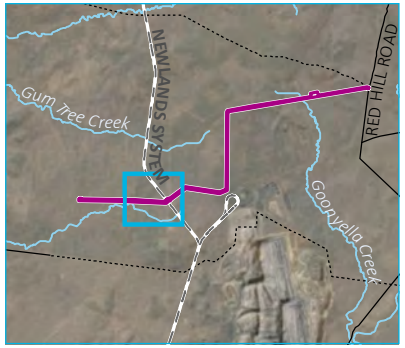
GDA 1994 MGA Zone 55

N

Latham's Snipe habitat
within the project area
Map 1 of 6

QPM Energy Project
MSES
Figure 6.8

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Potential Latham's Snipe habitat

Latham's Snipe habitat
within the project area
Map 2 of 6

QPM Energy Project
MSES
Figure 6.8

Source: EMM (2022); DNRME (2021)

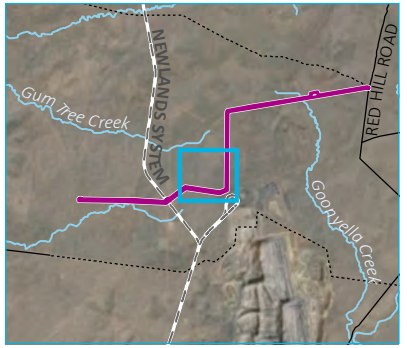
0 0.5 1 km

GDA 1994 MGA Zone 55

N

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES015 LathamsSnipeHabitat 20220920 03.mxd 20/09/2022

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary
- Potential Latham's Snipe habitat

Latham's Snipe habitat within the project area
Map 3 of 6

QPM Energy Project
MSES
Figure 6.8

Source: EMM (2022); DNRME (2021)

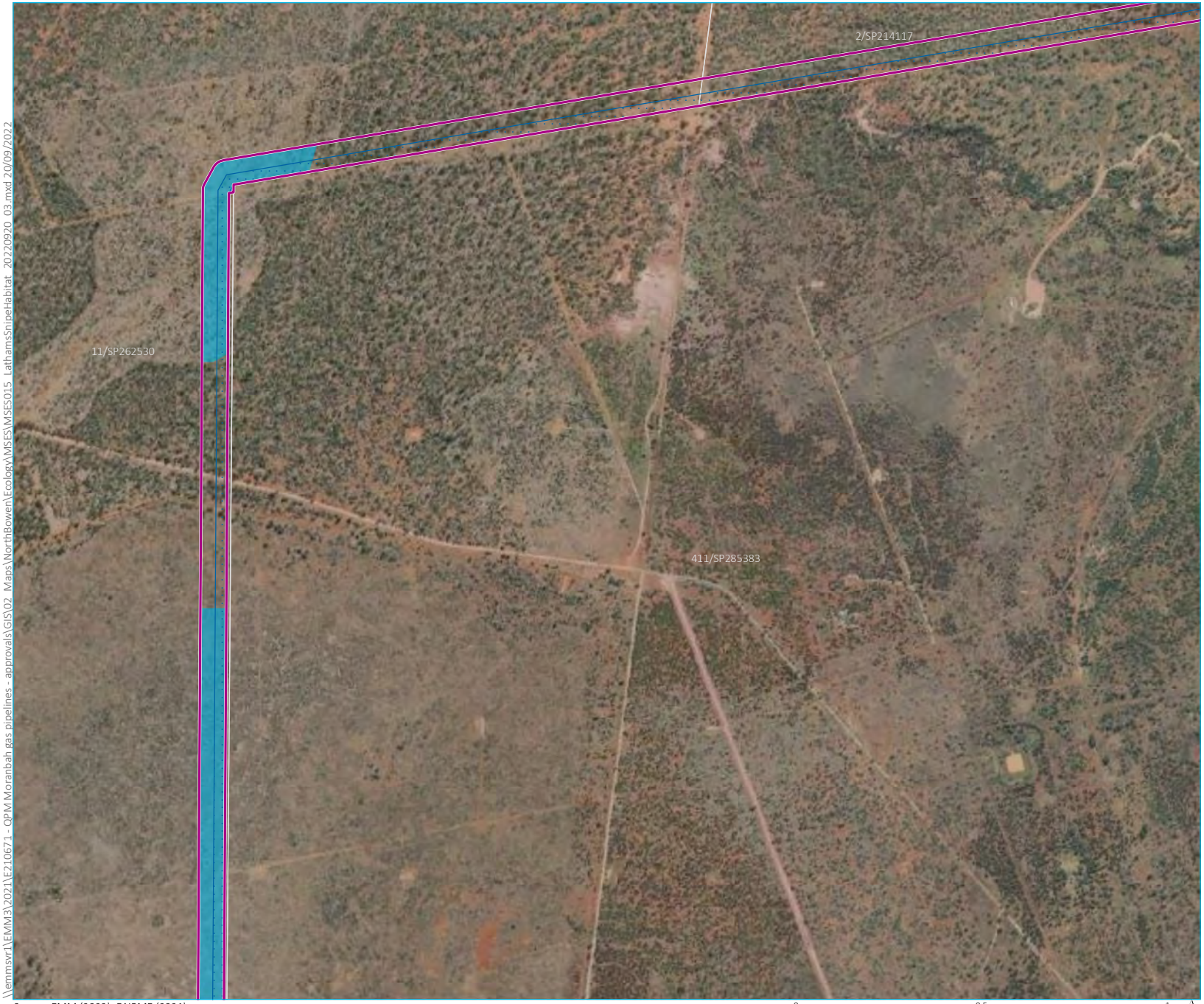
0 0.5 1 m

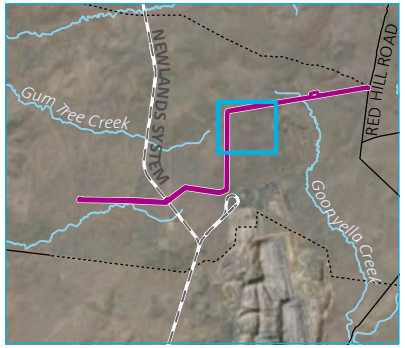
GDA 1994 MGA Zone 55

N

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES015 LathamsSnipeHabitat 20220920 03.mxd 20/09/2022

EMM creating opportunities





KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Cadastral boundary
- Potential Latham's Snipe habitat

\\emmsvr1\EMM3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\02 Maps\NorthBowen\Ecology\MSES\MSES015 LathamsSnipeHabitat 20220920 03.mxd 20/09/2022

Source: EMM (2022); DNRME (2021)

0 0.5 1 m

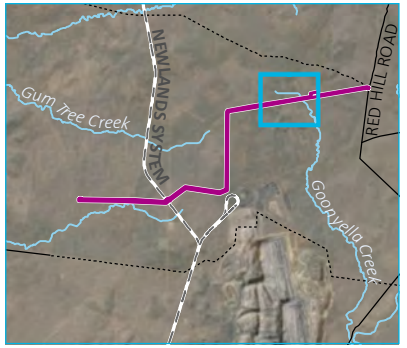
GDA 1994 MGA Zone 55

N

Latham's Snipe habitat
within the project area
Map 4 of 6

QPM Energy Project
MSES
Figure 6.8

EMM
creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 km

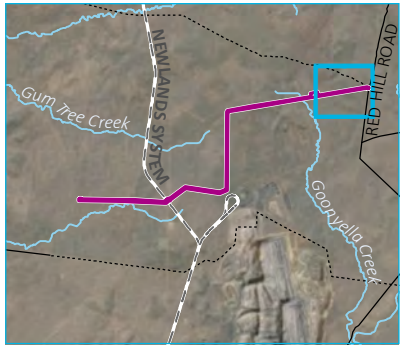
GDA 1994 MGA Zone 55

N

Latham's Snipe habitat within the project area Map 5 of 6

QPM Energy Project
MSES
Figure 6.8

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- Electrical transmission line
- Water pipeline
- Rail line
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

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Source: EMM (2022); DNRME (2021)

0 0.5 1 m

GDA 1994 MGA Zone 55

N

Latham's Snipe habitat within the project area
Map 6 of 6

QPM Energy Project
MSES
Figure 6.8

EMM
creating opportunities

7 Potential impacts

7.1 Overview

The Project disturbance footprint has been defined based on the Project Description in Section 2, to provide a maximum direct impact area. The Project footprint mapped and assessed within this report includes areas permanently required for infrastructure.

The total Project footprint is approximately 65.05 ha. QPM Energy will not clear any additional areas beyond those maximum disturbance limits identified. The Gas Compression Facility footprint is 6 ha. The buried pipeline reduces to an area of 30 ha which is predominantly existing farm tracks, firebreaks and pulled cleared pasture.

7.1.1 Avoidance and minimisation through Project design

During early stages of Project design, and following ecological surveys of the Project area, QPM Energy has sought to avoid and minimise ecological constraints wherever practicable. This includes:

- The location of the compressor facility is in an area of non-remnant vegetation, with shrubby regrowth and weedy understorey. This area is not suitable habitat for any of the target threatened species.
- With the exception of the GCF and Pig Receiver Station near the NQ Gas Pipeline, the remainder of the infrastructure will be installed underground. This was to minimise impact on existing land uses (eg grazing) and reduce as far as reasonably practicable impacts of domesticated and native animal movements (connectivity).
- The high-pressure pipeline crossing of Goonyella Creek was chosen as the most viable option as it was considered to generate the least impact when compared to Mabbin Creek and Gum Tree Creek. The creek is unformed in the vicinity of the crossing with no definable banks.
- The high-pressure pipeline alignment will follow existing clearings (eg pulled and cleared pasture, fire breaks, fence lines, access tracks) where practicable to minimise disturbance on the surrounding environment.
- High-pressure pipeline and rail crossing in the same vicinity.
- QPM Energy sought to use the existing Peabody access track for access to the compression facility although were denied. It is also exposed to subsidence due to underground mining. The chosen access route along the existing Red Hill Road and farm fence line track was deemed as the most viable route due to similar distance and impact to remnant vegetation.

Constraints relating to MSES are outlined in this technical report.

7.1.2 Potential impacts from the Project

Throughout the construction, operation and decommissioning phases, the Project has the potential to impact MSES values through the following activities:

- loss of habitat as a result of vegetation clearing;
- habitat fragmentation;
- fauna injury or mortality during vegetation clearing;
- fauna injury or mortality as a result of vehicle strike;
- disturbance to wildlife during construction as a result of noise, light and vibration;
- erosion and sedimentation which may impact on water quality;
- potential spills of hazardous materials;
- increase in numbers of pest animals and weeds due to increased vehicle movements and opening up areas of remnant vegetation from clearing for infrastructure; and
- elevated bushfire risk due to increase in activities on site that may cause a fire to start.

7.2 Direct impacts

Direct impacts occur as a direct result of a project's activities (Franks et al. 2010). This may include impacts from vegetation/habitat clearance or direct mortality of fauna from vehicle strike. Further detail on potential direct impacts that may occur to MSES are summarised below.

7.2.1 Vegetation/habitat clearance

The Project area supports areas of remnant vegetation and regrowth as well as extensive non-remnant areas which are dominated by gilgai.

Clearing of these habitats will reduce breeding, foraging, and sheltering habitat for fauna and flora species, and the process of vegetation clearing has potential to result in injury or mortality of native fauna species. Some species which are more sedentary (eg reptiles such as Ornamental Snake) are more prone to impact than others. Conversely, mobile species such as Squatter Pigeon and migratory birds, with broader habitat preferences, are unlikely to be impacted from vegetation clearing as they are more mobile and can disperse more easily.

The site layout has evolved to minimise vegetation clearing and impacts on MNES and MSES habitats. This has included:

- The location of the compressor facility is in an area of non-remnant vegetation, with shrubby regrowth and weedy understorey. This area is not suitable habitat for any of the target threatened species.
- The high-pressure pipeline alignment will follow existing clearings (eg fence lines, pulled and cleared pasture, firebreaks, access tracks) where practicable to minimise disturbance on the surrounding environment.
- QPM Energy sought to use the existing Peabody access track for access to the compression facility although were denied. The chosen access route was deemed as the most viable route due to minimised distance and impact to remnant vegetation.

The total estimated area of vegetation clearing is 8.04 ha of remnant vegetation, 0.37 ha of mapped high-value regrowth vegetation and 56.64 ha of non-remnant areas as outlined in Table 7.1. Estimated (maximum) clearance for each MSES potential habitat is in Table 7.2. Specific impacts for each MSES are outlined in Section 9.

Table 7.1 Summary of ground-truthed REs in the Project footprint

RE	RE description	Remnant (ha)	HVR (ha)
11.5.3	*Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces	4.74	0
11.4.9	*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains	3.04	0.37
11.8.5	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks	0.26	0
Non-remnant		56.64	

Table 7.2 Estimated clearance of MSES habitat

Species	Habitat type	Total habitat within Project footprint (ha)
Brigalow TEC	N/A	0.8
Ornamental Snake	Breeding	36.05
	Dispersal/connectivity	19.62
Squatter Pigeon	Breeding	9.55
	Foraging	19.98
	Dispersal	2.15
Koala	Potential	5.0
Greater Glider	Potential denning	3.16
	Potential foraging	1.84
White-throated Needletail	Foraging	58.01
	Roosting	7.04
Fork-tailed Swift	Foraging	65.05
Latham's Snipe	Foraging	36.05

7.2.2 Species mortality

Direct fauna mortality may occur as a result of the Project during vegetation clearing (eg through removal of mature trees containing hollows), digging up breeding places such as reptiles residing under rocks, or vehicle collision. In particular for pipeline projects, direct mortality of native fauna may occur through construction of the pipeline trench (through overnight entrapment or direct mortality during earthworks). This will involve removal of ground vegetation, soil and rock which provide fauna habitat.

During trenching activities there is potential for fauna to fall into and become trapped in open trenches, where they may perish or become subject to increased predation risk if not removed in a timely fashion each morning in accordance with normal operating procedures. Particularly susceptible species groups include reptiles, frogs, and small mammals.

Increased traffic around the Project area has the potential to kill or injure fauna on impact. Some species may be particularly susceptible to traffic impacts; mainly ground-dwelling or slow-moving species.

Direct mortality of flora may occur through trampling or destruction of individuals from uncontrolled vehicle or personnel movement.

7.3 Indirect and facilitated impacts

Indirect impacts can be produced away from the Project or as a result of a complex impact pathway (Franks et al. 2010). Such indirect impacts include fragmentation, bushfire risk, extreme environmental events, erosion and water quality, noise and lighting, reduced air quality, weeds and pests and alienation. Facilitated impacts result from further actions (including actions by third parties) which are made possible or facilitated by the action. This is included as an indirect impact.

Beyond the defined project area, the NQGP transports the compressed gas north to Townsville, where in turn it will be depressurised and distributed, by a third party, to industrial users, including the QPM TECH Project. It should be noted that existing and proposed upstream, mid-stream and downstream infrastructure operated by third parties do not form part of this referral and will be/have been regulated under independent approvals frameworks at the local, State and Commonwealth levels. For the sake of clarity, this referral does not include any upstream gas field development, as this has been authorised beneath existing State and Commonwealth approvals for existing surrounding coal mining operations and, in some cases, overlapping Petroleum Licenses.

QPM Energy's Project will support projects such as the TECH Project by utilising waste coal mine gas from the Bowen Basin which would be either flared or directly emitted to the atmosphere as a fugitive emission of methane which has a Global Warming Potential factor of 28 times that of carbon dioxide over 100 years and 84 times carbon dioxide over the first 20 years. Dual benefits of capturing and consuming gas that would otherwise contribute significantly to Global Warming and manufacturing battery grade minerals to support the ongoing electrification of the automobile industry. Downstream users of the gas will be subject to their own planning and environmental approvals, and do not form part of this referral.

Further detail on potential indirect and facilitated impacts that may occur to MNES during construction are summarised below.

7.3.1 Fragmentation

Terrestrial habitat connectivity may be reduced as a result of a Project due to clearing which has potential to reduce fauna movement between areas of retained remnant or regrowth vegetation. Such habitat fragmentation is more prominent where clearing widths are larger, such as over 100 m (construction corridor is 30 m wide and largely co-located with existing fence lines and cleared pasture) and intersect intact areas of vegetation. Clearing linear widths through habitats also has the potential to increase edge effects (additional light entering forest, weed encroachment, feral animal abundance may increase and increased risk of bushfire) which has a negative impact on ecological functions for those areas.

Some species are more prone to this fragmentation of habitat. Other species such as Squatter Pigeon are not likely to be impacted by these cleared areas as they are known to disperse quite readily across non-remnant areas and have commonly been found on existing dirt access roads.

Post-construction, the easement will shrink to a 15 m operating width (ie 30 ha) which comprises the 11 m to the high-pressure pipeline centreline. This section typically includes an existing fence on one side and farm track/firebreak running each side of that fence line plus 4 m to the other side of the pipeline to allow pipeline remediation, if required. This approach will keep occasional inspection access to an existing farm track which will enable the remaining area to rehabilitate.

Terrestrial habitat connectivity in the vicinity of the GCF may be disturbed as a result of the Project by obstructing movement of fauna across the 200 m x 300 m fenced area, although this area contains non-remnant vegetation.

However, much of the proposed disturbance has been focused along existing cleared fence lines in these areas and is considered very unlikely to pose an ongoing issue to habitat connectivity following the construction disturbance and subsequent revegetation and maintenance of the corridor. Any impacts to remnant vegetation that are unavoidable have sought to clear areas adjacent to existing clearance, to avoid further fragmentation.

There is one waterway passing through the alignment – Goonyella Creek. The crossing of this minor watercourse which is perpendicular to the pipeline corridor is unlikely to be impacted in terms of fragmentation.

Large areas of habitat surrounding the alignment will not be impacted and will be retained, including extensive areas of gilgai. This will ensure the EVNT species likely to utilise the Project area still have large areas that be utilised as corridors, including to habitats outside the Project area.

Weed management, pest animal management and bushfire management will be implemented to minimise environmental impacts from the Project on native species and habitats.

Once the project is operational, the operating infrastructure has the potential to influence fauna behaviour particularly the 6 ha compression facility. There may be localised displacement in the area around the Gas Compression Facility due to increased activity in the area and noise. Due to the avoidance of main areas of remnant vegetation in the vicinity, and the lack of particularly sensitive species to barrier effects, this is not anticipated to be a significant issue for the Project.

7.3.2 Changes in water quality and hydrology

Potential surface water related impacts associated with the construction, operation and decommissioning of the Project are categorised as follows:

- altered surface water quantity (streamflow, surface water availability and flood regime);
- altered surface water quality (concentration of salts, increased nutrients, sediment load and turbidity, and other important physical and chemical water quality constituents); and
- altered surface water-groundwater interaction.

Potential impacts to baseline water quality and hydrological characteristics (include geomorphology) during construction and operation have been assessed as part of the development application (DA) (EMM 2022a). A summary of the potential impacts relevant to MSES is summarised below.

The main construction activities that could impact on water quality are excavations and earthmoving for construction of the high-pressure pipeline, access road and compression facility, as well as other ancillary infrastructure. This may lead to erosion and sedimentation, reduction in water quality and changes to water flows.

During construction activities, sediment may be mobilised and transported by surface water during rainfall events, ultimately discharging into watercourses and drainage lines and potentially reducing water quality in downstream aquatic habitats. Increased suspended sediments can reduce light penetration into the water column, reducing photosynthesis of aquatic macrophytes, and decreasing dissolved oxygen levels. However, watercourses and drainage lines in the Project area are ephemeral (including Goonyella Creek), which may reduce the magnitude of these impacts.

Goonyella Creek would be crossed during dry weather conditions using conventional open cut methods. Retained vegetation in between will act as a buffer to potential sedimentation impacts.

Changes in the hydrology of the Project area may occur through alteration of surface flows and stormwater runoff, including obstruction of flow.

During construction and operation, the accidental release of pollutants (including spills from construction vehicles and plant, leaks, and other uncontrolled releases) into the surrounding environment and waterways has the potential to degrade aquatic habitat quality in the Project area and impact vegetation communities and terrestrial fauna utilising these areas although the Gas Compression Facility is embankment bunded in addition to area bunding). This includes direct toxic impacts on fauna from ingestion or inhalation. Without mitigation, contaminants may enter waterways including oily wastewater (from heavy equipment cleaning), contaminated runoff from chemical or fuel storage areas and general washdown water although there are limited waterways in the Project area for this to be applicable. Nonetheless mitigation is described in Section 8.5.

Impacts to groundwater are not anticipated from the Project. There will be no extraction of groundwater therefore there are no pathways through which the quantity of groundwater can be impacted (earthworks will be at or near ground surface level). Release of pollutants or contaminated runoff from the Project area have the potential to impact on groundwater quality. However, Project infrastructure will be designed and constructed to ensure that water quality objectives are met, and pathways to impact surface and groundwater quality are minimised.

Project pipeline construction works and therefore potential sedimentation impacts will be temporary. No further potential for impacts are expected following construction and subsequent revegetation and maintenance of the corridor.

The proposed water management approach is currently being designed with consideration of several key water management objectives, including:

- progressive rehabilitation of disturbance areas anticipated to minimise the potential for erosion and sediment incidents occurring;
- the construction right of way (ROW) will be reduced to an operating easement, with much of the ROW being rehabilitated (exception of a maintenance road/farm track within the operating easement);
- the farm track/maintenance road surface material will be fit for purpose to avoid scouring and reduce the potential for increased sediment loads in surface water run-off;

- an oily water treatment unit will be installed and utilised during the operational phase of the project to separate oily water at the Gas Compression Facility;
- separated oily water sludge will be trucked off-site and processed at an existing registered water treatment facility and the clean water returned to the relevant mine site to meet their regulatory requirements for water management; and
- the depth of the high-pressure pipeline has been assessed and is not anticipated to impact on groundwater resources.

Detailed Environmental Management Plans (EMP) for construction and operation (Construction and Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP)) will be prepared that identifies management measures to be implemented during construction (clearing and earthworks) and operation. Engineering design and industry operating procedures have been committed to by QPM Energy to ensure deleterious substances do not leave site via overland flows, and erosion does not occur.

7.3.3 Bushfire risk

Fire is a natural part of the Australian landscape, and most vegetation communities are adapted to periodic fires. However, changes in the natural fire regime may result in changes in the species composition and/or structure of the vegetation. The increased presence of construction vehicles and personnel in the Project area may increase fire risk through use of machinery that may generate sparks, use of flammable liquids and idling vehicles being present in areas of ground vegetation.

A Project CEMP and OEMP will be prepared that collectively identify how fire will be avoided and managed during all phases of the Project. It will be important that any fires started from site activities are put out quickly and no unplanned bushfires occur. Fuel loads will need to be managed across the Project area, and bushfire buffers to infrastructure maintained.

7.3.4 Noise and lighting

Noise may adversely affect fauna by interfering with communication (eg territorial bird song), masking the sound of predators and prey, slowing avoidance reactions and motivating displacement from habitat. Construction noise will be generated by the Project through the use of machinery, plant, and vehicles and will vary from short intermittent noise from plant and equipment to more persistent noise from generators and mobile equipment. The generation of construction noise may be in areas which have the potential to support threatened fauna species. Many animals react to new noise initially as a potential threat, but quickly 'learn' that the noise is not associated with a threat (Radle 2007). Individuals that occur on or near the Project area may leave the area of impact. Project construction works and therefore potential noise impacts will be temporary.

Artificial lighting from infrastructure and machinery may impact fauna within the Project area during construction. Artificial lighting can have a range of impacts which vary between species. Artificial light can disrupt patterns of both nocturnal and diurnal species by eliciting responses. Some species may avoid brightly lit areas, potentially due to the perception of being increased risk of predation. Species such as Sugar Glider (*Petaurus breviceps*) have been shown to reduce foraging time under artificial lighting in laboratory conditions (Barber-Meyer 2007). Other potential adverse impacts include disruption of breeding and migratory patterns, disorientation, and potential collision with structures.

Conversely, some species such as nocturnal reptiles, frogs and bats may congregate at artificial light sources to feed on insects attracted to light.

Site lighting will be kept to the minimum needed for safety during operation of the Project and very minimal lighting will be required during construction. Wherever practicable, construction activities will be limited to daylight hours to reduce the need for lighting and resultant light spill into adjacent habitat. The site is not typically manned during night-time which further promotes low lighting.

7.3.5 Reduced air quality and dust emissions

Increased dust from vegetation clearing, soil stripping and vehicle movements during construction has the potential to temporarily and locally impact flora and fauna values in the vicinity of the Project footprint. Excess generation of dust is also a construction problem. Subsequent deposition on leaves can impair plant photosynthesis and productivity (also resulting in reduced habitat quality for fauna), impact on respiratory systems of fauna, alter soil properties impacting on plan species assemblages and reduce water quality in aquatic habitats.

Dust is expected to potentially be an issue during vegetation clearing and construction. Dust levels will be monitored and, when needed, dust suppression implemented such as wetting down dirt roads or reducing vehicle speeds. These measures will be further defined within the Project CEMP and are an essential part of the construction process.

7.3.6 Weeds and pests

Project activities have the potential to increase the abundance of pest flora in the Project area and facilitate dispersal of species to previously unimpacted areas. For linear projects such as pipelines across multiple properties of varying level of weed infestation this can be a significant issue.

Uncontrolled movement of vehicles, equipment and personnel throughout the Project area is the key vector of transmission, in particular vehicles and equipment sourced from regions beyond the Project area which may introduce new species. Many weed species thrive on ground disturbance and will rapidly colonise disturbed areas in advance of native species recolonisation.

Pest and weeds may pose a significant threat to flora and fauna values adjacent to the Project area and the productive capacity of adjacent agricultural and grazing lands. Much of the grazing lands already contains a proportion of introduced grass species designed to improve the grazing capacity of the land. Species such as Buffel Grass are a significant component. Weeds such as Prickly Pear (occasional plants) and Parthenium were encountered during the surveys.

Increased pest flora abundance has adverse impacts on native vegetation and biodiversity, as well as potential negative economic effects on local land uses such as grazing activities.

Project related activities may also increase pest fauna abundance in the Project area. This can lead to increased competition with, and predation of native fauna. In addition, habitat degradation may occur through vegetation trampling. Creation of new access points into areas of intact vegetation may create pathways for feral fauna species to disperse. In addition, the creation of artificial water sources may increase the capacity of the area to support feral species such as Cane Toads. Uncontained waste sources may also attract feral fauna such as Wild Dog.

8 Mitigation measures

The approach used to assess Project impacts utilises proven mitigation measures that have been successfully implemented or are standard practice. Mitigation measures which have not been proven, or are not known to be successful, have not been considered in the management actions outlined below. Without evidence of the effectiveness of mitigation, the precautionary principle is applied. Avoidance and minimisation through design has been prioritised as the most effective measure (see Section 8.1).

8.1 Avoidance and minimisation

Further to the ecological input into Project design, the following general measures will be implemented to avoid and minimise environmental impacts to the greatest practical extent:

- Vegetation clearing will be limited to those areas required for earthworks and construction of the Project. Those areas which are not required for the ongoing operation and maintenance of the Project will be rehabilitated as part of the construction process. Rehabilitation will be detailed in a Vegetation Management Plan (VMP) to be prepared prior to commissioning of the Project.
- The approved disturbance area will be clearly demarcated prior to clearing to avoid unnecessary clearing of vegetation and to ensure personnel and vehicles stay within the approved footprint. Measures to ensure clearing limits are adhered to will be documented in the CEMP and addressed in site inductions.
- Clearing limits will be clearly demarcated on site, including through use of temporary fencing (eg flagging tape to mark out areas or plastic mesh fencing installed with star pickets) to avoid unintentional access to retained sensitive environmental areas.
- Large hollow bearing trees should be clearly marked for avoidance during construction if practicable.
- Sequential clearing of remnant vegetation will occur to minimise impacts on native fauna, particularly arboreal fauna which may be using tree hollows. This is discussed further in Section 8.2.
- Access points have been identified and are limited to approved access roads and tracks.

8.2 Vegetation and habitat clearance

The following measures will be implemented to mitigate and manage impacts as much as practicable during vegetation clearing:

- Develop a Species Management Program (required by DES under the NC Act when impacting on animal breeding places) to identify specific measures to be implemented that will mitigate impacts to threatened fauna species and animal breeding places during clearing, as well as operation of the Project. Measures will include sequential clearing, presence of a fauna spotter catcher and reducing vehicle speeds to minimise any wildlife injuries.
- Prior to any clearing activities, pre-clearance surveys will be undertaken by a suitably qualified ecologist to:
    - Identify MNES, MSES and other native fauna species habitats and clearly demarcate the habitats being retained to ensure no direct or indirect impacts occur during clearing and construction.
    - Searches for threatened grasses in suitable habitat.
    - Identify and mark hollow-bearing trees to ensure they are managed by the fauna spotter catcher during clearing phase.

- Identify and mark any other active breeding places such as nests, burrows etc to ensure they are managed by the fauna spotter catcher during clearing phase.

- Identify suitable release sites should any fauna species need to be captured and released during clearing phase.

- Identify presence of weed species and identify if any require treatment prior to clearing.

- A suitably qualified fauna spotter-catcher will be present during clearing activities, working under a DES approved Species Management Program under the NC Act. The fauna spotter-catcher will be responsible to check an area immediately prior to any clearing for; presence of any native fauna including searches of all potential habitats such as terrestrial microhabitats and hollows, etc. Any captured species (excluding Koalas) will be relocated to an agreed release site. The fauna spotter-catcher will then advise the ground staff as to measures that need to be taken to avoid impacts on breeding places and fauna species. Specific threatened species pre-clearance activities within the Project footprint will include:

  - Canopy searches in suitable foraging tree species for Koala.

  - Searches of gilgai habitats for Ornamental Snake.

  - Searches of open woodland habitat for Squatter Pigeon nests.

- Sequential clearing will occur in areas where remnant vegetation is to be cleared. Key steps as part of sequential clearing are summarised below and will be formalised in a protocol as part of the Species Management Program to be prepared under the NC Act:

  - The first phase will consist of removing understorey vegetation and smaller juvenile trees only. Juvenile trees are under 4 m in height or trunk circumference of less than 31.5 cm at 1.3 m above the ground. No hollow-bearing trees will be cleared in Phase 1.

  - After 48 hours the second phase can commence which is to clear the remaining larger trees, including those with hollows. Where practicable hollow bearing trees are to be “soft felled” to minimise the risk to hollow dwelling fauna. Depending on the result of spotlighting surveys prior to construction, suitable hollow bearing trees for Greater Glider may be checked by an elevated work platform (EWP) prior to clearing if Greater Glider have been observed during spotlighting activities. They will then be inspected by the fauna spotter-catcher post-felling to ensure no wildlife remain in the hollow. Where practicable fauna will be caught and released into suitable recipient sites once clearing has stopped. If roosting bats are located, they are to be “roosted” during the day in a safe, cool, dark space and released at night in areas of habitat to be retained.

  - Dispersal corridors will be left in place that link vegetation with clearing areas to adjacent areas of retained habitat and are to be maintained for a further 24 hours, to facilitate overnight dispersal. Such corridors will act as ‘stepping stones’ to allow any Greater Glider or Koala present to depart to retained vegetation.

  - If any native fauna is injured, they will be taken to a local vet/wildlife carer for treatment.

  - It is important the clearing is done in such a way that arboreal fauna is given the opportunity to disperse from the area once clearing has commenced under their own volition.

  - Any confirmed Koalas will be identified by putting flagging tape and/or marking spray on the tree they are in, and any nearby trees with overlapping crowns or those trees that may impact the Koala’s tree during felling will not be cleared until the Koala has moved from the area under its own volition. In most situations the Koala will move from the area overnight.

- Fell trees away from retained areas of vegetation where practicable. Where trees unavoidably fall into retained areas, leave in-situ to mimic natural tree fall and provide habitat for ground-dwelling fauna.

- Fauna spotter catcher will undertake a final walkthrough ahead of the clearing machinery on the day of clearing checking for breeding places, flipping over timber and peeling bark to relocate fauna, and identifying the potential breeding places marked in the preclearance breeding survey and liaising with the machinery operator over their presence and appropriate clearing techniques.

- The eastern end of the new alignment is mapped as high risk for protected plants. This is due to records of *Dichanthium queenslandicum*. Although none were recorded in the June 2022 survey, and most grasses were flowering, a formal protected plant survey needs to be undertaken in areas of high-risk trigger mapping within 12 months of clearing.

8.3 Fragmentation

The following measures will be implemented to mitigate and manage impacts of fragmentation as much as practicable during the construction and operational phases:

- All fencing at the GCF, including security fencing, will consider the movement of fauna where practicable. Fencing design will consider common mitigations to prevent entanglement of wildlife, and not using barbed wire on the top strand of fences if security or land management practices allow.

- Install fauna exclusion fencing around the GCF to reduce the risk of fauna species being impacted.

- Undertake staged clearing of native vegetation, and retain habitat trees where practicable, to minimise impacts to native fauna species.

- Implement weed and pest control across the Project area to reduce degradation of habitats and edge effects as a result of the Project.

- Retained vegetation will be maintained following a site VMP to reduce hazards from fire, pest species, degradation, and other potential impacts. This will assist in maintaining the integrity of the vegetation as habitat and reduce disturbance to surrounding habitat. The Project VMP will be developed prior to construction and include the following components outlined in Table 8.1. A brief summary of the scope and content of the plan is also provided.

Table 8.1 Structure and content of site Vegetation Management Plan

Aspect	Scope and content
Access control	Unless approved by the site manager; vehicles and equipment are to remain on defined roads and designated areas. Access to be highly restricted to retained areas of vegetation during operational phase except for land management activities. Limiting the disturbance of vegetation – flagging of buffer areas to prevent incursion into retained vegetation; no collection of timber or firewood from areas to be protected; retaining riparian vegetation. Protocols around how clearing limits are to be defined will be established, including monitoring of clearing limits and record keeping requirements. Maintenance checks of fencing during operations will be incorporated twice a year.
Vegetation clearing	Protocols around the staged clearing of vegetation during construction will be established as detailed in Section 8.2.
Bushfire	Requirements for monitoring of fire status will be established (daily checks).

Table 8.1 Structure and content of site Vegetation Management Plan

Aspect	Scope and content
Dust	Dust mitigation to reduce the impact to and function of retained vegetation in the Project area. Protocols for site inspections and habitat monitoring.
Revegetation/ rehabilitation practices	Protocols for salvaging topsoil for use in rehabilitation activities; revegetation or regeneration of areas that will not continue to be disturbed by site operations; revegetation with indigenous plant species. Tree species selected will be consistent with regional ecosystems present on site.
Weed control	Weed species management will be established- for example requiring all plant and equipment to be free of soil and weed seeds prior to entering the site; minimising the use of chemicals and fertilisers, ongoing weed management of retained vegetation areas on site. Requirements for weed mapping to provide a baseline of existing weeds and weed infestation areas within and immediately adjacent to the disturbance footprint will be established. Protocols to check wash-downs are occurring in an effective manner will be established including audits and checks of certificates. Requirements for weed survey during construction and operation will be set out as well as appropriate corrective actions (eg amending weed control methods, or frequency of control).
Erosion	Bi-annual assessment of erosion and sediment loads. Site inspections to assess erosion and sediment control measures (monthly or post heavy rainfall events) plus inspection of hazardous material storage areas (and storage ponds).

8.4 Erosion and sedimentation

The following measures will be implemented to mitigate and manage impacts of erosion and sediment as much as practicable during the construction and operational phases:

- Erosion in active construction areas cannot be eliminated but can be controlled. As part of the construction planning a certified Erosion and Sediment Control Plan (ESCP) will be prepared prior to construction and implemented during on-site activities. Sediment and erosion control measures to prevent soil loss will be developed consistent with the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control (BPESC) document. The ESCP will form part of the overall CEMP. Particular focus will be given to managing runoff in the vicinity of watercourses.
- Design on site infrastructure to ensure water flows are not impounded or concentrated (eg culverts, diversion ditches, etc).
- The only open cut creek crossing location – Goonyella Creek – will take advantage of existing areas of cleared riparian vegetation as far as possible and be carried out during periods of no flow. It is not a formed creek with defined banks.
- No equipment or materials will be stored across flow paths.
- The extent of the area required to carry out the permitted activity must be limited to the minimum area necessary to reasonably carry out the works.

8.5 Changes to water quality

The application of mitigation measures relevant to water quality will be ensured through the future conditions of an EA (issued by DES). A comprehensive suite of mitigation and management measures for water quality has been prepared and detailed within EMM 2022a. In summary, the following measures will be implemented to mitigate and manage impacts on water quality as far as practicable during the construction and operational phases:

- Construction equipment is to be maintained to minimise risk of spill or leakage.
- All refuelling facilities, or storage facilities for hydrocarbons and chemicals will be in appropriately designed sites and comply with Australian Standards (eg *AS 1940: The storage and handling of flammable and combustible liquids*). Materials will be stored within bunded areas with a storage capacity of 110% of the storage vessel. Bunding will have floors and walls lined with impermeable material. These areas must be adequately protected from rainfall and stormwater.
- Refuelling should not take place within 50 m of a watercourse.
- Spill control materials such as booms and absorbent materials will be maintained on site, commensurate with the types and volumes of materials in use, and in place where hazardous materials are stored or used.
- Personnel will receive appropriate spill clean-up training.
- Apply appropriate Australian and industry standards and codes of practice for the design of infrastructure associated with the storage of hazardous materials. Reagents and hazardous chemicals will be stored away from sensitive receiving environments and stored, handled, and managed in accordance with:
    - relevant workplace health and safety (WHS) legislation;
    - AS 1940:2017 *Storage and Handling of Flammable or Combustible Substances*; and
    - AS 3780:2008 T*he Storage and Handling of Corrosive Substances*.
- Chemical storage areas are to be located away from existing drainage lines and have appropriate bunding and wastewater collection mechanisms.
- Water and wastewater discharges will be treated to comply with conditions for discharge quality specified in the future EA.
- Runoff from developed areas will be treated to remove pollutant loads before discharging to waterways. The expected pollutant loads from the respective areas will determine the method of treatment.
- During detailed design, issues relating to site runoff entering into drainage lines will be considered. These will include the preparation of a Stormwater Management Plan.
- Safety procedures will be developed to reduce the potential for exposure pathways to contaminated material.

8.6 Bushfire

The following measures will be implemented to mitigate and manage impacts from bushfire risks as much as practicable during the construction and operational phases:

- As part of the construction planning a certified Bushfire Management Plan will be prepared prior to construction and implemented during on-site activities. This will include details of controlled burning requirements, appropriate to the vegetation types present on the Project area. This will seek to manage the fuel load to reduce the risk of high-intensity fires occurring. The Bushfire Plan key provisions will include:
  - asset protection zones;
  - maintaining access tracks to provide a fire break and defendable space to assist in arresting fires;
  - bushfire risk mapping (considering slope, vegetation, aspect etc);
  - firefighting equipment being on site; and
  - emergency evacuation.
- During the bushfire season, the fire danger status will be monitored daily through the Rural Fire Service website. Contact and arrangements will be made with the local fire officers.
- For “hot-work” activities, a risk assessment will be completed considering forecast weather, fire hazard ratings and site conditions.
- Vehicles may not idle or be parked in areas of long grass.
- Smoking will not be permitted on site aside from designated safe zones.

8.7 Noise and lighting

The following measures will be implemented to mitigate and manage impacts from noise and lighting as much as practicable during the construction and operational phases:

- Lighting from Project activities will be minimised at night to reduce light spill disturbance to nocturnal fauna.
- Night lighting will mainly be limited to that required for safety and security. Project lighting will be minimised (ie low luminance) as far as possible.
- Directional lighting should be away from environmentally sensitive areas.
- All equipment will be properly maintained onsite in accordance with manufacturers specifications.
- Implement noise control techniques in accordance with standard industry noise suppression techniques.

8.8 Dust emissions

The following measures will be implemented to mitigate and manage impacts from dust as much as practicable during the construction phase:

- areas which have potential to generate airborne dust will be wetted down regularly;
- low speed limits will be implemented on site to minimise dust generation;
- areas stripped of topsoil not required for operation will be rehabilitated as soon as practicable;
- machinery and vehicle tyres will be regularly cleaned to reduce wheel entrained dust emissions or consider use of vibration grids;
- design access roads to have a less erodible surface;
- water spraying of nearby sensitive vegetation should be considered if visible dust sedimentation is observed; and
- dust and other emission levels will be adhered to under the State conditions of approval once the Development Application is approved.

8.9 Weeds and pests

The following measures will be implemented to mitigate and manage impacts from weeds and pest animals as much as practicable during the construction phase:

- A Weed and Pest Management Plan will be developed for the Project with specific advice for key identified species. The plan will include management of weed spread, management of pest infestations, and monitoring effectiveness of control measures. The Project area is currently subject to high-levels of weed infestation and as such focus is to avoid further impacting the quality of retained areas of habitat along the riparian corridors.
- Parthenium weed (*Parthenium hysterophorus*) is abundant along the pipeline alignment, especially at the eastern end near Red Hill Road. This is a declared pest under the Biosecurity Act (Qld) so weed hygiene protocols will need to ensure it is not spread. It is also common on Denham Park.
- Weed hygiene protocols will be implemented such as a dedicated vehicle and machinery cleaning bay. This will not be placed near a watercourse and runoff will be contained and the area treated. The location will be determined by property requirements.
- Hygiene protocols will be implemented to reduce the potential for introduction or spread of weeds. Measures will include:
    - Hygiene checks will focus on ensuring no weed plant material/seed/mud/soil material enters the site (or leaves known infestation areas within the site), with all machinery, vehicles and equipment including footwear will be cleaned prior to entering the site, and when working within a known contaminated area within the site, prior to exiting the contaminated area.
- Onsite waste disposal (especially food waste) to discourage presence of pest fauna. Waste will be stored in covered bins/skips to prevent fauna access.

- Weeds will be identified during pre-clearing surveys, in particular, any large infestations within proposed disturbance areas. Clean and dirty zones should be demarcated on site to facilitate weed management.
- Any materials brought into site (such as gravel) will be certified as weed and disease free.
- Any herbicides used on site must be dispensed by an appropriately trained and qualified weed sprayer.
- Access into retained areas of habitat during construction will be limited and monitoring of weeds in these areas in place.

8.10 Species mortality

The following measures will be implemented to prevent species mortality during the construction and operational phases:

- All vehicles associated with construction or operational activities will travel at slow speeds to minimise the chance of any fauna strikes occurring. Speed limit signage will be placed at the entrance to the site and other key points.
- A suitably qualified fauna spotter/catcher will be present during clearing activities associated with the vegetation clearance, working under a Species Management Program. The spotter/catcher will be responsible to check an area prior to any slashing, minor vegetation removal, or ground disturbance occurring for; animal breeding places (such as hollow bearing trees, nests, dens and fallen logs) and presence of any fauna species (such as checking for reptiles under fallen logs, and Koalas within eucalypt trees).
- All contractors will be educated on the presence of native fauna including threatened species and need to travel slowly and look out for fauna when driving (especially Squatter Pigeon). This training will form part of mandatory inductions.
- Vehicle traffic will be confined to designated roads and access tracks.
- All fauna encountered (eg vehicle strike or during clearing activities) will be recorded in a central register by the Project Environment Manager. Any injured fauna will be reported as required in the Species Management Program that will be in place for the Project.
- Appropriate procedures for managing injured wildlife should be developed and included in the CEMP and OEMP.
- During trenching activities, open trenches will be monitored daily. If species are trapped in the trench, they will be released by a fauna spotter-catcher. The amount of open trench will be minimised.
- Escape ramps or planks and/or shelter (eg sawdust filled bags) for trapped fauna will be installed in open trenches.
- Any clearing would take place in a way to allow Koalas (if present) to move into adjacent areas of retained vegetation. This will include setting clearing limits per day and allowing escape paths to retained vegetation to be maintained. If Koalas are encountered, they are to be left in-situ, works stop in the area, and wait for the animal to move to retained habitat. This will entail:
    - Leaving a 30 m buffer of vegetation around the tree in which the Koala is located and a corridor of vegetation to retained habitat.

- Monitoring the Koala location and if the animal appears stressed.
- Allowing the Koala to relocate without assistance unless the animal is in immediate danger or is injured.

Ongoing presence will be managed by the fauna spotter catcher under the Species Management Program.

- Spotlighting pre-clearance surveys will occur in mapped areas of Ornamental Snake habitat. If any individuals are caught, they will then be released in adjacent suitable habitats which are being retained outside of the Project area.
- For areas where Ornamental Snake were recorded during spotlighting pre-clearance surveys, a fauna spotter catcher will also supervise any earthworks due to the likelihood they could be residing in soil cracks. If any individuals are caught, they will then be released that night to adjacent suitable habitats which are being retained outside of the Project area.

8.11 Rehabilitation

Clean-up, restoration, and rehabilitation will occur in a 2 staged approach for the project. Generally, clean-up and rehabilitation will involve removal of foreign material (construction material and waste), surface contouring and respreading topsoil. Existing seed stock within the topsoil is expected to naturally revegetate the disturbed easement. The removal of trees will be offset through the planting of tube stock shrubs or native grasses sourced from local nurseries where considered necessary.

8.11.1 Progressive rehabilitation during construction

Rehabilitation will progressive and as soon as reasonably practicable be undertaken throughout the life of the proposed project. The target for successful rehabilitation is to ensure that reinstatement of vegetation is equal to or better that pre-construction status, except where permanent operational access is required.

Progressive rehabilitation and stockpiling of soils near the site of excavation will be conducted to minimise potential blending of topsoil with other material. Mulching of green waste will be completed throughout the construction phase of the project and stockpiled for use in rehabilitation and erosion and sediment control within the authorised construction area (although unlikely, mulch stockpiles are to be no greater than 10 m wide and higher than 2 m). All potential microhabitats features (eg rocks and fallen logs) will be relocated or stockpiled for use in rehabilitation. Watercourse rehabilitation will be consistent with surrounding environment and contours of the channel at the time of construction.

The aim of the progressive rehabilitation and reinstatement is to ensure that the environment is safe, non-polluting and self-sustaining. The intention is to minimise additional management throughout the operational phase of the project. Ongoing inspection for the management and removal of invasive weed species will be completed throughout all phases of the rehabilitation process. Rehabilitated areas are to be tracked via GIS.

Where feasible to do so, the landscape will be rehabilitated to pre-existing contours with natural drainage lines restored and protected (if required). In certain cases, rehabilitation will be tailored to prior site-specific conditions in consultation with the landholder. To promote vegetation regrowth and promote and protect against the loss of topsoil, the pipeline 30 m wide construction corridor Right of Way (RoW) surface will normally be lightly scarified prior to the respreading of topsoil.

8.11.2 Operational phase

The construction ROW will shrink to a 15 m wide operating easement after the first 3.2 km. This width will typically include farm tracks and firebreaks alongside a fence line plus 4 m to the other side of the pipeline to allow pipeline remediation and protection from deep-rooted trees. This approach will maintain inspection traffic to an existing farm track which will enable the remaining area to become largely rehabilitated. This approach was developed with the assistance of the farm lessee to minimise long term impacts by using existing farm management practises and corridors.

Given that the pipeline would be underground, land users would be able to resume previous land use activities on top of the pipeline provided that they did not include excavation activities. Whilst deep rooted vegetation cannot be re-established within the operating easement, due to the potential for damage to the pipeline's coating, grasslands can be re-established, and no long-term impacts would be expected to sensitive ecosystems.

Rehabilitation will be undertaken in accordance with best practice and will ensure that:

- topsoil cover is re-established, and all land and waterways disturbed by project activities are returned to a stable condition as soon as practicable after construction;
- land is returned as close as possible to its previous productivity;
- stable landforms are re-established to original topographic contours;
- natural drainage patterns are reinstated;
- erosion control measures (eg contour banks, filter strips) are installed in erosion prone zones;
- the pre-construction environment is reinstated, and disturbed habitats recreated;
- fences and gates are restored; and
- pipeline marker signs are installed.

9 Impact assessment – MSES

Significant residual impact assessments were carried out for MSES within the Project footprint using the SRI Guideline (DEHP 2014). This includes assessing the following MSES matters in Table 9.1.

Table 9.1 MSES SRI assessment summary

MSES under SRI guideline	Relevance and assessment
Regulated vegetation	**Relevant** Endangered REs are present in the footprint. Refer Section 9.1.
Connectivity areas	**Relevant** Connectivity has been assessed, refer Section 9.4.
Wetlands and watercourses	**Not relevant – no referable wetlands, wetlands of HES or watercourses of HES.**
Protected wildlife habitat	**Relevant** A number of threatened flora and fauna species have potential to occur in the Project footprint, based on desktop assessments. Refer Section 7.3.3.
Koala habitat in south east Queensland	**Not relevant – the Project is not within South East Queensland.**
Protected areas	**Not relevant – no protected areas in the footprint.**
Fish habitat areas and highly protected zones of state marine parks	**Not relevant – no declared fish habitat areas in the footprint.**
Waterway providing for fish passage	**Relevant** Goonyella Creek is mapped as a green (low risk) waterway on the WWBW map. The proposed pipeline crosses this waterway at the eastern end of the Project area. Works proposed across waterways (eg access tracks) that may have an impact on fish passage need to be assessed. Refer Section 9.3.
Marine plants	**Not relevant – no marine plants in the footprint.**
Legally secured offset areas	**Not relevant – no legally secured offset areas in the footprint.**

A summary of each assessable MSES value is discussed below and detailed assessments against criteria are provided in Annexure G following the *Significant Residual Impact Guideline* for projects requiring assessment under the EP Act.

It has been identified the Project may result in a SRI to Endangered RE11.4.9 and Ornamental Snake habitat. Subject to approvals and detailed design, environmental offsets will be provided by QPM Energy for these residual impacts in accordance with Qld Environmental Offsets Policy (QEOP). As the Ornamental Snake is listed under the EPBC Act, if a SRI is found to occur to the species under the EPBC Act, the species will be offset under the EPBC Act. This is in accordance with the hierarchy specified under the QEOP. The EPBC referral, currently in the application stage, has concluded a SRI to this species.

Prior to Project commencement, QPM Energy will prepare an Environmental Offset Strategy that will confirm the Project's MSES and MNES offset requirements, assess offset delivery options under applicable policies, identify potential offset areas and confirm future steps to finalising an offset package.

9.1 Assessment of impact on regulated vegetation

9.1.1 Endangered REs

Patches of RE 11.4.9 were ground-truthed along the pipeline on Lot 2 and Lot 23 totalling 3.04 ha of remnant vegetation.

The Project will have a SRI under this criterion as the clearing of RE 11.4.9 is greater than 20 m wide in a number of patches.

The clearing will be greater than 20 m wide in all three patches intersected by the alignment.

Under the MNES assessment, only one of the three patches mapped met the criteria for Brigalow TEC, due to the weedy nature of the understory dominated by Buffel Grass. Disturbance of the patch meeting TEC status would be limited to approximately 0.8 ha of a more extensive, 60 ha patch.

Weed hygiene protocols will be put in place to minimise the risk of project activities facilitating the spread of weeds and weed management will occur to ensure weeds do not encroach into the remaining patch of Brigalow. Erosion and sediment control measures will also ensure that the integrity of abiotic factors in retained Brigalow is maintained. No SRI to Brigalow TEC was predicted in the MNES assessment.

A full SRI assessment is in Appendix G.1.

9.1.2 Vegetation within a defined distance from a watercourse

RE 11.8.5 was ground-truthed along the pipeline in the vicinity of Goonyella Creek.

Based on the alignment, the project footprint will avoid this patch of vegetation within the defined bank of the watercourse.

Therefore this Project will not have a SRI on watercourse vegetation.

A full SRI assessment is in Appendix G.2.

9.2 Assessment of impact on protected wildlife habitat

Assessment of the impact on protected wildlife habitat is based upon ground truthed areas of habitat mapped by EMM following ecological survey in December 2021, March 2022, and June 2022.

As the species assessed are all listed under the EPBC Act (with the exception of Short-beaked Echidna – SLC under the NC Act), if a SRI is found to occur under the EPBC Act, the species will be offset under the EPBC Act. This is in accordance with the hierarchy specified under the QEOP. The EPBC referral currently in preparation has included SRIs for all the species in Appendix G with the exception of Short-beaked Echidna.

The significance assessment under the EP Act concluded a significant impact to Ornamental Snake habitat. It should be noted that a significant impact to Ornamental Snake habitat was concluded under the separate MNES assessment (EMM 2022) therefore under the hierarchy of impacts, offsets for that species will be prepared under the EPBC Act framework.

9.2.1 Essential habitat

Several areas of essential habitat (mapped by DES) are mapped across the Project area, associated with record(s) of Ornamental Snake, as follows:

- Areas of Essential Habitat (mapped by DES), associated with records of Ornamental Snake are mapped on Lot 11 and Lot 2 (as shown in Figure 5.2);
- within mapped brigalow communities in the central portion of Lot 23.

Essential habitat for *Dichanthium queenslandicum* was also present although due to a lack of suitable native grasslands, extensive areas of Buffel Grass and other exotic species, heavy cattle grazing, and previous clearing activity, the species is considered unlikely to occur in the Project area. No habitat mapping has been prepared for this species. No SRI assessment has also been prepared.

The eastern end of the alignment is mapped as high risk for protected plants. This is due to records of *Dichanthium queenslandicum*. Although none were recorded in the June 2022 survey, and most grasses were flowering, a formal protected plant survey will be undertaken in areas of high-risk trigger mapping within 12 months of clearing (a requirement under Queensland legislative framework). Should the species be found, efforts will be made to avoid during clearing. If the species cannot be avoided, a suitable mitigation will be determined in consultation with DCCEEW/DoR.

9.3 Assessment of impact on waterways providing for fish passage

There is only one watercourse crossing proposed and these will be temporary. Detailed design has not been completed.

Works will occur when watercourses are dry to avoid impacting on fish passage and water quality. Appropriate mitigation measures will be put in place to avoid any spills or contamination into watercourses that may result in mortality of fish and aquatic ecosystems. These measures will be outlined in a CEMP.

Hydrology conditions including bed and banks of the watercourse will be maintained. No significant residual impact to fish passage is likely.

A full SRI assessment is in Appendix G.4.

9.4 Assessment of impact on connectivity areas

The SRI assessment is based on consideration of both certified RE mapping in the Project footprint as well as ground-truthed RE mapping as shown in Figure 6.1. The total estimated area of vegetation clearing is 8.04 ha of remnant vegetation, 0.37 ha of mapped high-value regrowth vegetation and 56.64 ha of non-remnant areas.

Native vegetation along riparian corridors is being maintained. Therefore connectivity is being maintained through the site.

The SRI assessment also used the Landscape Fragmentation and Connectivity (LFC) Tool version 1.4, which performs a desktop assessment of development impacts on connectivity areas containing remnant vegetation. Where impacts cannot be avoided, mitigation and management measures will be implemented to reduce residual impacts to the lowest extent practicable. These measures are discussed in further detail in Section 8.

The LFC Tool concluded that the Project will not result in a significant residual impact on connectivity. A SRI assessment of connectivity is detailed in Appendix G.5.

10 Risk assessment

A preliminary risk assessment has been undertaken in accordance with the likelihood, consequence, and risk matrices in Section 4.3. Mitigation measures presented in Section 8 have been incorporated into the residual risk assessment, demonstrating the risk level to be as low as is reasonably practicable.

Table 10.1 Risk assessment table

Risk	Description	Phase	Initial (pre-mitigation)*			Residual (post mitigation)*		
			L	C	R	L	C	R
Vegetation/habitat clearance	Reduced vegetation and available habitat.	Construction	Almost certain	Major	Extreme	Likely	Moderate	High
		Operation	Unlikely	Major	Medium	Unlikely	Moderate	Low
Species mortality	Direct fauna mortality may occur as a result of the Project during vegetation clearing (eg through removal of mature trees containing hollows), digging up breeding places such as reptiles residing under rocks, or vehicle collision.	Construction	Likely	Major	High	Possible	Moderate	Medium
		Operation	Likely	Major	High	Possible	Moderate	Medium
Fragmentation	Terrestrial habitat connectivity may be reduced as a result of a Project due to clearing which has potential to reduce fauna movement between areas of retained remnant or regrowth vegetation.	Construction	Likely	Major	High	Possible	Moderate	Medium
		Operation	Likely	Major	High	Possible	Moderate	Medium
Changes in water quality	Erosion from construction or operations impacts on surface water quality.	Construction	Likely	Moderate	High	Unlikely	Moderate	Low
	Run-off becomes contaminated due to chemical leak or residue.	Operation	Likely	Moderate	High	Unlikely	Moderate	Low
Bushfire	Plant and/ or equipment causes fire, disturbing vegetation, and fauna.	Construction	Possible	Major	High	Possible	Moderate	Medium
	Personnel actions result in fire.	Operation	Possible	Major	High	Possible	Moderate	Medium
Noise and lighting	Lighting required for night operations impacts native fauna species.	Construction	Unlikely	Minor	Low	Unlikely	Minor	Low
	Noise during construction and operation impacts fauna.	Operation	Unlikely	Minor	Low	Unlikely	Minor	Low

Table 10.1 Risk assessment table

Risk	Description	Phase	Initial (pre-mitigation)*			Residual (post mitigation)*		
			L	C	R	L	C	R
Reduced air quality and dust	Increased emissions resulting from construction plant and equipment. Dust from vehicles and plant. Increased emissions resulting from gas flare activities.	Construction	Possible	Moderate	Medium	Unlikely	Moderate	Low
		Operation	Possible	Moderate	Medium	Unlikely	Moderate	Low
Weeds and pests	Existing weed species spread because of disturbance to impacted areas. Pest fauna species increase due to presence of waste resulting from project works.	Construction	Possible	Moderate	Medium	Unlikely	Moderate	Low
		Operation	Possible	Moderate	Medium	Unlikely	Moderate	Low

Notes: L (Likelihood), C (Consequence), R (Risk)

* Refer Section 8 for proposed mitigation measures.

11 Conclusion

EMM has been commissioned by QPM Energy to undertake ecological assessments for the proposed QPM Energy Project, comprising a GCF and high-pressure pipeline. This assessment included a desktop review and field surveys to characterise the MSES values of the Project area and defined study area.

Key results of the assessment are summarised as follows:

- Presence of Endangered REs;
- Essential habitat for Ornamental Snake;
- threatened species habitat, including confirmed records of Ornamental Snake and Squatter Pigeon with records of White-throated Needletail close by (within 3 km); and
- no flora protected under the NC Act were recorded.

An assessment of the Project's significant residual impacts was undertaken. The assessment was made against *Significant Residual Impact Guideline* for projects requiring assessment under the EP Act.

The significance assessments concluded a significant impact to endangered vegetation (RE 11.4.9) as well as Ornamental Snake habitat. It should be noted that a significant impact to Ornamental Snake habitat was concluded under the separate MNES assessment (EMM 2022) therefore under the hierarchy of impacts, offsets for that species will be prepared under the EPBC Act framework.

Key avoidance and mitigation measures to be implemented to ensure significant residual impacts do not occur to MSES are:

- Design the Project to avoid areas of high ecological value where practicable. This has already been a principle in design and micro-siting of infrastructure will continue to be employed where practical.
- Develop a Species Management Program (required by DES under the NC Act when impacting on animal breeding places) to identify specific measures to be implemented that will mitigate impacts to threatened fauna species and animal breeding places during clearing, as well as operation of the Project.
- Sequential clearing is to be implemented. This will ensure impacts to fauna during clearing are avoided and minimised. A suitably qualified fauna spotter-catcher will be present during clearing to ensure native fauna are not impacted.
- Potential indirect impacts to MSES will be managed through implementation of measures such as weed hygiene protocols, managing weeds in retained bushland areas, reducing noise, and lighting and managing stormwater runoff. These measures will be detailed in management plans to be prepared during detailed design.

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Annexure A
Desktop searches

EMM
creating opportunities

A.1 PMST search results

Australian Government
Department of Agriculture, Water and the Environment

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: 09-May-2022

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:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	26
Listed Migratory Species:	9

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

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 http://www.environment.gov.au/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:	14
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	24
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, 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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area	In feature area
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area	In feature area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area	In feature area

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 ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus			
Red Goshawk [942]	Vulnerable	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
Geophaps scripta scripta			
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Grantiella picta			
Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Neochmia ruficauda ruficauda			
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
Poephila cincta cincta			
Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Tyto novaehollandiae kimberli			
Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area	In buffer area only
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
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Nyctophilus corbeni			
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area	In feature area
Petauroides volans			
Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area	In feature area
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 known to occur within area	In feature area
PLANT			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bertya opponens [13792]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Dichanthium queenslandicum King Blue-grass [5481]	Endangered	Species or species habitat likely to occur within area	In feature area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eucalyptus raveretiana Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat may occur within area	In feature area
Solanum graniticum Granite Nightshade [84819]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area	In feature area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Lerista allanae Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	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 Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may 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]		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]		Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to 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 buffer area only
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]		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
Calidris melanotos Pectoral Sandpiper [858]		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 known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may 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
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within 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

Extra Information

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Alpha Coal Project - Mine and Rail Development	2008/4648	Controlled Action	Post-Approval	In feature area
Arrow Bowen Pipeline (CSG), QLD	2012/6459	Controlled Action	Post-Approval	In buffer area only
BHP Billiton Goonyella to Abbot Point rail project	2011/6082	Controlled Action	Completed	In feature area
Bowen Gas Project	2012/6377	Controlled Action	Post-Approval	In feature area
Central Queensland Integrated Rail Project	2012/6322	Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Central Queensland Integrated Rail Project	2012/6321	Controlled Action	Completed	In feature area
Eaglefield Expansion Project - new open-cut coal mine pit	2009/4682	Controlled Action	Completed	In feature area
Ellensfield Underground Coal Mine	2007/3643	Controlled Action	Post-Approval	In buffer area only
Establishment of Galilee Coal Mine and Associated Infrastructure	2009/4737	Controlled Action	Post-Approval	In feature area
Galilee Infrastructure Corridor Project	2012/6489	Controlled Action	Guidelines Issued	In buffer area only
Gas pipeline	2002/728	Controlled Action	Post-Approval	In feature area
Goonyella Riverside Coal Mine Expansion	2005/2248	Controlled Action	Completed	In buffer area only
Goonyella Riverside Mine to South Walker Creek Mine Dragline Move	2016/7788	Controlled Action	Completed	In buffer area only
Moranbah North Extension Project, Moranbah, Qld	2018/8338	Controlled Action	Post-Approval	In buffer area only
New Lenton Coal Project	2012/6303	Controlled Action	Completed	In buffer area only
New Lenton Coal Project, 65kms north of Moranbah, QLD	2020/8778	Controlled Action	Assessment Approach	In buffer area only
Red Hill Mining Project,20kms north of Moranbah, Qld	2013/6865	Controlled Action	Post-Approval	In buffer area only
Wollombi Open Cut Coal Mine (Suttor Creek ML4761 Extension)	2005/2015	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Construction of Burdekin Pipeline	2005/2209	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Mining exploration on Wards Well West Project, Bowen Basin, Qld	2014/7256	Not Controlled Action	Completed	In buffer area only
North Goonyella Coal Co-disposal Facility	2008/4570	Not Controlled Action	Completed	In buffer area only
Rail link in central Qld	2005/2170	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
BHP Mitsui Coal???s Wards Well Exploration Program, QLD	2011/5820	Not Controlled Action (Particular Manner)	Post-Approval	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.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

A.2 Wildlife Online search results

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: -21.6442
Longitude: 147.9172
Distance: 20
Email: ajensen@emmconsulting.com.au
Date submitted: Thursday 05 May 2022 11:55:47
Date extracted: Thursday 05 May 2022 12:00:09

The number of records retrieved = 593

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			32
animals	amphibians	Hylidae	*Cyclorana alboguttata*	greenstripe frog		C		21
animals	amphibians	Hylidae	*Cyclorana brevipes*	superb collared frog		C		2
animals	amphibians	Hylidae	*Cyclorana cultripes*	grassland collared frog		C		3
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		32
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		99
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		1
animals	amphibians	Hylidae	*Litoria inermis*	bumpy rocketfrog		C		4
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		9
animals	amphibians	Limnodynastidae	*Limnodynastes salmini*	salmon striped frog		C		1
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		13
animals	amphibians	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk		C		5
animals	amphibians	Limnodynastidae	*Notaden bennettii*	holy cross frog		C		1
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		44
animals	amphibians	Myobatrachidae	*Uperoleia sp.*			C		1
animals	birds	Acanthizidae	*Acanthiza apicalis*	inland thornbill		C		4
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		1
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		7
animals	birds	Acanthizidae	*Gerygone fusca*	western gerygone		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		12
animals	birds	Acanthizidae	*Pyrrholaemus sagittatus*	speckled warbler		C		11
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		3
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		92
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		3
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		6
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		2
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		16
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		3
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		1
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		3
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		5
animals	birds	Anatidae	*Aythya australis*	hardhead		C		5
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		3
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		1
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		1
animals	birds	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose		C		3
animals	birds	Anatidae	*Spatula rhynchotis*	Australasian shoveler		C		1
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		4
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		2
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		3
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		2
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		3
animals	birds	Artamidae	*Artamus minor*	little woodswallow		C		1
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		79
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		63
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		56

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		47
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		41
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		17
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		44
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		7
animals	birds	Campephagidae	*Edolisoma tenuirostre*	common cicadabird		C		27
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		11
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		8
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		1
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		2
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		7
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		4
animals	birds	Columbidae	*Geopelia placida*	peaceful dove		C		17
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	12
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		6
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		38
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		2
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		16
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		118
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		4
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		3
animals	birds	Cuculidae	*Cacomantis variolosus*	brush cuckoo		C		2
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		19
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		4
animals	birds	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		C		6
animals	birds	Cuculidae	*Chalcites osculans*	black-eared cuckoo		C		1
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		5
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		7
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		15
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		22
animals	birds	Eurostopodidae	*Eurostopodus mystacalis*	white-throated nightjar		C		3
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		4
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		11
animals	birds	Gruidae	*Antigone rubicunda*	brolga		C		7
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		11
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		40
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		5
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		2
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		11
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		2
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		6
animals	birds	Jacanidae	*Irediparra gallinacea*	comb-crested jacana		C		1
animals	birds	Maluridae	*Malurus assimilis*	purple-backed fairy-wren		C		18
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		38
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		4
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		48
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		24
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		14
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		18
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		10
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		19
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		58
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		48
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		63
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		13
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		48
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		19
animals	birds	Monarchidae	*Monarcha melanopsis*	black-faced monarch		SL		1
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		17
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		1
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		46
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		12
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		10
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		10
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		7
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		32
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		15/1
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		58
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		3
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		2
animals	birds	Phasianidae	*Coturnix pectoralis*	stubble quail		C		1
animals	birds	Phasianidae	*Coturnix sp.*			C		1
animals	birds	Phasianidae	*Synoicus ypsilophorus*	brown quail		C		2
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		4
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		4
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		20
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		27
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		45
animals	birds	Psittacidae	*Trichoglossus moluccanus*	rainbow lorikeet		C		36
animals	birds	Ptilonorhynchidae	*Chlamydera maculata*	spotted bowerbird		C		5
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		3
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		3
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		1
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		2
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		6
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		9
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		7
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		2
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Turnicidae	*Turnix maculosus*	red-backed button-quail		C		2
animals	birds	Turnicidae	*Turnix varius*	painted button-quail		C		2
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		1
animals	mammals	Canidae	*Canis sp.*		Y			15
animals	mammals	Dasyuridae	*Planigale ingrami*	long-tailed planigale		C		3
animals	mammals	Dasyuridae	*Planigale maculata*	common planigale		C		3
animals	mammals	Dasyuridae	*Sminthopsis macroura*	stripe-faced dunnart		C		20
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		4
animals	mammals	Emballonuridae	*Taphozous troughtoni*	Troughton's sheathtail bat		C		2
animals	mammals	Felidae	*Felis catus*	cat	Y			7
animals	mammals	Leporidae	*Oryctolagus cuniculus*	rabbit	Y			8
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		20
animals	mammals	Macropodidae	*Notamacropus agilis*	agile wallaby		C		1
animals	mammals	Macropodidae	*Osphranter robustus*	common wallaroo		C		5
animals	mammals	Macropodidae	*Osphranter rufus*	red kangaroo		C		1
animals	mammals	Macropodidae	*Petrogale herberti*	Herbert's rock-wallaby		C		3
animals	mammals	Macropodidae	*Wallabia bicolor*	swamp wallaby		C		4
animals	mammals	Miniopteridae	*Miniopterus schreibersii oceanensis*	eastern bent-wing bat		C		2
animals	mammals	Molossidae	*Chaerephon jobensis*	northern freetail bat		C		3
animals	mammals	Molossidae	*Mormopterus lumsdenae*	northern free-tailed bat		C		3
animals	mammals	Molossidae	*Mormopterus ridei*	eastern free-tailed bat		C		2
animals	mammals	Muridae	*Hydromys chrysogaster*	water rat		C		1
animals	mammals	Muridae	*Mus musculus*	house mouse	Y			8
animals	mammals	Muridae	*Pseudomys delicatulus*	delicate mouse		C		6
animals	mammals	Muridae	*Pseudomys sp.*			C		1
animals	mammals	Muridae	*Rattus fuscipes*	bush rat		C		1
animals	mammals	Muridae	*Rattus tunneyi*	pale field-rat		C		5
animals	mammals	Petauridae	*Petaurus notatus*	Krefft's glider		C		2
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		5
animals	mammals	Potoroidae	*Aepyprymnus rufescens*	rufous bettong		C		5
animals	mammals	Pseudocheiridae	*Petauroides armillatus*	central greater glider		E	V	7
animals	mammals	Suidae	*Sus scrofa*	pig	Y			2
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		SL		7
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		7
animals	mammals	Vespertilionidae	*Chalinolobus morio*	chocolate wattled bat		C		3
animals	mammals	Vespertilionidae	*Chalinolobus nigrogriseus*	hoary wattled bat		C		4
animals	mammals	Vespertilionidae	*Chalinolobus picatus*	little pied bat		C		2
animals	mammals	Vespertilionidae	*Chalinolobus sp.*			C		8
animals	mammals	Vespertilionidae	*Nyctophilus gouldi*	Gould's long-eared bat		C		5
animals	mammals	Vespertilionidae	*Nyctophilus sp.*			C		3
animals	mammals	Vespertilionidae	*Scotorepens balstoni*	inland broad-nosed bat		C		2
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		7
animals	mammals	Vespertilionidae	*Scotorepens sp.*			C		2
animals	mammals	Vespertilionidae	*Vespadelus baverstocki*	inland forest bat		C		4
animals	mammals	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat		C		6
animals	reptiles	Agamidae	*Amphibolurus burnsi*	Burns's dragon		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Agamidae	*Chlamydosaurus kingii*	frilled lizard		C		2
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		4
animals	reptiles	Agamidae	*Diporiphora nobbi*	nobbi		C		2
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		32
animals	reptiles	Boidae	*Antaresia maculosa*	spotted python		C		29
animals	reptiles	Boidae	*Aspidites melanocephalus*	black-headed python		C		5
animals	reptiles	Carphodactylidae	*Nephrurus asper*	spiny knob-tailed gecko		C		12
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		2
animals	reptiles	Colubridae	*Dendrelaphis punctulatus*	green tree snake		C		6
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		1
animals	reptiles	Diplodactylidae	*Diplodactylus platyurus*	eastern fat-tailed gecko		C		22
animals	reptiles	Diplodactylidae	*Diplodactylus vittatus*	wood gecko		C		10
animals	reptiles	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko		C		26
animals	reptiles	Diplodactylidae	*Oedura monilis*	ocellated velvet gecko		C		14
animals	reptiles	Diplodactylidae	*Oedura monilis sensu lato*	ocellated velvet gecko		C		17
animals	reptiles	Diplodactylidae	*Strophurus williamsi*	soft-spined gecko		C		41
animals	reptiles	Elapidae	*Brachyurophis australis*	coral snake		C		11
animals	reptiles	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake		C		27
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whipsnake		C		22
animals	reptiles	Elapidae	*Demansia torquata*	collared whipsnake		C		1
animals	reptiles	Elapidae	*Denisonia maculata*	ornamental snake		V	V	66
animals	reptiles	Elapidae	*Furina diadema*	red-naped snake		C		4
animals	reptiles	Elapidae	*Hoplocephalus bitorquatus*	pale-headed snake		C		8
animals	reptiles	Elapidae	*Pseudonaja textilis*	eastern brown snake		C		17
animals	reptiles	Elapidae	*Suta suta*	myall snake		C		26
animals	reptiles	Elapidae	*Vermicella annulata*	bandy-bandy		C		5
animals	reptiles	Gekkonidae	*Gehyra catenata*	chain-backed dtella		C		13
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		61
animals	reptiles	Gekkonidae	*Gehyra versicolor*			C		4
animals	reptiles	Gekkonidae	*Hemidactylus frenatus*	house gecko	Y			1
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		77
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		64
animals	reptiles	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot		C		7
animals	reptiles	Pygopodidae	*Pygopus schraderi*	eastern hooded scaly-foot		C		6
animals	reptiles	Scincidae	*Carlia munda*	shaded-litter rainbow-skink		C		3
animals	reptiles	Scincidae	*Carlia rubigo*	orange-flanked rainbow skink		C		95
animals	reptiles	Scincidae	*Carlia schmeltzii*	robust rainbow-skink		C		7
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		8
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		19
animals	reptiles	Scincidae	*Ctenotus allotropis*	brown-blazed wedgesnout ctenotus		C		1
animals	reptiles	Scincidae	*Ctenotus ingrami*	unspotted yellow-sided ctenotus		C		15
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		22
animals	reptiles	Scincidae	*Ctenotus strauchii*	eastern barred wedgesnout ctenotus		C		2
animals	reptiles	Scincidae	*Ctenotus taeniolatus*	copper-tailed skink		C		7
animals	reptiles	Scincidae	*Eremiascincus fasciolatus*	narrow-banded sand swimmer		C		1
animals	reptiles	Scincidae	*Glaphyromorphus punctulatus*	fine-spotted mulch-skink		C		1

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animals	reptiles	Scincidae	*Lerista fragilis*	eastern mulch slider		C		8
animals	reptiles	Scincidae	*Lerista punctatovittata*	eastern robust slider		C		1
animals	reptiles	Scincidae	*Lerista sp.*			C		1
animals	reptiles	Scincidae	*Liburnascincus mundivensis*	outcrop rainbow-skink		C		1
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		54
animals	reptiles	Scincidae	*Menetia greyii*	common dwarf skink		C		17
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		46
animals	reptiles	Scincidae	*Morethia taeniopleura*	fire-tailed skink		C		3
animals	reptiles	Scincidae	*Praeteropus brevicollis*	short-necked worm-skink		C		1
animals	reptiles	Scincidae	*Pygmaeascincus timlowi*	dwarf litter-skink		C		8
animals	reptiles	Typhlopidae	*Anilios ligatus*	robust blind snake		C		11
animals	reptiles	Typhlopidae	*Anilios unguirostris*	claw-snouted blind snake		C		1
animals	reptiles	Varanidae	*Varanus tristis*	black-tailed monitor		C		1
fungi	lecanoromycetes	Caliciaceae	*Pyxine australiensis*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema austrosinense*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Physcia stellaris*			C		1/1
fungi	lecanoromycetes	Ramalinaceae	*Ramalina inflata*			C		1/1
fungi	lecanoromycetes	Ramalinaceae	*Ramalina subfraxinea*			C		1/1
plants	land plants	Acanthaceae	*Harnieria sp. (Lornesleigh E.J.Thompson+ CHA75)*			C		1/1
plants	land plants	Acanthaceae	*Rostellularia adscendens*			C		3/2
plants	land plants	Amaranthaceae	*Alternanthera nodiflora*	joyweed		C		1
plants	land plants	Amaranthaceae	*Gomphrena celosioides*	gomphrena weed	Y			1
plants	land plants	Amaranthaceae	*Gomphrena lanata*			C		1/1
plants	land plants	Amaranthaceae	*Ptilotus fusiformis*			C		1/1
plants	land plants	Amaranthaceae	*Ptilotus polystachyus*			C		3/3
plants	land plants	Amaranthaceae	*Ptilotus uncinellus*			E		1/1
plants	land plants	Apiaceae	*Daucus glochidiatus*	Australian carrot		C		1/1
plants	land plants	Apocynaceae	*Alstonia constricta*	bitterbark		C		1
plants	land plants	Apocynaceae	*Asclepias curassavica*	red-head cottonbush	Y			1
plants	land plants	Apocynaceae	*Carissa lanceolata*			C		1
plants	land plants	Apocynaceae	*Carissa ovata*	currantbush		C		2
plants	land plants	Apocynaceae	*Cerbera dumicola*			NT		2/1
plants	land plants	Apocynaceae	*Cynanchum pedunculatum*			C		1/1
plants	land plants	Apocynaceae	*Leichhardtia microlepis*			C		1
plants	land plants	Apocynaceae	*Leichhardtia viridiflora subsp. viridiflora*			C		1/1
plants	land plants	Apocynaceae	*Parsonsia lanceolata*	northern silkpod		C		1/1
plants	land plants	Apocynaceae	*Parsonsia straminea*	monkey rope		C		1
plants	land plants	Asphodelaceae	*Bulbine fraseri*			C		1/1
plants	land plants	Asteraceae	*Ageratum houstonianum*	blue billygoat weed	Y			1
plants	land plants	Asteraceae	*Apowollastonia spilanthoides*			C		1/1
plants	land plants	Asteraceae	*Bidens bipinnata*	bipinnate beggar's ticks	Y			1
plants	land plants	Asteraceae	*Calotis cuneata*			C		1/1
plants	land plants	Asteraceae	*Calotis cuneifolia*	burr daisy		C		3/2
plants	land plants	Asteraceae	*Cyanthillium cinereum*			C		2
plants	land plants	Asteraceae	*Emilia sonchifolia*		Y			1
plants	land plants	Asteraceae	*Euchiton sphaericus*			C		2/2

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plants	land plants	Asteraceae	*Flaveria trinervia*		Y			1/1
plants	land plants	Asteraceae	*Parthenium hysterophorus*	parthenium weed	Y			2
plants	land plants	Asteraceae	*Pterocaulon redolens*			C		1
plants	land plants	Asteraceae	*Rutidosis leucantha*			C		1/1
plants	land plants	Asteraceae	*Symphyotrichum subulatum*		Y			1
plants	land plants	Asteraceae	*Xanthium occidentale*		Y			1
plants	land plants	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		2/1
plants	land plants	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		2/1
plants	land plants	Boraginaceae	*Heliotropium geocharis*			C		2/2
plants	land plants	Boraginaceae	*Heliotropium peninsulare*			C		1/1
plants	land plants	Boraginaceae	*Trichodesma zeylanicum*			C		1/1
plants	land plants	Boraginaceae	*Trichodesma zeylanicum var. latisepaleum*			C		1/1
plants	land plants	Byttneriaceae	*Waltheria indica*			C		2/2
plants	land plants	Cactaceae	*Harrisia martinii*		Y			1
plants	land plants	Cactaceae	*Opuntia*					1
plants	land plants	Cactaceae	*Opuntia stricta*		Y			2
plants	land plants	Campanulaceae	*Lobelia concolor*			SL		1/1
plants	land plants	Campanulaceae	*Lobelia leucotos*			SL		2/1
plants	land plants	Campanulaceae	*Lobelia purpurascens*	white root		SL		1
plants	land plants	Campanulaceae	*Wahlenbergia*					1
plants	land plants	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell		SL		1/1
plants	land plants	Capparaceae	*Capparis anomala*			C		1
plants	land plants	Capparaceae	*Capparis canescens*			C		1
plants	land plants	Capparaceae	*Capparis lasiantha*	nipan		C		2/1
plants	land plants	Capparaceae	*Capparis shanesiana*			C		1/1
plants	land plants	Caryophyllaceae	*Polycarpaea corymbosa var. minor*			C		1/1
plants	land plants	Casuarinaceae	*Casuarina cristata*	belah		C		1/1
plants	land plants	Casuarinaceae	*Casuarina cunninghamiana subsp. cunninghamiana*			C		1
plants	land plants	Celastraceae	*Denhamia cunninghamii*			C		1
plants	land plants	Celastraceae	*Elaeodendron australe*			C		1
plants	land plants	Celastraceae	*Elaeodendron australe var. integrifolium*			C		1/1
plants	land plants	Chenopodiaceae	*Maireana villosa*			C		1/1
plants	land plants	Chenopodiaceae	*Salsola australis*			C		1
plants	land plants	Combretaceae	*Terminalia oblongata subsp. oblongata*			C		3/1
plants	land plants	Commelinaceae	*Commelina*					1
plants	land plants	Commelinaceae	*Commelina ensifolia*	scurvy grass		C		1/1
plants	land plants	Convolvulaceae	*Evolvulus alsinoides var. decumbens*			C		1
plants	land plants	Convolvulaceae	*Ipomoea lonchophylla*			C		1/1
plants	land plants	Convolvulaceae	*Ipomoea plebeia*	bellvine		C		1
plants	land plants	Convolvulaceae	*Polymeria pusilla*			C		1/1
plants	land plants	Cyperaceae	*Cyperus betchei subsp. betchei*			C		1/1
plants	land plants	Cyperaceae	*Cyperus bifax*	western nutgrass		C		1/1
plants	land plants	Cyperaceae	*Cyperus dactylotes*			C		1/1
plants	land plants	Cyperaceae	*Cyperus exaltatus*	tall flatsedge		C		1
plants	land plants	Cyperaceae	*Cyperus fulvus*			C		1
plants	land plants	Cyperaceae	*Cyperus gilesii*			C		1

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plants	land plants	Cyperaceae	*Cyperus gracilis*			C		1
plants	land plants	Cyperaceae	*Cyperus rigidellus*			C		1
plants	land plants	Cyperaceae	*Cyperus rotundus*	nutgrass	Y			1
plants	land plants	Cyperaceae	*Eleocharis philippinensis*			C		1/1
plants	land plants	Cyperaceae	*Fimbristylis depauperata*			C		2/2
plants	land plants	Ebenaceae	*Diospyros humilis*	small-leaved ebony		C		1
plants	land plants	Elatinaceae	*Bergia trimera*			C		1/1
plants	land plants	Erythroxylaceae	*Erythroxylum australe*	cocaine tree		C		2
plants	land plants	Euphorbiaceae	*Acalypha eremorum*	soft acalypha		C		3/1
plants	land plants	Euphorbiaceae	*Adriana tomentosa var. tomentosa*			C		2/2
plants	land plants	Euphorbiaceae	*Bertya opponens*			C	V	1/1
plants	land plants	Euphorbiaceae	*Croton insularis*	Queensland cascarilla		C		2
plants	land plants	Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton		C		2
plants	land plants	Euphorbiaceae	*Euphorbia coghlanii*			C		2/2
plants	land plants	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		1/1
plants	land plants	Euphorbiaceae	*Ricinocarpos ledifolius*	scrub wedding bush		C		1/1
plants	land plants	Goodeniaceae	*Goodenia glabra*			C		1/1
plants	land plants	Goodeniaceae	*Goodenia grandiflora*			C		1/1
plants	land plants	Goodeniaceae	*Goodenia hirsuta*			C		1/1
plants	land plants	Haloragaceae	*Haloragis stricta*			C		2/2
plants	land plants	Hypoxidaceae	*Hypoxis arillacea*			C		1/1
plants	land plants	Johnsoniaceae	*Tricoryne elatior*	yellow autumn lily		C		1/1
plants	land plants	Juncaceae	*Juncus usitatus*			C		2
plants	land plants	Lamiaceae	*Basilicum polystachyon*			C		1
plants	land plants	Lamiaceae	*Clerodendrum floribundum*			C		2
plants	land plants	Lamiaceae	*Teucrium junceum*			C		1
plants	land plants	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		1
plants	land plants	Laxmanniaceae	*Lomandra confertifolia subsp. pallida*			C		1
plants	land plants	Laxmanniaceae	*Lomandra longifolia*			C		1
plants	land plants	Laxmanniaceae	*Lomandra multiflora subsp. multiflora*			C		1
plants	land plants	Lecythidaceae	*Planchonia careya*	cockatoo apple		C		1
plants	land plants	Leguminosae	*Acacia*					1
plants	land plants	Leguminosae	*Acacia burdekensis*			C		1/1
plants	land plants	Leguminosae	*Acacia catenulata*	bendee		C		2/1
plants	land plants	Leguminosae	*Acacia conferta*			C		1/1
plants	land plants	Leguminosae	*Acacia crassa subsp. crassa*			C		1
plants	land plants	Leguminosae	*Acacia excelsa*			C		2
plants	land plants	Leguminosae	*Acacia fodinalis*			C		1/1
plants	land plants	Leguminosae	*Acacia harpophylla*	brigalow		C		3
plants	land plants	Leguminosae	*Acacia leiocalyx subsp. leiocalyx*			C		2
plants	land plants	Leguminosae	*Acacia oswaldii*	miljee		C		3/2
plants	land plants	Leguminosae	*Acacia salicina*	doolan		C		2/1
plants	land plants	Leguminosae	*Acacia shirleyi*	lancewood		C		2/1
plants	land plants	Leguminosae	*Acacia sparsiflora*			C		1/1
plants	land plants	Leguminosae	*Alysicarpus muelleri*			C		3/3
plants	land plants	Leguminosae	*Archidendropsis basaltica*	red lancewood		C		1

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plants	land plants	Leguminosae	*Bossiaea carinalis*			C		1/1
plants	land plants	Leguminosae	*Cassia brewsteri*			C		3/1
plants	land plants	Leguminosae	*Clitoria ternatea*	butterfly pea	Y			1
plants	land plants	Leguminosae	*Crotalaria juncea*	sunhemp	Y			1/1
plants	land plants	Leguminosae	*Crotalaria medicaginea*	trefoil rattlepod		C		1
plants	land plants	Leguminosae	*Crotalaria novae-hollandiae subsp. novae-hollandiae*			C		1
plants	land plants	Leguminosae	*Cullen tenax*	emu-foot		C		1/1
plants	land plants	Leguminosae	*Desmodium campylocaulon*			C		2/1
plants	land plants	Leguminosae	*Desmodium macrocarpum*			C		1/1
plants	land plants	Leguminosae	*Glycine falcata*			C		1/1
plants	land plants	Leguminosae	*Glycine tomentella*	woolly glycine		C		1
plants	land plants	Leguminosae	*Hardenbergia perbrevidens*			C		1/1
plants	land plants	Leguminosae	*Hardenbergia violacea*			C		1/1
plants	land plants	Leguminosae	*Hovea longipes*	brush hovea		C		2/1
plants	land plants	Leguminosae	*Lysiphyllum*					1
plants	land plants	Leguminosae	*Lysiphyllum carronii*	ebony tree		C		2
plants	land plants	Leguminosae	*Lysiphyllum hookeri*	Queensland ebony		C		3/1
plants	land plants	Leguminosae	*Macroptilium lathyroides var. semierectum*		Y			1
plants	land plants	Leguminosae	*Neptunia gracilis forma gracilis*			C		1
plants	land plants	Leguminosae	*Neptunia monosperma*			C		1/1
plants	land plants	Leguminosae	*Prosopis pallida*		Y			1/1
plants	land plants	Leguminosae	*Rhynchosia minima*			C		2
plants	land plants	Leguminosae	*Sesbania cannabina*			C		1
plants	land plants	Leguminosae	*Sesbania cannabina var. cannabina*			C		1
plants	land plants	Leguminosae	*Stylosanthes*					1
plants	land plants	Leguminosae	*Vigna radiata var. sublobata*			C		1/1
plants	land plants	Leguminosae	*Zornia muriculata subsp. angustata*			C		1/1
plants	land plants	Loranthaceae	*Amyema quandang var. bancroftii*	broad-leaved grey mistletoe		C		1/1
plants	land plants	Loranthaceae	*Lysiana subfalcata*			C		1/1
plants	land plants	Lythraceae	*Ammannia multiflora*	jerry-jerry		C		1
plants	land plants	Malvaceae	*Gossypium sturtianum*			C		1
plants	land plants	Malvaceae	*Hibiscus sturtii*			C		1
plants	land plants	Malvaceae	*Hibiscus sturtii var. sturtii*			C		2/2
plants	land plants	Malvaceae	*Sida atherophora*			C		2/1
plants	land plants	Malvaceae	*Sida brachypoda*			C		1/1
plants	land plants	Malvaceae	*Sida cordifolia*		Y			2
plants	land plants	Malvaceae	*Sida filiformis - S.macropoda*			C		1
plants	land plants	Malvaceae	*Sida hackettiana*			C		1
plants	land plants	Malvaceae	*Sida laevis*			C		1/1
plants	land plants	Malvaceae	*Sida rhombifolia*		Y			2
plants	land plants	Malvaceae	*Sida sp. (Aramac E.J.Thompson+ JER192)*			C		1/1
plants	land plants	Malvaceae	*Sida spinosa*	spiny sida	Y			2
plants	land plants	Malvaceae	*Sida trichopoda*			C		1
plants	land plants	Marsileaceae	*Marsilea exarata*	sway-back nardoo		C		1/1
plants	land plants	Meliaceae	*Owenia acidula*	emu apple		C		1
plants	land plants	Menispermaceae	*Tinospora smilacina*	snakevine		C		1/1

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plants	land plants	Molluginaceae	*Glinus lotoides*	hairy carpet weed		C		1/1
plants	land plants	Myrtaceae	*Calytrix tetragona*	fringe myrtle		C		1/1
plants	land plants	Myrtaceae	*Corymbia clarksoniana*			C		4/2
plants	land plants	Myrtaceae	*Corymbia dallachiana*			C		1
plants	land plants	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		2
plants	land plants	Myrtaceae	*Eucalyptus*					2
plants	land plants	Myrtaceae	*Eucalyptus brownii*	Reid River box		C		2
plants	land plants	Myrtaceae	*Eucalyptus camaldulensis subsp. acuta*			C		2
plants	land plants	Myrtaceae	*Eucalyptus cambageana*	Dawson gum		C		3/2
plants	land plants	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		1
plants	land plants	Myrtaceae	*Eucalyptus drepanophylla*			C		1
plants	land plants	Myrtaceae	*Eucalyptus exserta*	Queensland peppermint		C		2
plants	land plants	Myrtaceae	*Eucalyptus persistens*			C		1
plants	land plants	Myrtaceae	*Eucalyptus populnea*	poplar box		C		2
plants	land plants	Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*			C		3/1
plants	land plants	Myrtaceae	*Eucalyptus thozetiana*			C		1
plants	land plants	Myrtaceae	*Melaleuca bracteata*			C		1/1
plants	land plants	Myrtaceae	*Melaleuca pallescens*			C		1/1
plants	land plants	Myrtaceae	*Thryptomene parviflora*			C		1/1
plants	land plants	Onagraceae	*Ludwigia octovalvis*	willow primrose		C		1
plants	land plants	Oxalidaceae	*Oxalis chnoodes*			C		2/2
plants	land plants	Phyllanthaceae	*Breynia oblongifolia*			C		1
plants	land plants	Phyllanthaceae	*Flueggea leucopyrus*			C		1
plants	land plants	Phyllanthaceae	*Phyllanthus*					1/1
plants	land plants	Phyllanthaceae	*Phyllanthus hebecarpus*			C		1/1
plants	land plants	Picrodendraceae	*Petalostigma pubescens*	quinine tree		C		2
plants	land plants	Pittosporaceae	*Bursaria incana*			C		1
plants	land plants	Pittosporaceae	*Pittosporum angustifolium*			C		1
plants	land plants	Pittosporaceae	*Pittosporum spinescens*			C		1
plants	land plants	Plantaginaceae	*Scoparia dulcis*	scoparia	Y			2
plants	land plants	Poaceae	*Alloteropsis cimicina*			C		2/2
plants	land plants	Poaceae	*Alloteropsis semialata*	cockatoo grass		C		1/1
plants	land plants	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		1
plants	land plants	Poaceae	*Aristida benthamii var. benthamii*			C		1/1
plants	land plants	Poaceae	*Aristida calycina*			C		2
plants	land plants	Poaceae	*Aristida calycina var. calycina*			C		1/1
plants	land plants	Poaceae	*Aristida caput-medusae*			C		1
plants	land plants	Poaceae	*Aristida holathera var. holathera*			C		1/1
plants	land plants	Poaceae	*Aristida hygrometrica*			C		1/1
plants	land plants	Poaceae	*Aristida jerichoensis var. subspinulifera*			C		1/1
plants	land plants	Poaceae	*Aristida leptopoda*	white speargrass		C		1/1
plants	land plants	Poaceae	*Aristida lignosa*			C		1
plants	land plants	Poaceae	*Aristida personata*			C		1
plants	land plants	Poaceae	*Arundinella nepalensis*	reedgrass		C		1/1
plants	land plants	Poaceae	*Astrebla elymoides*	hoop mitchell grass		C		1/1
plants	land plants	Poaceae	*Astrebla lappacea*	curly mitchell grass		C		1/1

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plants	land plants	Poaceae	*Bothriochloa*					1
plants	land plants	Poaceae	*Bothriochloa bladhii*			C		1
plants	land plants	Poaceae	*Bothriochloa decipiens var. cloncurrensis*			C		1
plants	land plants	Poaceae	*Bothriochloa decipiens var. decipiens*			C		1
plants	land plants	Poaceae	*Bothriochloa erianthoides*	satintop grass		C		3/3
plants	land plants	Poaceae	*Bothriochloa ewartiana*	desert bluegrass		C		2/1
plants	land plants	Poaceae	*Bothriochloa pertusa*		Y			1
plants	land plants	Poaceae	*Brachyachne convergens*	common native couch		C		1/1
plants	land plants	Poaceae	*Calyptochloa gracillima subsp. gracillima*			C		2
plants	land plants	Poaceae	*Cenchrus ciliaris*		Y			3
plants	land plants	Poaceae	*Chionachne hubbardiana*			C		1/1
plants	land plants	Poaceae	*Chloris gayana*	rhodes grass	Y			1
plants	land plants	Poaceae	*Chloris virgata*	feathertop rhodes grass	Y			2
plants	land plants	Poaceae	*Cleistochloa subjuncea*			C		2/1
plants	land plants	Poaceae	*Cymbopogon bombycinus*	silky oilgrass		C		1/1
plants	land plants	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		2
plants	land plants	Poaceae	*Cynodon dactylon var. dactylon*		Y			2
plants	land plants	Poaceae	*Dichanthium*					10/10
plants	land plants	Poaceae	*Dichanthium annulatum*	sheda grass	Y			2/1
plants	land plants	Poaceae	*Dichanthium aristatum*	angleton grass	Y			1
plants	land plants	Poaceae	*Dichanthium fecundum*	curly bluegrass		C		1/1
plants	land plants	Poaceae	*Dichanthium queenslandicum*			V	E	26/26
plants	land plants	Poaceae	*Dichanthium sericeum*			C		7/6
plants	land plants	Poaceae	*Dichanthium sericeum subsp. humilius*			C		1/1
plants	land plants	Poaceae	*Dichanthium sericeum subsp. sericeum*			C		3/3
plants	land plants	Poaceae	*Digitaria ammophila*	silky umbrella grass		C		4/3
plants	land plants	Poaceae	*Digitaria bicornis*			C		1/1
plants	land plants	Poaceae	*Digitaria brownii*			C		2/2
plants	land plants	Poaceae	*Digitaria ciliaris*	summer grass	Y			1
plants	land plants	Poaceae	*Digitaria divaricatissima*	spreading umbrella grass		C		1/1
plants	land plants	Poaceae	*Digitaria fumida*			C		1/1
plants	land plants	Poaceae	*Digitaria minima*			C		1
plants	land plants	Poaceae	*Digitaria porrecta*			NT		4/4
plants	land plants	Poaceae	*Dinebra decipiens*			C		1
plants	land plants	Poaceae	*Dinebra ligulata*			C		2/2
plants	land plants	Poaceae	*Echinochloa colona*	awnless barnyard grass	Y			1
plants	land plants	Poaceae	*Elionurus citreus*	lemon-scented grass		C		1/1
plants	land plants	Poaceae	*Enneapogon lindleyanus*			C		1
plants	land plants	Poaceae	*Enneapogon robustissimus*			C		1/1
plants	land plants	Poaceae	*Enneapogon truncatus*			C		1/1
plants	land plants	Poaceae	*Enteropogon ramosus*			C		1
plants	land plants	Poaceae	*Eragrostis elongata*			C		2
plants	land plants	Poaceae	*Eragrostis lacunaria*	purple lovegrass		C		2/1
plants	land plants	Poaceae	*Eragrostis parviflora*	weeping lovegrass		C		2/2
plants	land plants	Poaceae	*Eragrostis sororia*			C		2/2
plants	land plants	Poaceae	*Eragrostis tenellula*	delicate lovegrass		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	*Eriachne ciliata*			C		1/1
plants	land plants	Poaceae	*Eriachne mucronata forma (Alpha C.E.Hubbard 7882)*			C		2/2
plants	land plants	Poaceae	*Eriachne obtusa*			C		1/1
plants	land plants	Poaceae	*Eriachne pallescens*			C		1/1
plants	land plants	Poaceae	*Eriochloa crebra*	spring grass		C		1/1
plants	land plants	Poaceae	*Eriochloa procera*	slender cupgrass		C		2/1
plants	land plants	Poaceae	*Eriochloa pseudoacrotricha*			C		1/1
plants	land plants	Poaceae	*Eulalia aurea*	silky browntop		C		2/1
plants	land plants	Poaceae	*Heteropogon contortus*	black speargrass		C		2
plants	land plants	Poaceae	*Heteropogon triticeus*	giant speargrass		C		1
plants	land plants	Poaceae	*Hyparrhenia rufa subsp. rufa*		Y			1/1
plants	land plants	Poaceae	*Iseilema vaginiflorum*	red flinders grass		C		1/1
plants	land plants	Poaceae	*Leptochloa digitata*			C		1
plants	land plants	Poaceae	*Megathyrsus maximus var. maximus*		Y			2/1
plants	land plants	Poaceae	*Megathyrsus maximus var. pubiglumis*		Y			2
plants	land plants	Poaceae	*Melinis repens*	red natal grass	Y			2
plants	land plants	Poaceae	*Moorochloa eruciformis*		Y			1/1
plants	land plants	Poaceae	*Ophiuros exaltatus*			C		1/1
plants	land plants	Poaceae	*Panicum decompositum var. decompositum*			C		1/1
plants	land plants	Poaceae	*Panicum effusum*			C		4/3
plants	land plants	Poaceae	*Panicum queenslandicum var. queenslandicum*			C		1/1
plants	land plants	Poaceae	*Paspalidium albovillosum*			C		1
plants	land plants	Poaceae	*Paspalidium caespitosum*	brigalow grass		C		1
plants	land plants	Poaceae	*Paspalidium globoideum*	sago grass		C		3/3
plants	land plants	Poaceae	*Paspalidium gracile*	slender panic		C		1/1
plants	land plants	Poaceae	*Paspalidium rarum*			C		1/1
plants	land plants	Poaceae	*Paspalum dilatatum*	paspalum	Y			1
plants	land plants	Poaceae	*Perotis rara*	comet grass		C		1/1
plants	land plants	Poaceae	*Poaceae*					1
plants	land plants	Poaceae	*Sarga plumosum*			C		1/1
plants	land plants	Poaceae	*Setaria*					1
plants	land plants	Poaceae	*Setaria surgens*			C		1/1
plants	land plants	Poaceae	*Sorghum halepense*	Johnson grass	Y			1
plants	land plants	Poaceae	*Sporobolus australasicus*			C		2/1
plants	land plants	Poaceae	*Sporobolus caroli*	fairy grass		C		1
plants	land plants	Poaceae	*Sporobolus contiguus*			C		1/1
plants	land plants	Poaceae	*Sporobolus elongatus*			C		1
plants	land plants	Poaceae	*Sporobolus scabridus*			C		1
plants	land plants	Poaceae	*Thaumastochloa pubescens*			C		1/1
plants	land plants	Poaceae	*Thellungia advena*	coolibah grass		C		1/1
plants	land plants	Poaceae	*Themeda avenacea*			C		1
plants	land plants	Poaceae	*Themeda quadrivalvis*	grader grass	Y			1
plants	land plants	Poaceae	*Themeda triandra*	kangaroo grass		C		2
plants	land plants	Poaceae	*Thyridolepis xerophila*			C		1/1
plants	land plants	Poaceae	*Urochloa mosambicensis*	sabi grass	Y			2/1
plants	land plants	Poaceae	*Urochloa piligera*			C		2/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	*Walwhalleya subxerophila*			C		1/1
plants	land plants	Polygalaceae	*Polygala crassitesta*			C		3/3
plants	land plants	Proteaceae	*Hakea lorea subsp. lorea*			C		1
plants	land plants	Pteridaceae	*Cheilanthes sieberi subsp. sieberi*			C		1
plants	land plants	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		2
plants	land plants	Rhamnaceae	*Ventilago viminalis*	supplejack		C		1/1
plants	land plants	Rubiaceae	*Dolichocarpa argillacea*			C		1/1
plants	land plants	Rubiaceae	*Dolichocarpa coerulescens*			C		1/1
plants	land plants	Rubiaceae	*Everistia vacciniifolia forma crassa*			C		1/1
plants	land plants	Rubiaceae	*Everistia vacciniifolia forma vacciniifolia*			C		2
plants	land plants	Rubiaceae	*Larsenaikia ochreata*			C		1
plants	land plants	Rubiaceae	*Pavetta granitica*			C		1/1
plants	land plants	Rubiaceae	*Psydrax odorata*			C		1
plants	land plants	Rubiaceae	*Psydrax oleifolia*			C		1/1
plants	land plants	Rubiaceae	*Spermacoce*					1/1
plants	land plants	Rubiaceae	*Spermacoce sp. (Dislyn A.R.Bean 14098)*			C		2/2
plants	land plants	Rutaceae	*Citrus glauca*			C		1
plants	land plants	Rutaceae	*Flindersia australis*	crow's ash		C		1
plants	land plants	Rutaceae	*Flindersia dissosperma*			C		1
plants	land plants	Rutaceae	*Flindersia maculosa*	leopardwood		C		1
plants	land plants	Rutaceae	*Geijera parviflora*	wilga		C		1
plants	land plants	Rutaceae	*Phebalium nottii*	pink phebalium		C		2
plants	land plants	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		2
plants	land plants	Sapindaceae	*Atalaya*					1
plants	land plants	Sapindaceae	*Atalaya hemiglauca*			C		1
plants	land plants	Sapindaceae	*Dodonaea stenophylla*			C		1/1
plants	land plants	Sapindaceae	*Dodonaea viscosa*			C		1
plants	land plants	Scrophulariaceae	*Eremophila deserti*			C		1
plants	land plants	Scrophulariaceae	*Eremophila mitchellii*			C		2
plants	land plants	Solanaceae	*Physalis pubescens*		Y			1/1
plants	land plants	Solanaceae	*Solanum*					1
plants	land plants	Solanaceae	*Solanum ellipticum*	potato bush		C		1
plants	land plants	Solanaceae	*Solanum esuriale*	quena		C		1/1
plants	land plants	Solanaceae	*Solanum parvifolium subsp. parvifolium*			C		1/1
plants	land plants	Sparrmanniaceae	*Corchorus trilocularis*			C		1/1
plants	land plants	Sparrmanniaceae	*Grewia savannicola*			C		2
plants	land plants	Thymelaeaceae	*Pimelea haematostachya*			C		2/2
plants	land plants	Verbenaceae	*Stachytarpheta jamaicensis*	Jamaica snakeweed	Y			1
plants	land plants	Verbenaceae	*Verbena macrostachya*			C		2/2
plants	land plants	Violaceae	*Pigea enneasperma*			C		1/1
plants	land plants	Violaceae	*Pigea stellarioides*			C		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.

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Queensland status: Rare and threatened species
Records: All
Date: All
Latitude: -21.6442
Longitude: 147.9172
Distance: 20
Email: ajensen@emmconsulting.com.au
Date submitted: Thursday 05 May 2022 12:03:43
Date extracted: Thursday 05 May 2022 12:10:03

The number of records retrieved = 7

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	12
animals	mammals	Pseudocheiridae	*Petauroides armillatus*	central greater glider		E	V	7
animals	reptiles	Elapidae	*Denisonia maculata*	ornamental snake		V	V	66
plants	land plants	Amaranthaceae	*Ptilotus uncinellus*			E		1/1
plants	land plants	Apocynaceae	*Cerbera dumicola*			NT		2/1
plants	land plants	Poaceae	*Dichanthium queenslandicum*			V	E	26/26
plants	land plants	Poaceae	*Digitaria porrecta*			NT		4/4

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.

A.3 MSES reports

Queensland Government

Department of Environment and Science

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest
Lot: 2 Plan: SP214117

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 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 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.

Table of Contents

Summary Information

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

Table 1: Area of interest details: Lot: 2 Plan: SP214117

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

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

Assessment Type	Assessment Area and Version
Biodiversity Planning Assessment(s)	Brigalow Belt v2.1
Aquatic Conservation Assessment(s) (riverine)	Great Barrier Reef Catchments v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Great Barrier Reef Catchments v1.3

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

Biodiversity Status	Area (Ha)	% of AOI
Endangered	1,026.96	9.81
Of concern	4,111.32	39.26
No concern at present	2,777.76	26.53

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 and Science's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	183.19	1.75
State	7,594.34	72.52
Regional	503.76	4.81
Local or Other Values	427.74	4.08

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
(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

Name	Permanency
CHARLIE CREEK	Non-perennial
EAGLEFIELD CREEK	Non-perennial
GOONYELLA CREEK	Non-perennial
KENNEDY CREEK	Non-perennial
SKULL CREEK	Non-perennial

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 and Science'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
Very High	0.0	0.0
High	3,297.69	31.49
Medium	7,174.37	68.51
Low	0.0	0.0
Very Low	0.0	0.0

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

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
(No Records)		

Biodiversity Planning Assessments

Introduction

The Department of Environment and Science (DES) 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 DES.

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:

http://qspatial.information.qld.gov.au/geoportal/

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 significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	183.19	1.75
State	7,594.34	72.52
Regional	503.76	4.81
Local or Other Values	427.74	4.08

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	Nat. Threatened Ecol. Community (B1)	0.49	0.0
State	Nat. Threatened Ecol. Community (B1) & Remnant contains at least one Of Concern RE (B1)	2,845.58	27.17
State	Nat. Threatened Ecol. Community (B1) & Remnant contains at least one Of Concern RE (B1) & Remnant contains a RE that is one of the largest of its type in the bioregion (D1)	1,529.43	14.6
State	Remnant contains at least 1 Endangered or 2 Vulnerable or Near Threatened species (A)	3.04	0.03
State	Remnant contains at least 1 Endangered or 2 Vulnerable or Near Threatened species (A) & Nat. Threatened Ecol. Community (B1)	180.15	1.72
State	Remnant contains at least 1 Endangered RE (B1) & Nat. Threatened Ecol. Community (B1)	866.17	8.27
State	Remnant contains at least 1 Vulnerable or Near Threatened species (A) & Nat. Threatened Ecol. Community (B1)	2,066.78	19.74
Regional	Remnant contains at least 1 Vulnerable or Near Threatened species (A)	401.09	3.83
Regional	Remnant contains at least one Of Concern RE (B1)	134.55	1.28
Regional	Remnant is part of a Tract that is one of the largest in the bioregion (C) & Remnant has Ecosystem diversity in the top quartile (F)	71.02	0.68
Regional	Remnant is part of a Tract that is one of the largest in the bioregion (C) & Remnant has high connectivity or buffers an endangered RE or Significant Wetland (G)	129.61	1.24
Local or Other Values	Refer to diagnostic data for additional information	481.11	4.59

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	183.2	1.7	2,614.43	25.0	5,144.82	49.1	766.62	7.3
B1: Ecosystem Value (Bioregion)	7,488.65	71.5	137.59	1.3	291.71	2.8		
B2: Ecosystem Value (Subregion)			866.18	8.3	7,051.77	67.3		
C: Tract Size	7,892.99	75.4					24.96	0.2
D1: Relative RE Size (Bioregion)	1,564.05	14.9	16.67	0.2	1,960.63	18.7	4,376.60	41.8
D2: Relative RE Size (Subregion)	1,580.72	15.1	3,426.29	32.7	373.2	3.6	2,537.74	24.2

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
F: Ecosystem Diversity	261.48	2.5	5,959.37	56.9	1,552.71	14.8	144.39	1.4
G: Context and Connection	3,289.85	31.4	2,965.17	28.3	1,658.92	15.8	4.01	

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
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	1,454.32	13.89
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I) & Remnant forms part of a bioregional corridor (J)	8.52	0.08
State	Remnant forms part of a bioregional corridor (J)	3,040.66	29.04
Local	Refer to Expert Panel data for additional information	694.8	6.63

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					814.57	7.8		
Ia: Centres of Endemism			8.52	0.1				
Ib: Wildlife Refugia	1,454.34	13.9	8.52	0.1				
Ic: Disjunct Populations								
Id: Limits of Geographic Ranges								
Ie: High Species Richness								
If: Relictual Populations								
Ig: Variation in Species Composition								
Ih: Artificial Wetland								
Ii: Hollow Bearing Trees			8.52	0.1				
Ij: Breeding or Roosting Site								
Ik: Climate Refugia								

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
State	3,049.18	29.12
Regional	0.0	0.0
Local	0.0	0.0

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

Decision Number	Description	Panel Recommended Significance	Criteria Values
brbn_l_17a	None	None	None
brbn_l_18b	None	None	None

Decision Number	Description	Panel Recommended Significance	Criteria Values
brbn_l_83	Core areas	State	Ib (refugia): VH
brbn_l_84	Carborough, Kerlong ranges and Redcliffe Vale Sandstone Massives	State	Ia (endemic richness): H; Ib (refugia): H; Ii (hollow-density): H

Expert panel decision descriptions:

brbn_l_17a

None

brbn_l_18b

None

brbn_l_83

Tracts are defined as patches of continuous remnant vegetation. The size of any tract is a major indicator of ecological significance and is 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. These areas can be considered core nodes/refugia in which a large proportion of the bioregions biodiversity is represented.

A modified tract size analysis (Criterion C) (EHP 2014) was used to identify and delineate discrete tracts of remnant vegetation at a bioregion scale. For the purpose of the assessment, a core area was identified as a relatively contiguous area of remnant vegetation (disregarding small perforations, or linear breaks) and which was generally greater than 5km in width (based upon the minimum width of the terrestrial corridor network). Tracts of greater than 10,000ha were included.

Refer to brbs_l_16 for the southern BRB implementation of this decision.

brbn_l_84

The ranges and massives exhibit unique flora, fauna and geomorphological characteristics. The landscape contains gorge areas and although not the same elevation as Carnarvon, parts are still relatively high at an altitude of 600 to 700m. Lake Elphinstone, at the eastern edge, is thought to have been formed in relatively recent geological time and is assumed to have been created through an unusual rainfall event. Groundwater Dependent Ecosystems (GDEs) are present, which might play a refugial role for some species.

The area has mature ecosystems which, from a fauna perspective, supply good habitat complexes of hollow-bearing trees. These provide habitat for species such as the vulnerable greater glider Petauroides volans. Examples of bioregional endemic taxa found within these ranges include Corymbia aureola, Cerbera dumicola and Dianella fruticans. Species adapted to drier areas such as Brachychiton spp. occur on the flanks of Redcliffe Tableland. Other threatened species found on these ranges include northern quoll Dasyurus hallucatus and squatter pigeon Geophaps s. scripta along with priority taxa such as Carlia rubigo.

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 prcesses

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:

http://qspatial.information.qld.gov.au/geoportal/

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
Very High	0.0	0.0

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	3,297.69	31.49
Medium	7,174.37	68.51
Low	0.0	0.0
Very Low	0.0	0.0

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	9,718.46	92.8			16.6	0.2	737.01	7.0
2. Naturalness catchment	6,283.23	60.0	4,188.84	40.0				
3. Diversity and richness			4,034.70	38.5	444.91	4.2	5,992.46	57.2
4. Threatened species and ecosystems			10,472.07	100.0				
5. Priority species and ecosystems								
6. Special features								
7. Connectivity					16.6	0.2	10,455.47	99.8
8. Representative-ness								

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:

(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
(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
(No Records)								

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:

(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

Species	Common name	NCA status	EPBC status	Back on Track rank	Migratory species*	Wetland species**	Identified flora/fauna
Bertya opponens		C	V				FL
Dichanthium queenslandicum		V	E	Low			FL
Digitaria porrecta		NT		Low			FL
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V	Medium			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DES 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

Species	Common name	Back on Track rank	Identified flora/fauna
Capparis shanesiana	None	None	FL
Carlia rubigo	Orange-flanked Rainbow Skink	None	FA
Gehyra catenata	None	L	FA
Lagorchestes conspicillatus	Spectacled Hare-wallaby	L	FA
Pyrrholaemus sagittatus	Speckled Warbler	L	FA

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 results)

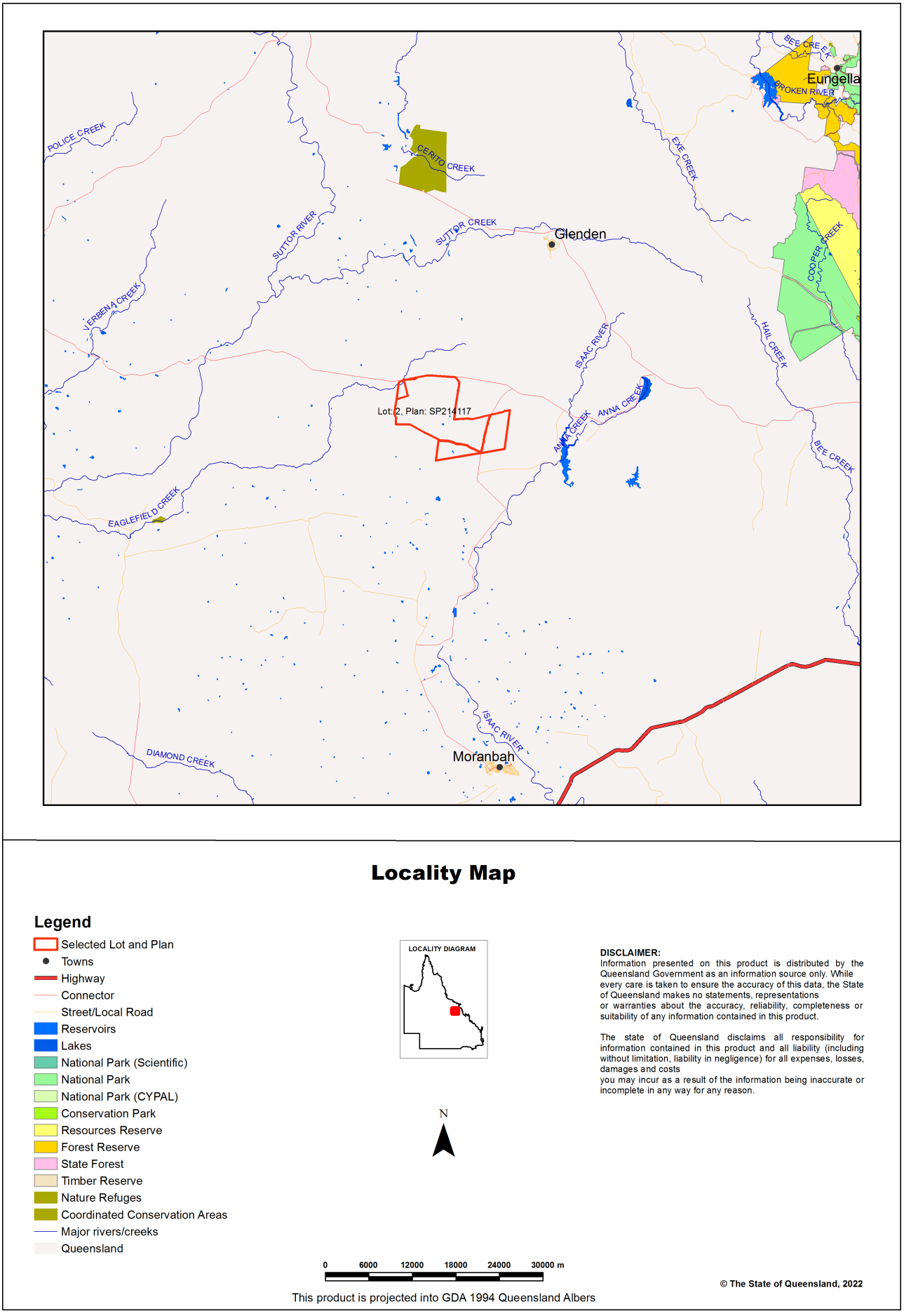
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(no results)

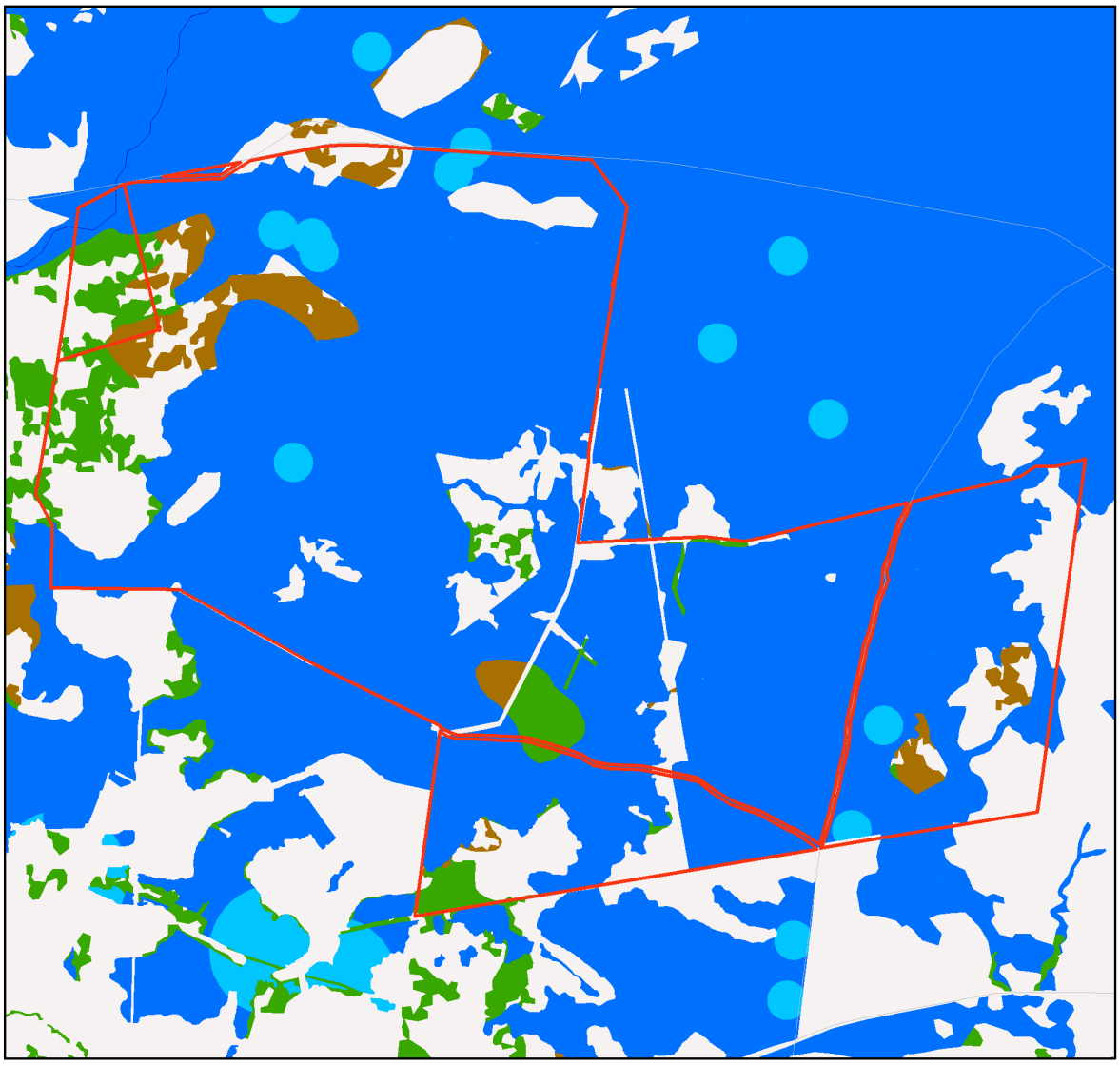
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details 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)



Biodiversity Planning Assessments

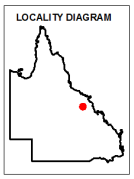
Legend

- Selected Lot and Plan
- Towns
- Roads
- Major rivers/creeks
- Queensland

Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem

LOCALITY DIAGRAM



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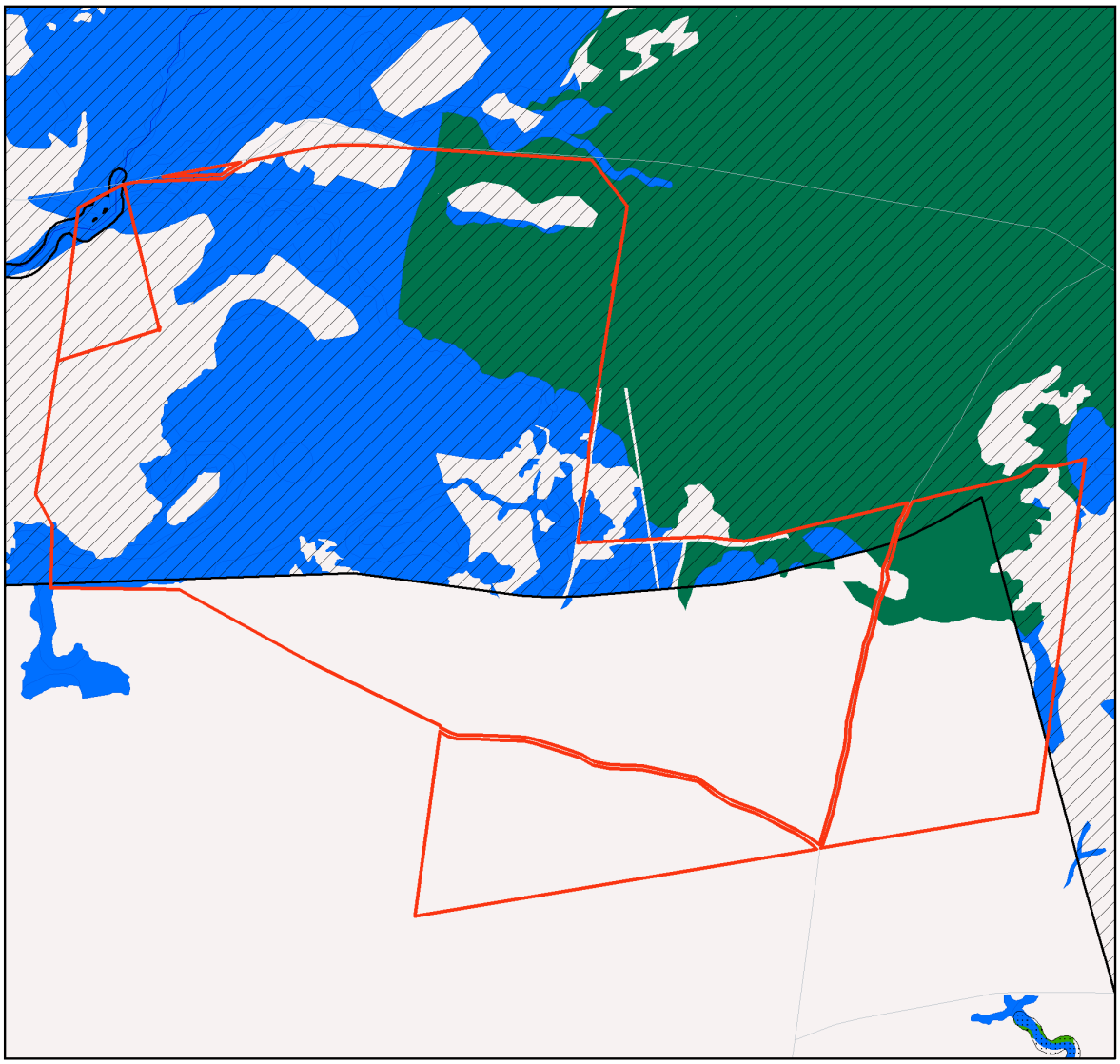
Map 3 - Corridors



Corridors

Legend

- Selected Lot and Plan
- Towns
- Roads
- Major rivers/creeks
- Queensland

Corridors

- State
- Regional

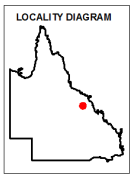
Corridor Triggered Vegetation

- State
- Regional
- Local

Core Area Vegetation

- Brigalow Belt only

LOCALITY DIAGRAM



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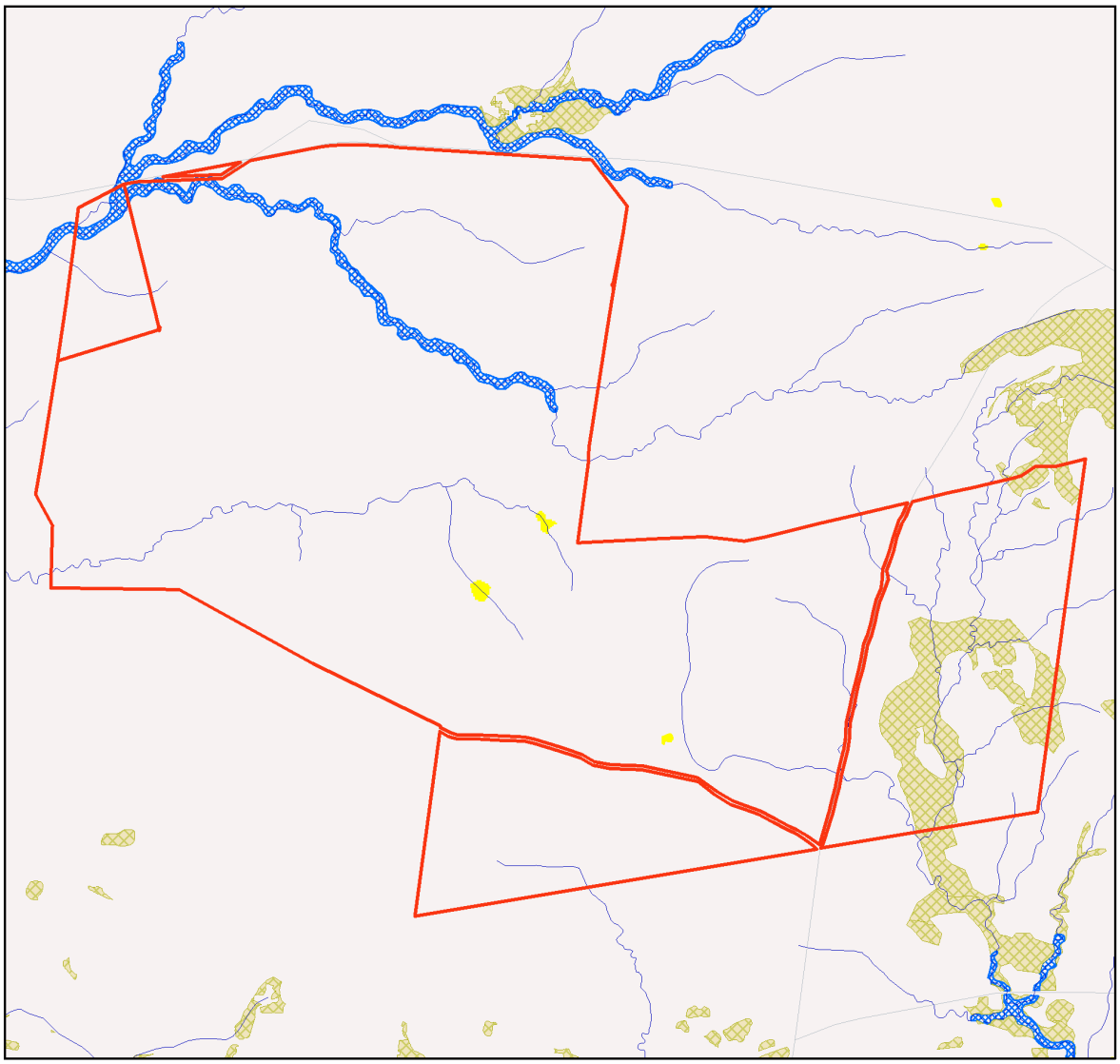
Map 4 - Wetlands and waterways



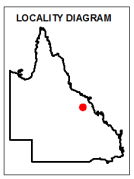
Wetlands and Waterways

Legend

- Selected Lot and Plan
- Towns
- Roads
- Springs
- Rivers/Creeks
- Directory of Important Wetlands
- Ramsar Sites - QLD
- Queensland

Wetland Type

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies
- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)



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0 920 1840 2760 3680 4600 m

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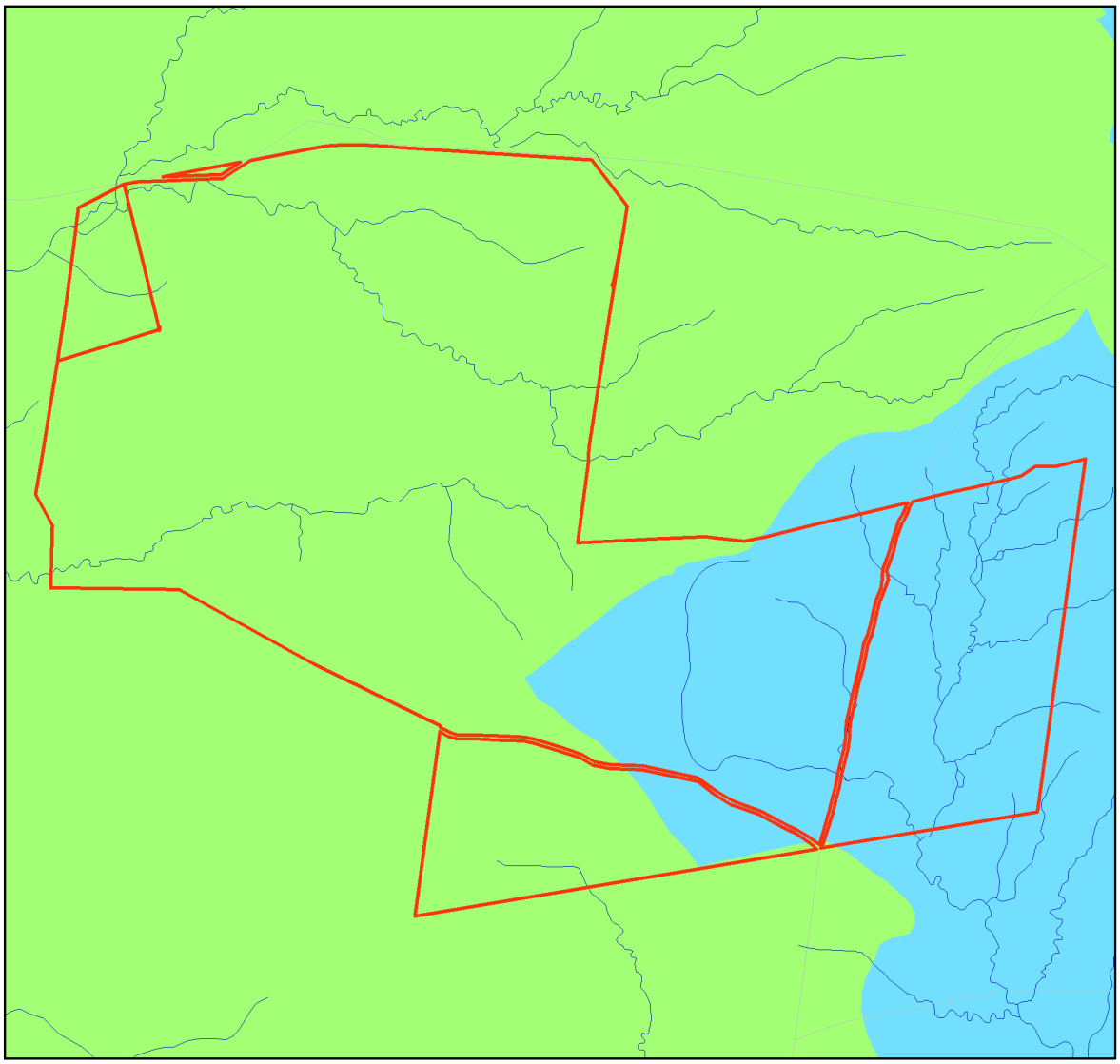
Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

Legend

- Selected Lot and Plan
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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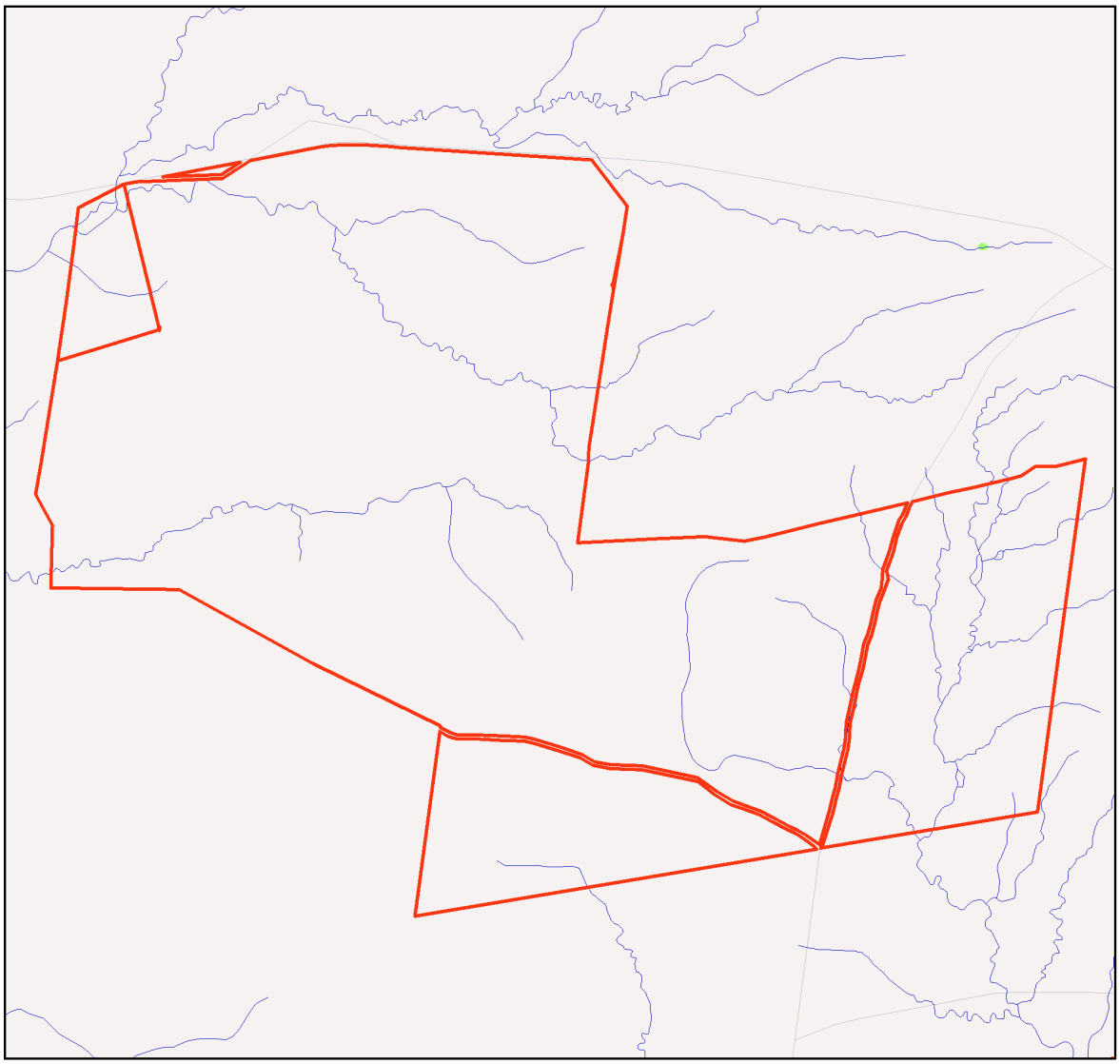
Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



Aquatic Conservation Assessment (ACA) - nonriverine

Legend

- Selected Lot and Plan
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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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/

Environmental Protection Agency (2002) *Biodiversity Assessment and Mapping Methodology. Version 2.1, July 2002.* (Environmental Protection Agency, 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 QMDB Non-riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1
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 QMDB Riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1
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 Einasleigh 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 DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, 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
DES	- Department of Environment and Science
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
Lot: 2 Plan: SP214117

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 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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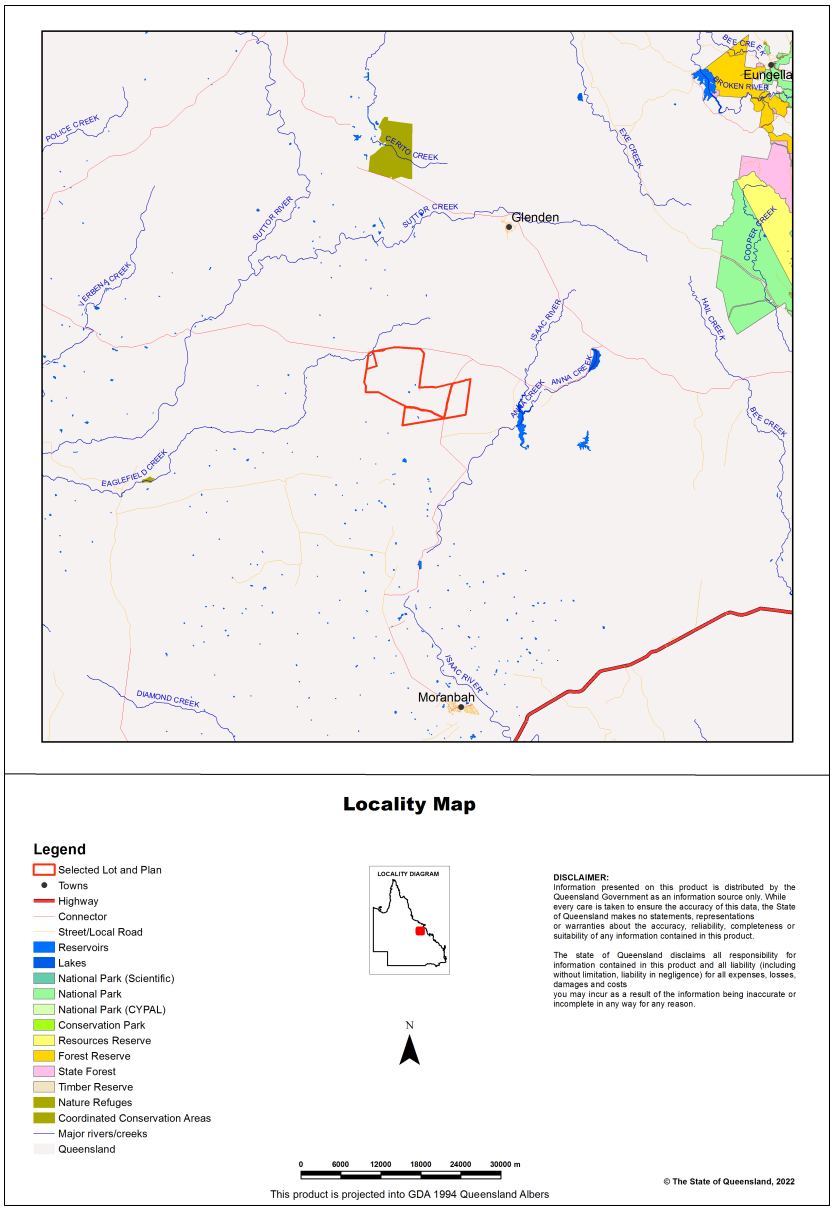
Table of Contents

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 Lot: 2 Plan: SP214117

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin



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 planning and development assessment decision-making. Its primary purpose is to support 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. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts 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	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	0.0 ha	0.0 %
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	4593.25 ha	43.9%
7b Special least concern animals	0.0 ha	0.0 %
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
7d Sea turtle nesting areas	0.0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	5210.31 ha	49.8%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	346.84 ha	3.3%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	30.89 ha	0.3%
8d Regulated Vegetation - Essential habitat	4910.38 ha	46.9%
8e Regulated Vegetation - intersecting a watercourse	69.2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0.0 ha	0.0 %
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 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

Values are present

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
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Macadamia ternifolia		V	None
Macadamia tetraphylla		V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	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

Scientific name	Common name	NCA status	EPBC status	Migratory status
Dichanthium queenslandicum		V	E	

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, 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)

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.8.13	E-dom	rem_end
11.3.2/11.3.25	O-dom	rem_oc
11.3.2/11.3.1	E-subdom	rem_end
11.5.15/11.8.13	E-subdom	rem_end
11.8.11/11.8.5	O-dom	rem_oc
11.8.11	O-dom	rem_oc
11.9.5	E-dom	rem_end
11.3.3	O-dom	rem_oc

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.8.13	E-dom	hvr_end
11.8.11/11.8.5	O-dom	hvr_oc
11.9.5	E-dom	hvr_end
11.5.15/11.8.13	E-subdom	hvr_end

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.3.2/11.3.25	O-dom	hvr_oc
11.3.2/11.3.1	E-subdom	hvr_end

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

Regulated vegetation map category	Map number
R	8454

8d. Regulated Vegetation - Essential habitat

Values are present

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

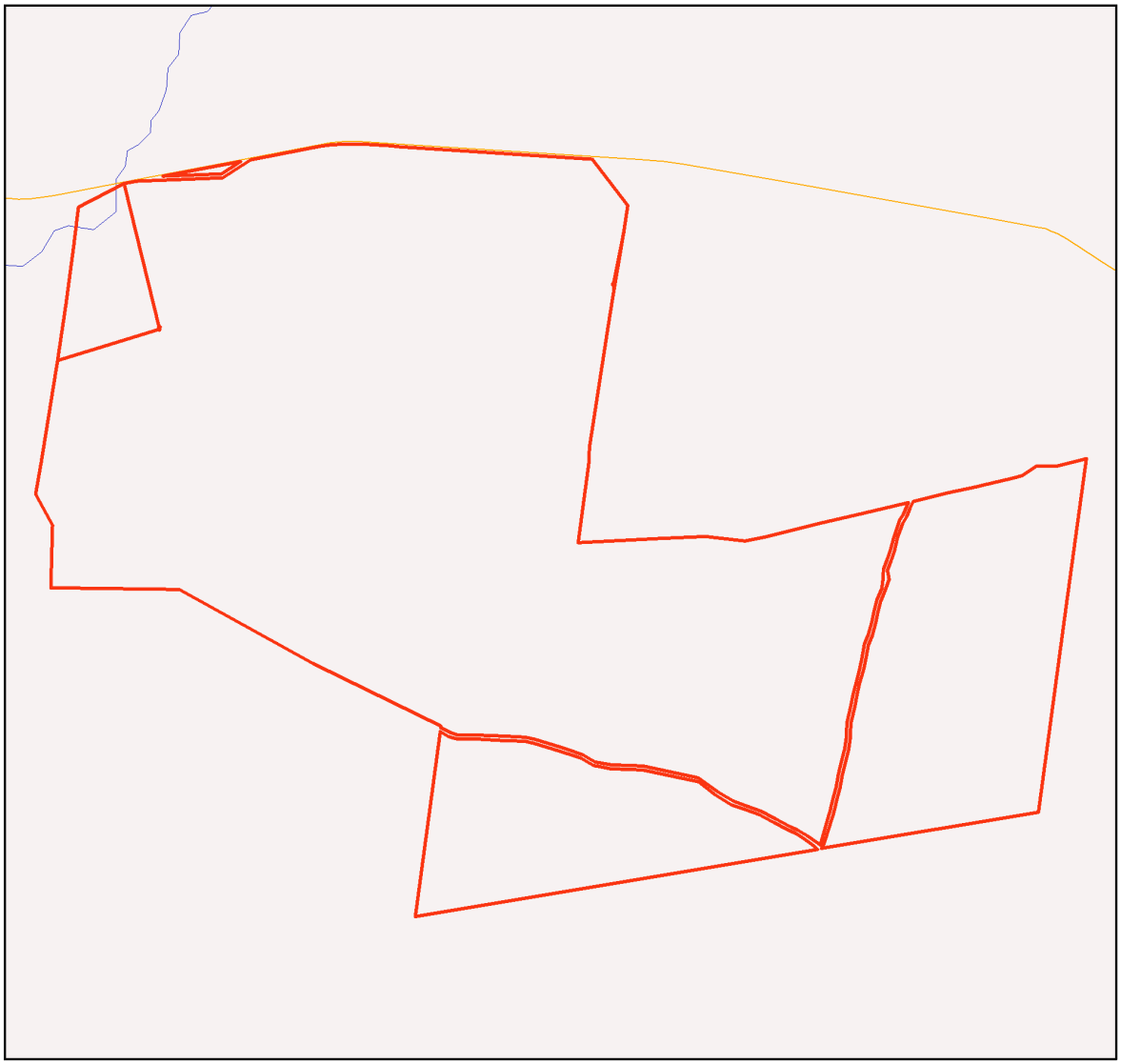
(no results)

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.

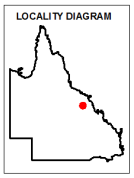
Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates, nature refuges, special wildlife reserves)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)



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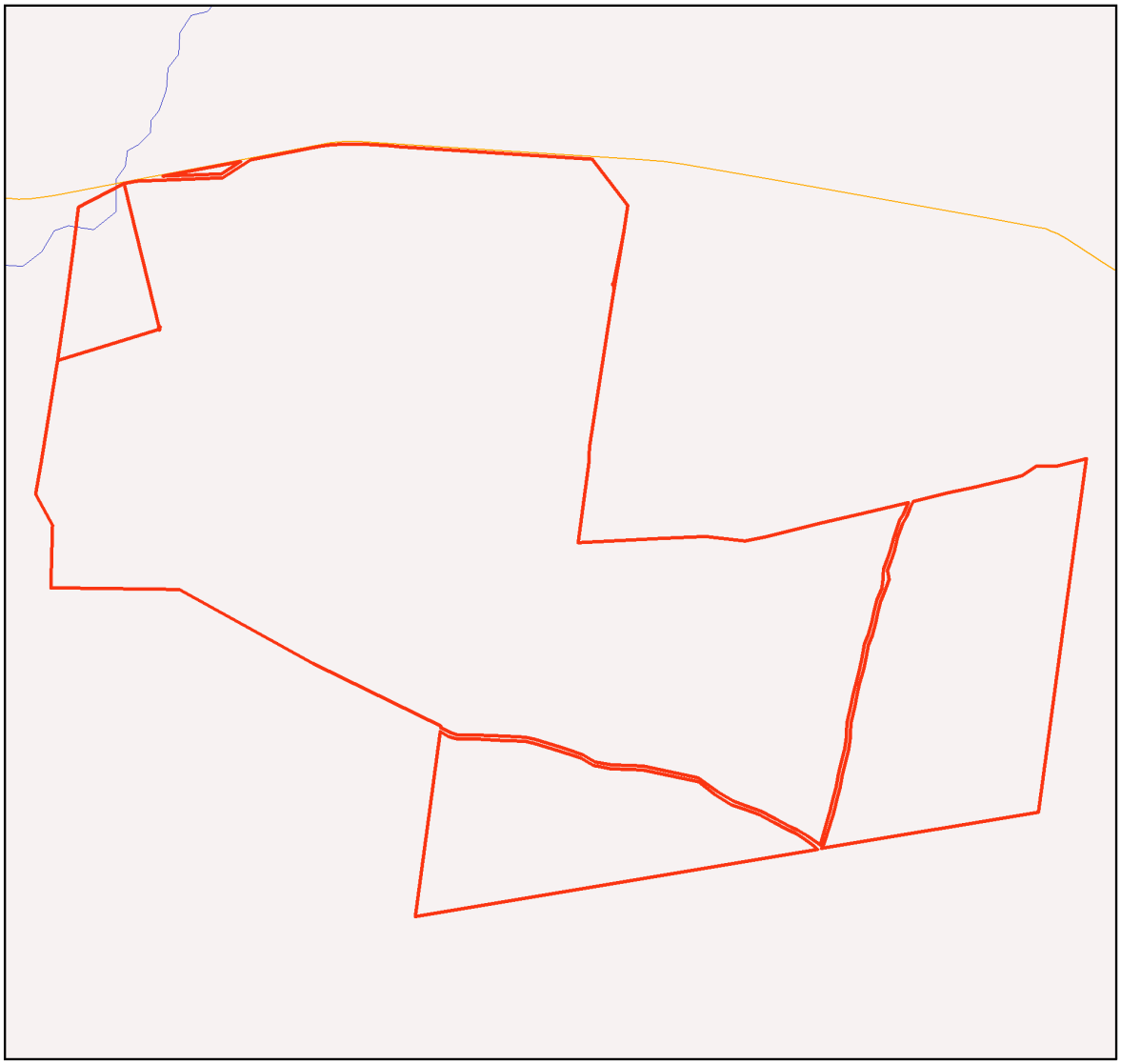
Map 2 - MSES - Wetlands and Waterways

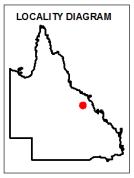


MSES - Wetlands and Waterways

Area of Interest

- Selected Lot and Plan
- 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

LOCALITY DIAGRAM



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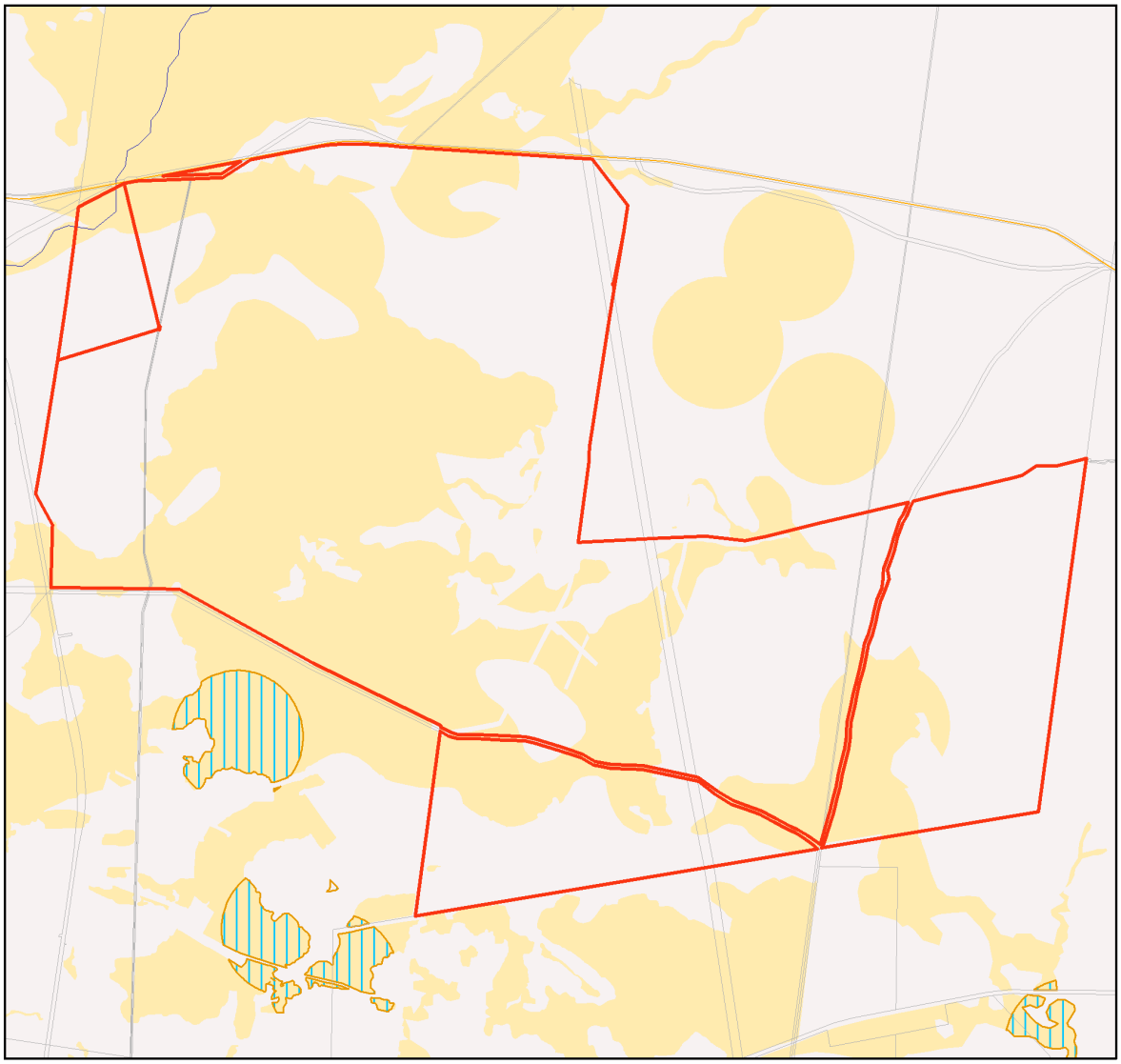
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals

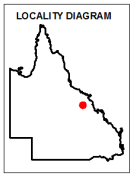


MSES - Species
Threatened (endangered or vulnerable) wildlife and special least concern animals

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)

LOCALITY DIAGRAM



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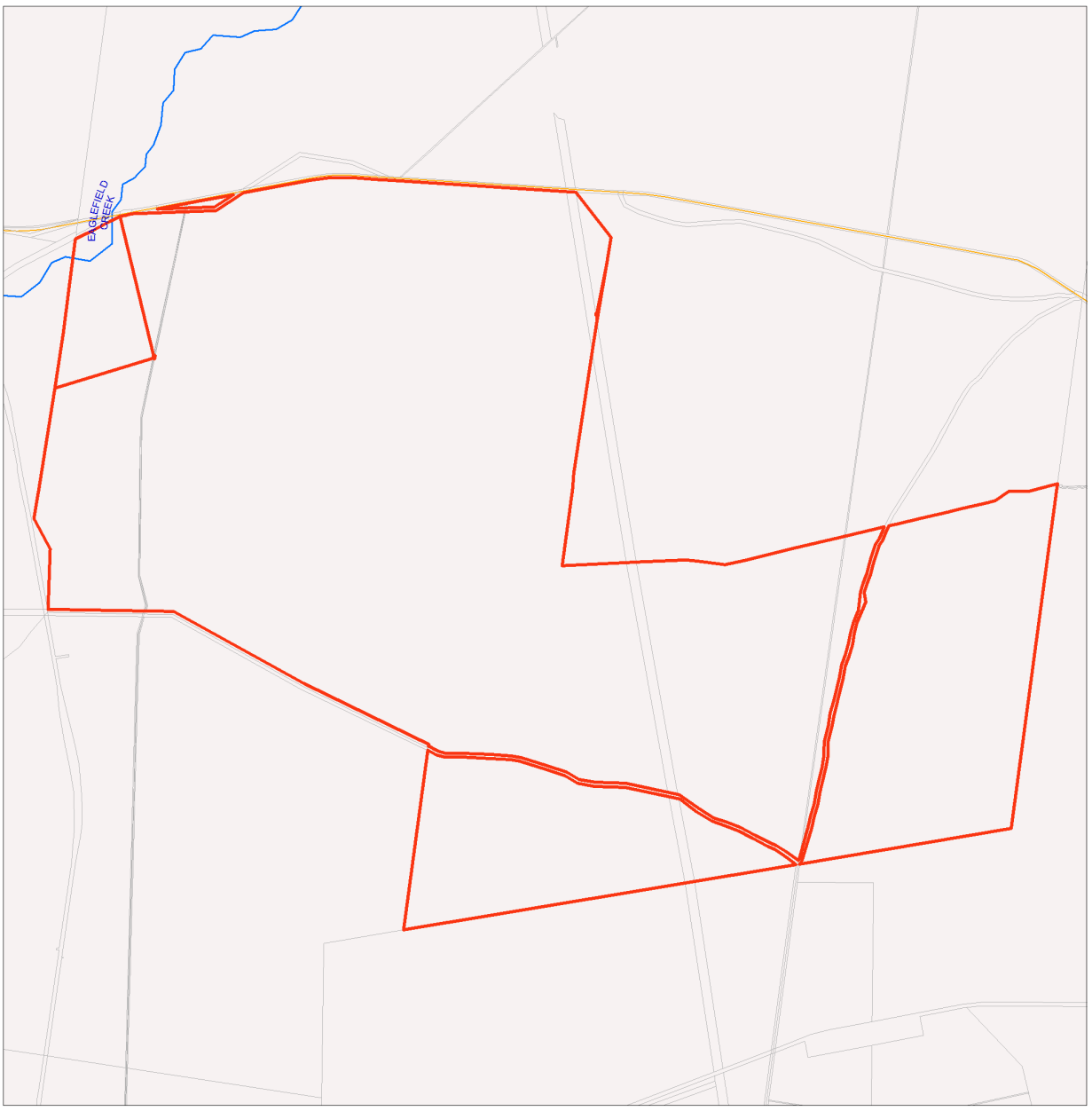
This product is projected into GDA 1994 Queensland Albers

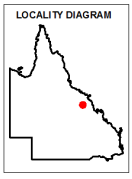
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)

LOCALITY DIAGRAM



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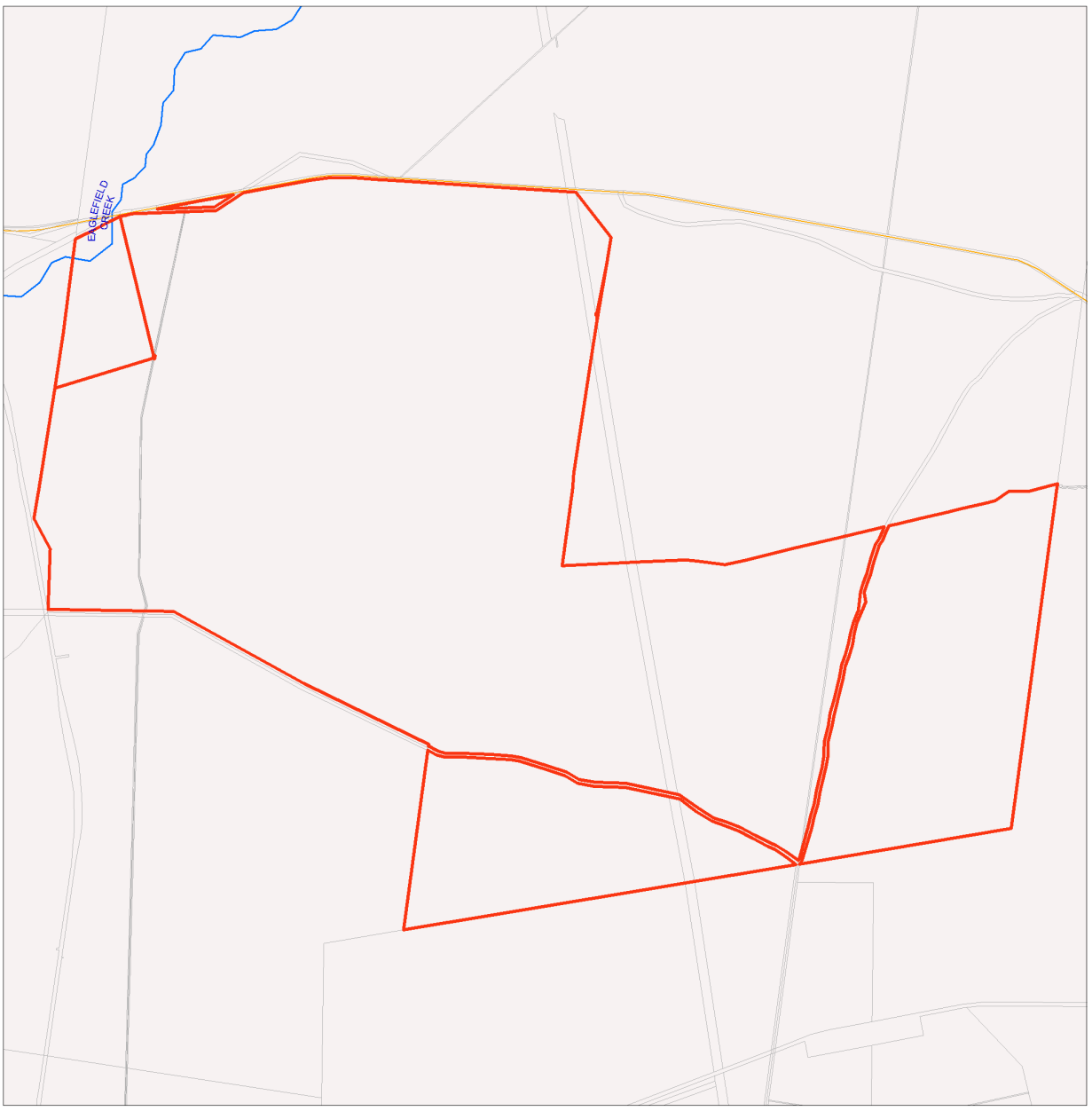
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be 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.

0 875 1,750 2,625 3,500 4,375 m

This product is projected into GDA 1994 Queensland Albers

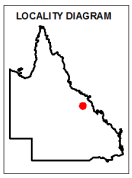
Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)

LOCALITY DIAGRAM

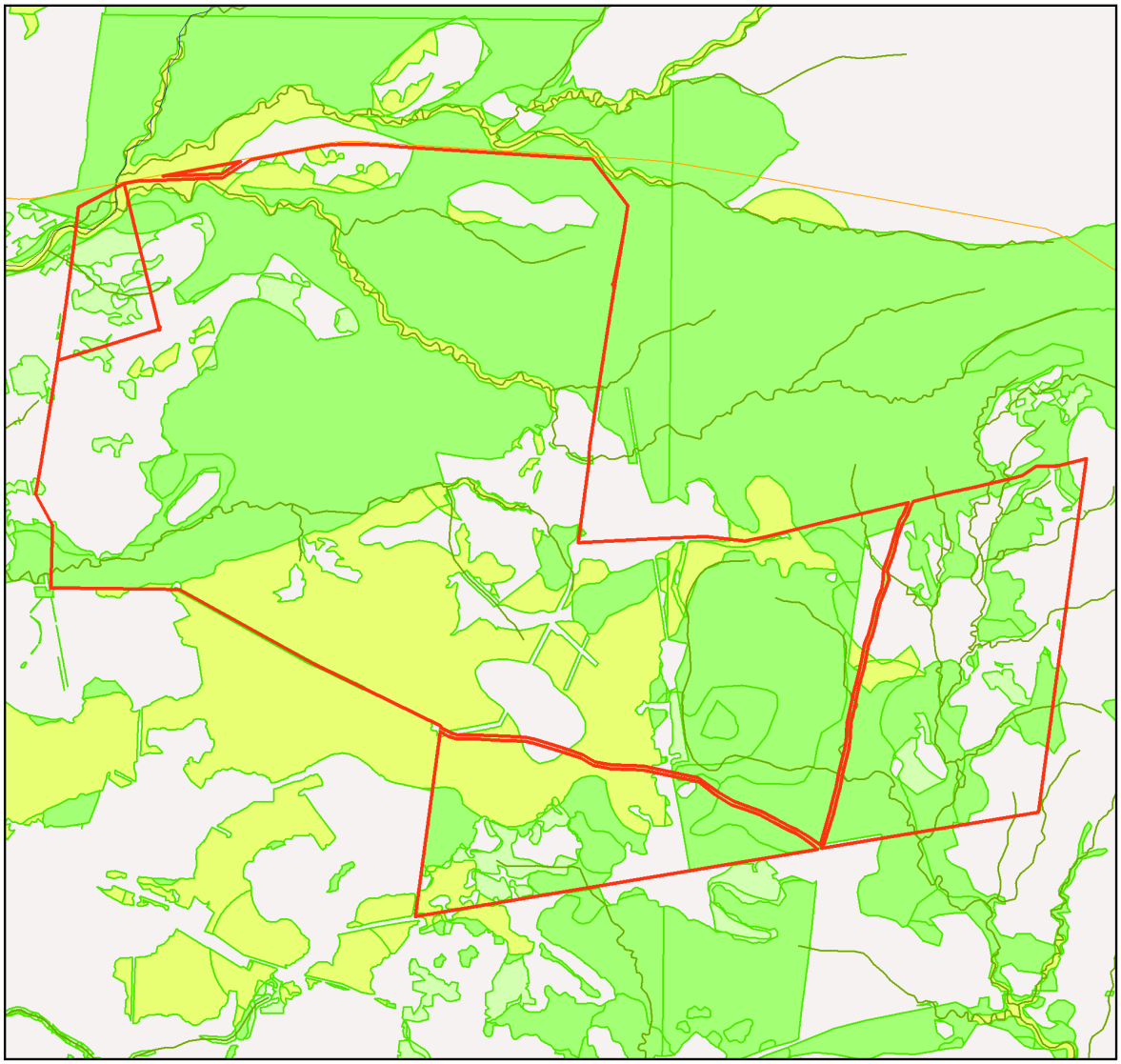


MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.

0 875 1,750 2,625 3,500 4,375 m

This product is projected into GDA 1994 Queensland Albers

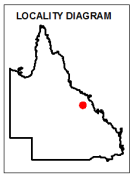
Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)



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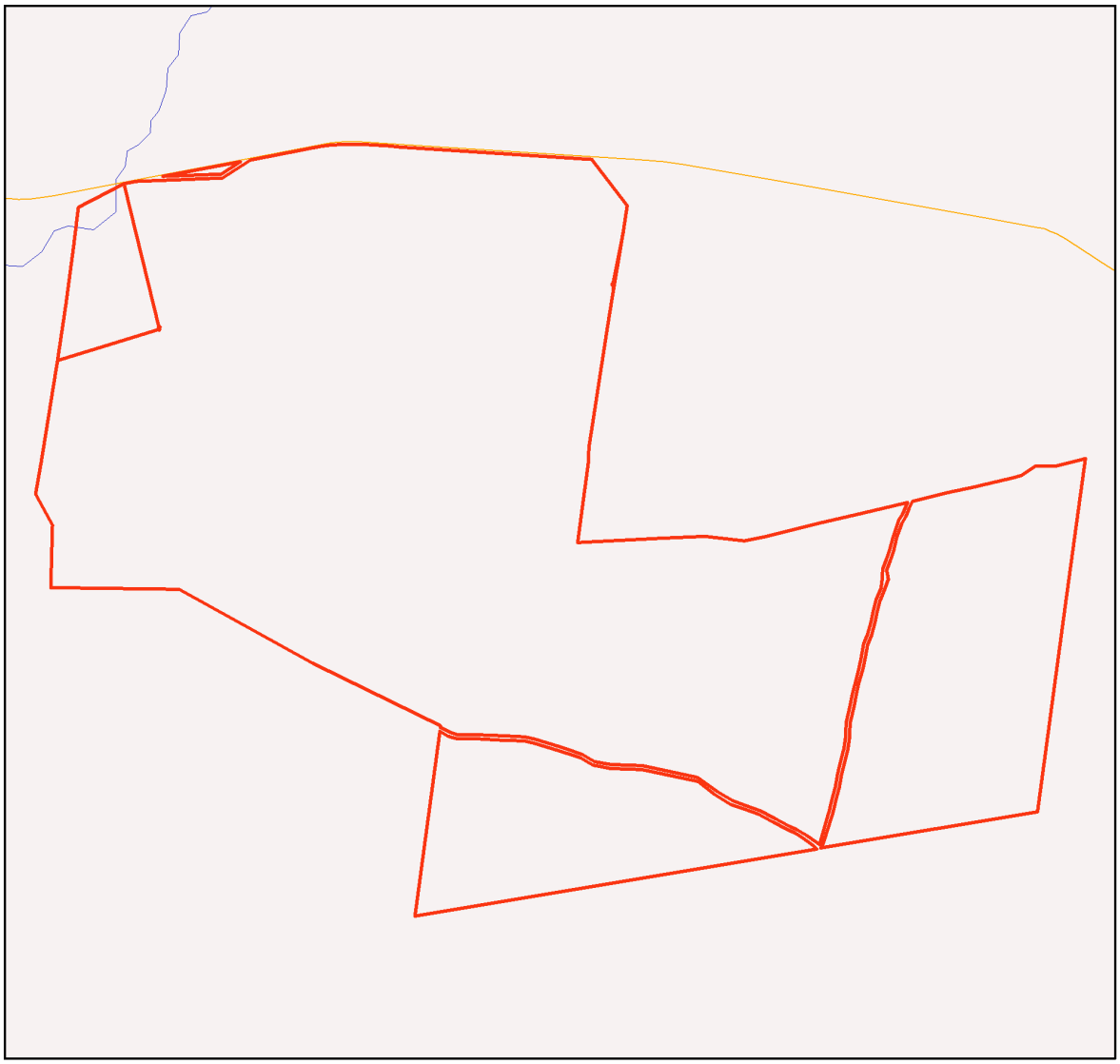
0 920 1840 2760 3680 4600 m

This product is projected into GDA 1994 Queensland Albers

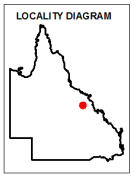
Map 5 - MSES - Offset Areas



MSES - Offsets

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)



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This product is projected into GDA 1994 Queensland Albers

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). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support 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. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" 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 - Sea Turtle Nesting Areas records
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
DES	- Department of Environment and Science
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 and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
Lot: 2 Plan: SP214117

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 input coordinates.

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 matters of interest 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.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.resources.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@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.

Table of Contents

Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details: Lot: 2 Plan: SP214117

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	1,026.96	9.81
Of concern	4,111.32	39.26
No concern at present	2,777.76	26.53
Total remnant vegetation	7,916.03	75.59

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

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.resources.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
11.10.3	Acacia shirleyi or A. catenulata open forest on coarse-grained sedimentary rocks. Crests and scarps	No concern at present	6.82	0.07
11.10.4a	Eucalyptus decorticans, Lysicarpus angustifolius +/- Eucalyptus spp., Corymbia spp., Acacia spp. woodland on coarse-grained sedimentary rocks	No concern at present	1.7	0.02
11.3.1	Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains	Endangered	14.46	0.14
11.3.2	Eucalyptus populnea woodland on alluvial plains	Of concern	299.63	2.86
11.3.25	Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	Of concern	138.91	1.33
11.3.3	Eucalyptus coolabah woodland on alluvial plains	Of concern	4.92	0.05
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces	Endangered	435.76	4.16
11.5.3	Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces	No concern at present	1,739.58	16.61
11.8.11	Dichanthium sericeum grassland on Cainozoic igneous rocks	Of concern	3,667.87	35.02
11.8.13	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks	Endangered	330.14	3.15
11.8.5	Eucalyptus orgadophila open woodland on Cainozoic igneous rocks	No concern at present	958.63	9.15
11.9.2	Eucalyptus melanophloia +/- E. orgadophila woodland to open woodland on fine-grained sedimentary rocks	No concern at present	14.2	0.14
11.9.5	Acacia harpophylla and/or Casuarina cristata open forest to woodland on fine-grained sedimentary rocks	Endangered	246.6	2.35
11.9.9	Eucalyptus crebra woodland on fine-grained sedimentary rocks	No concern at present	56.82	0.54
non-remnant	None	None	2,556.06	24.41

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
11.10.3	Pre-clearing 382000 ha; Remnant 2019 336000 ha	24a	Not a Wetland	Medium
11.10.4a	Pre-clearing 487000 ha; Remnant 2019 465000 ha	12a	Not a Wetland	High
11.3.1	Pre-clearing 784000 ha; Remnant 2019 81000 ha	25a	Not a Wetland	Low
11.3.2	Pre-clearing 1914000 ha; Remnant 2019 503000 ha	17a	Contains Palustrine	Low
11.3.25	Pre-clearing 804000 ha; Remnant 2019 519000 ha	16a	Riverine	Low
11.3.3	Pre-clearing 932000 ha; Remnant 2019 273000 ha	16c	Not a Wetland	Low
11.5.15	Pre-clearing 44000 ha; Remnant 2019 15000 ha	7a	Not a Wetland	Low
11.5.3	Pre-clearing 976000 ha; Remnant 2019 369000 ha	17a	Not a Wetland	Low
11.8.11	Pre-clearing 602000 ha; Remnant 2019 170000 ha	30b	Not a Wetland	Low
11.8.13	Pre-clearing 50000 ha; Remnant 2019 6000 ha	7a	Not a Wetland	Low
11.8.5	Pre-clearing 632000 ha; Remnant 2019 346000 ha	11a	Not a Wetland	Low
11.9.2	Pre-clearing 377000 ha; Remnant 2019 143000 ha	17b	Not a Wetland	Medium
11.9.5	Pre-clearing 2270000 ha; Remnant 2019 162000 ha	25a	Not a Wetland	Low
11.9.9	Pre-clearing 258000 ha; Remnant 2019 127000 ha	13c	Not a Wetland	Low
non-remnant	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
11.10.3	Habitat for threatened flora species including Acacia deuteroneura, A. wardellii and Bertya calycina.

Regional Ecosystem	Special Values
11.10.4a	Habitat for threatened flora species including Acacia islana, Bertya calycina, Calytrix islensis and Eucalyptus beaniana and the near threatened flora species A. pubicosta and Eucalyptus curtisii.
11.3.1	Habitat for threatened fauna species including painted honeyeater, Grantiella picta particularly in subregion 35 (Oliver et al. 2003).
11.3.2	Habitat for threatened flora species Homopholis belsonii. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.3.25	Shown to be associated with a high fauna species richness in the Taroom area (Venz et al. 2002). Within parts of the Fitzroy catchment, this RE is known habitat for the threatened freshwater turtle Rheodytes leukops. Known to be important habitat for other riparian freshwater turtle species. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.3.3	Mature trees provide hollows for fauna especially nesting birds. Associated with a high number fauna species (Dick 1992, Venz et al. 2002). 11.3.3c: Mature trees provide hollows for fauna especially nesting birds. Associated with a high number of fauna species (Dick 1992, Venz et al. 2002).
11.5.15	Habitat for threatened plant species including Fontainea fugax, Pomaderris clivicola and Cadellia pentastylis and the near threatened species Macropteranthes leiocaulis; a wide range of flora and fauna species with disjunct distributions.
11.5.3	Potential habitat for NCA listed species: Sannantha brachypoda
11.8.11	Habitat for threatened plant species including Trioncinia retroflexa and Dichanthium queenslandicum. T. retroflexa is currently known from three small populations.
11.8.13	Habitat for threatened plant species Croton magneticus.
11.8.5	In southern part of bioregion, habitat for a number of threatened plant species including Picris evae and Thesium australe and near threatened species Digitaria porrecta and Discaria pubescens. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus). 11.8.5a: This ecosystem is known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.9.2	Potential habitat for NCA listed species: Solanum elachophyllum
11.9.5	Habitat for threatened fauna species including Jalmenus eubulus, pale imperial hairstreak butterfly (Eastwood et al. 2008)
11.9.9	Potential habitat for NCA listed species: Capparis humistrata, Leucopogon sp. (Coolmunda D.Halford Q1635), Omphalea celata. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
non-remnant	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	2,556.06	24.41
11a	Moist to dry open forests to woodlands dominated by Eucalyptus orgadophila (mountain coolibah). Some areas dominated by E. tereticornis (blue gum), E. melliodora (yellow box), E. albens (white box), E. crebra (narrow-leaved red ironbark) or E. melanophloia (silver-leaved ironbark). (land zones 8, 11, 4, [3]) (BRB, SEQ, EIU)	958.63	9.15
12a	Dry woodlands to open woodlands dominated by ironbarks such as Eucalyptus decorticans (gum-topped ironbark), E. fibrosa subsp. nubila (blue-leaved ironbark), or E. crebra (narrow-leaved red ironbark) and/or bloodwoods such as Corymbia trachyphloia (yellow bloodwood), C. leichhardtii (rustyjacket), C. watsoniana (Watson's yellow bloodwood), C. lamprophylla, C. peltata (yellowjacket). Occasionally E. thozetiana (mountain yapunyah), E. cloeziana (Gympie messmate) or E. mediocris are dominant. Mostly on sub-coastal/inland hills with shallow soils. (land zones 10, 7, 9) (BRB, DEU, SEQ, GUP)	1.7	0.02
13c	Woodlands of Eucalyptus crebra (sens. lat.) (narrow-leaved red ironbark), E. drepanophylla (grey ironbark), E. fibrosa (dusky-leaved ironbark), E. shirleyi (shirley's silver-leaved ironbark) on granitic and metamorphic ranges (land zones 12, 11, 9, [5]) (BRB, EIU, SEQ, NET, CQC)	56.82	0.54
16a	Open forest and woodlands dominated by Eucalyptus camaldulensis (river red gum) (or E. tereticornis (blue gum)) and/or E. coolabah (coolabah) (or E. microtheca (coolabah)) fringing drainage lines. Associated species may include Melaleuca spp., Corymbia tessellaris (carbeen), Angophora spp., Casuarina cunninghamiana (riveroak). Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (MGD, BRB, GUP, CHC, MUL, DEU, EIU, NWH, SEQ, [NET, WET]) (All bioregions except CYP and CQC)	138.91	1.33
16c	Woodlands and open woodlands dominated by Eucalyptus coolabah (coolabah) or E. microtheca (coolabah) or E. largiflorens (black box) or E. tereticornis (blue gum) or E. chlorophylla on floodplains. Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (All bioregions except WET, principally GUP, BRB, MUL).	4.92	0.05
17a	Woodlands dominated by Eucalyptus populnea (poplar box) (or E. brownii (Reid River box)) on alluvium, sand plains and footslopes of hills and ranges. (land zones 3, 5, 10, 9, 4, 11, 12, [8]) (BRB, MUL, DEU, MUL, EIU)	2,039.21	19.47
17b	Woodlands to open woodlands dominated by Eucalyptus melanophloia (silver-leaved ironbark) (or E. shirleyi (shirley's silver-leaved ironbark)) on sand plains and footslopes of hills and ranges. (land zones 5, 12, 3, 11, 9, 7) (BRB, DEU, EIU, SEQ, NET, GUP, NWH)	14.2	0.14

BVG (1 Million)	Description	Area (Ha)	% of AOI
24a	Low woodlands to tall shrublands dominated by Acacia spp. on residuals. Species include A. shirleyi (lancewood), A. catenulata (bendee), A. microsperma (bowyakka), A. clivicola, A. sibirica, A. rhodoxylon (rosewood) and A. leptostachya (Townsville wattle). (land zones 7, 10, 5, 12, 11, [9, 3]) (MUL, CHC, BRB, GUP, EIU, MGD, DEU, NWH, [CYP])	6.82	0.07
25a	Open forests to woodlands dominated by Acacia harpophylla (brigalow) sometimes with Casuarina cristata (belah) on heavy clay soils. Includes areas co-dominated with A. cambagei (gidgee) and/or emergent eucalypts (land zones 4, 9, 3, 11, 7, 12, [5, 8]) (BRB, MUL, MGD, DEU, [SEQ])	261.05	2.49
30b	Tussock grasslands dominated by Astrebla spp. (mitchell grass) or Dichanthium spp. (bluegrass) often with Iseilema spp. on undulating downs or clay plains. (land zones 9, 3, 4, 8, [5]) (MGD, CHC, GUP, BRB, [EIU, DEU, NWH])	3,667.87	35.02
7a	Semi-evergreen vine thickets on wide range of substrates. (land zones 8, 9, 11, 12, 5, 4, 3, 10, [7]) (BRB, EIU, SEQ, CQC, [WET, GUP]) (Tracey 1982 11)	765.91	7.31

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

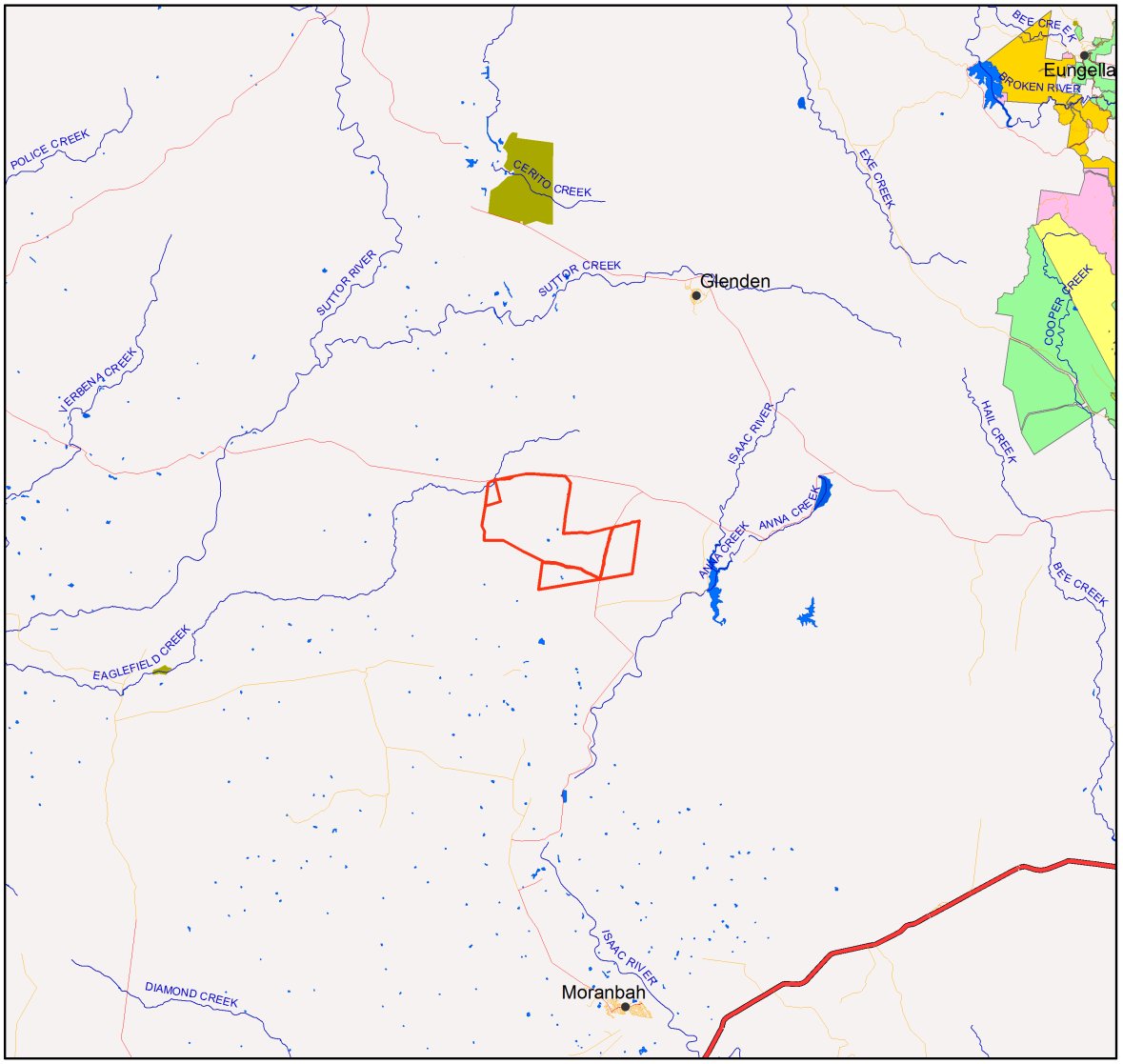
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
11.10.3	Available	Available
11.10.4a	Available	Not currently available
11.3.1	Available	Available
11.3.2	Available	Available
11.3.25	Available	Available
11.3.3	Available	Available
11.5.15	Available	Available
11.5.3	Available	Available
11.8.11	Available	Available
11.8.13	Available	Not currently available
11.8.5	Available	Not currently available
11.9.2	Available	Available
11.9.5	Available	Available
11.9.9	Available	Available
non-remnant	Not currently available	Not currently available

Maps

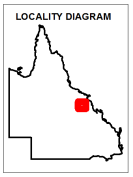
Map 1 - Location



Locality Map

Legend

- Selected Lot and Plan
- Towns
- Highway
- 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



N

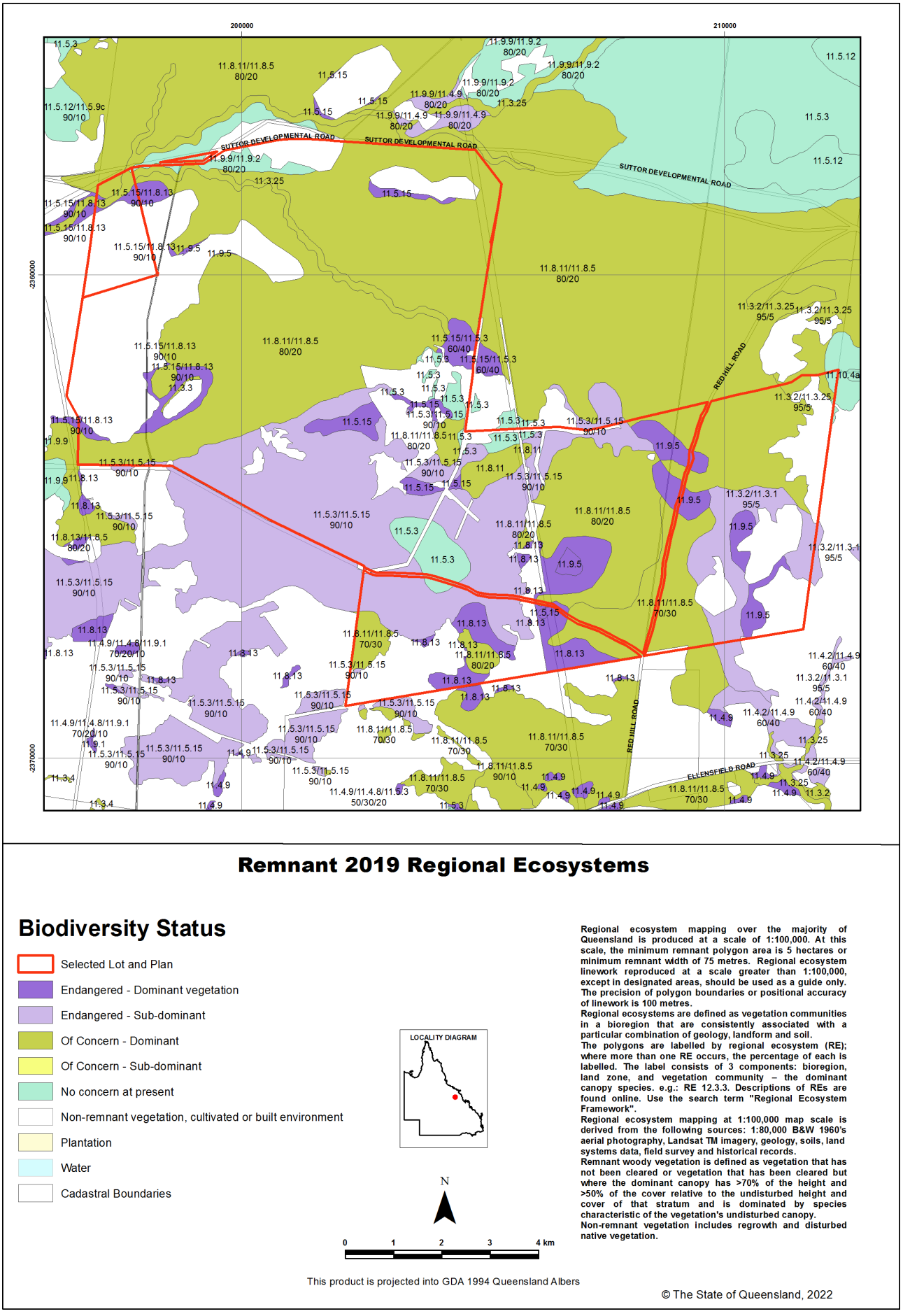
0 6000 12000 18000 24000 30000 m

This product is projected into GDA 1994 Queensland Albers

DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Map 2 - Remnant 2019 regional ecosystems



Remnant 2019 Regional Ecosystems

Biodiversity Status

- Selected Lot and Plan
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant vegetation, cultivated or built environment
- Plantation
- Water
- Cadastral Boundaries

This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

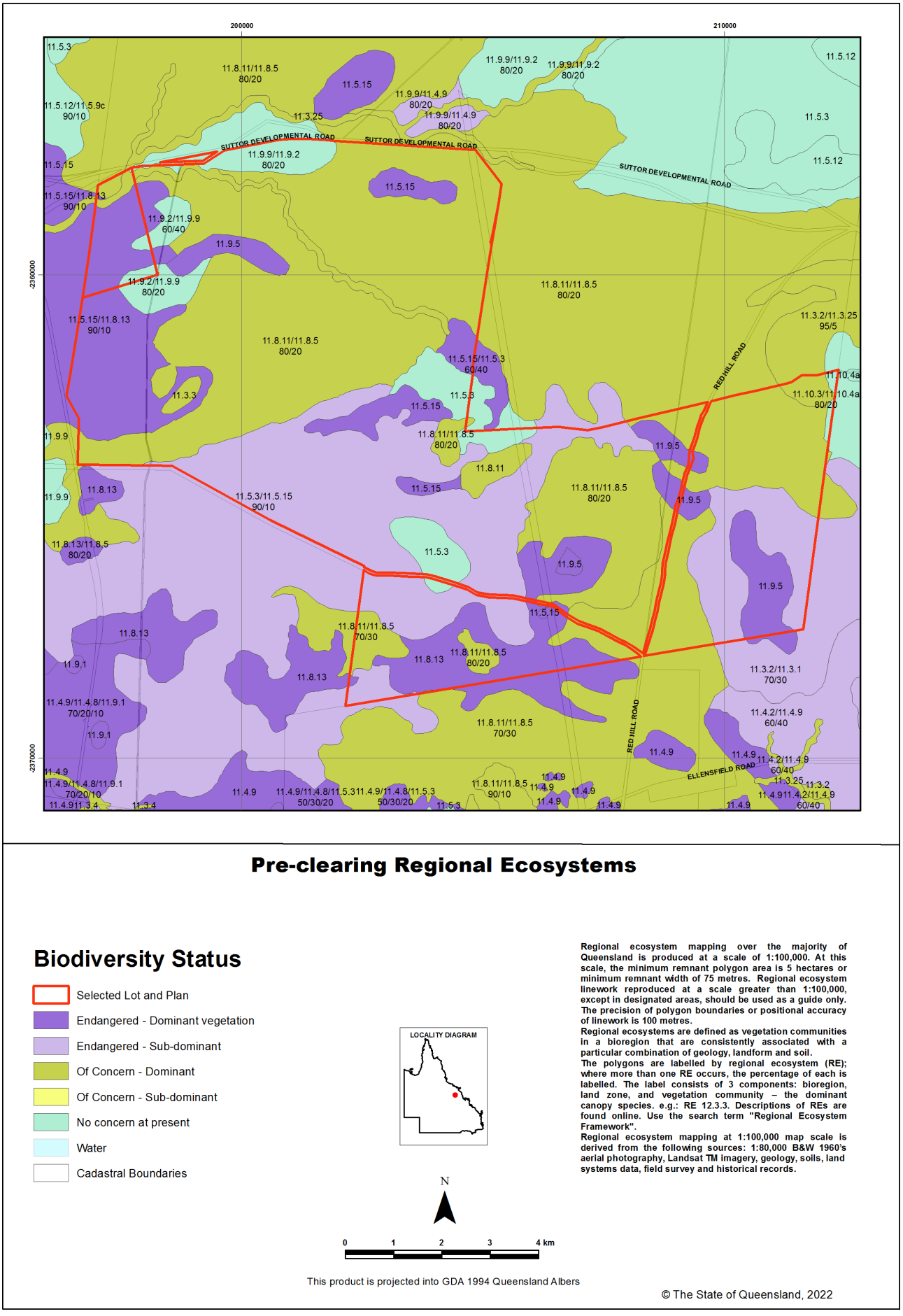
The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

Non-remnant vegetation includes regrowth and disturbed native vegetation.

Map 3 - Pre-clearing regional ecosystems



Pre-clearing Regional Ecosystems

Biodiversity Status

- Selected Lot and Plan
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries

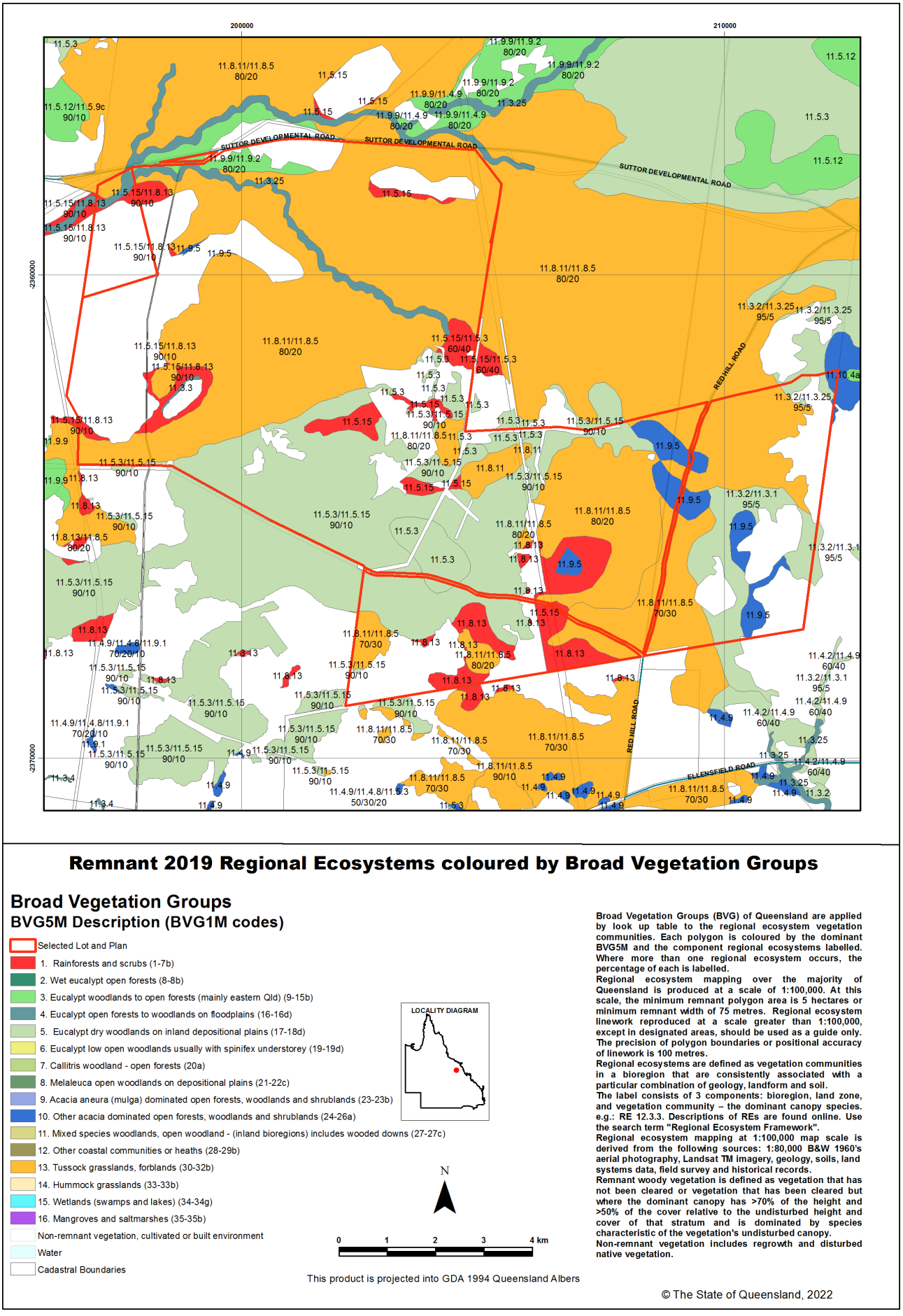
N

0 1 2 3 4 km

This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Remnant 2019 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- Selected Lot and Plan
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries

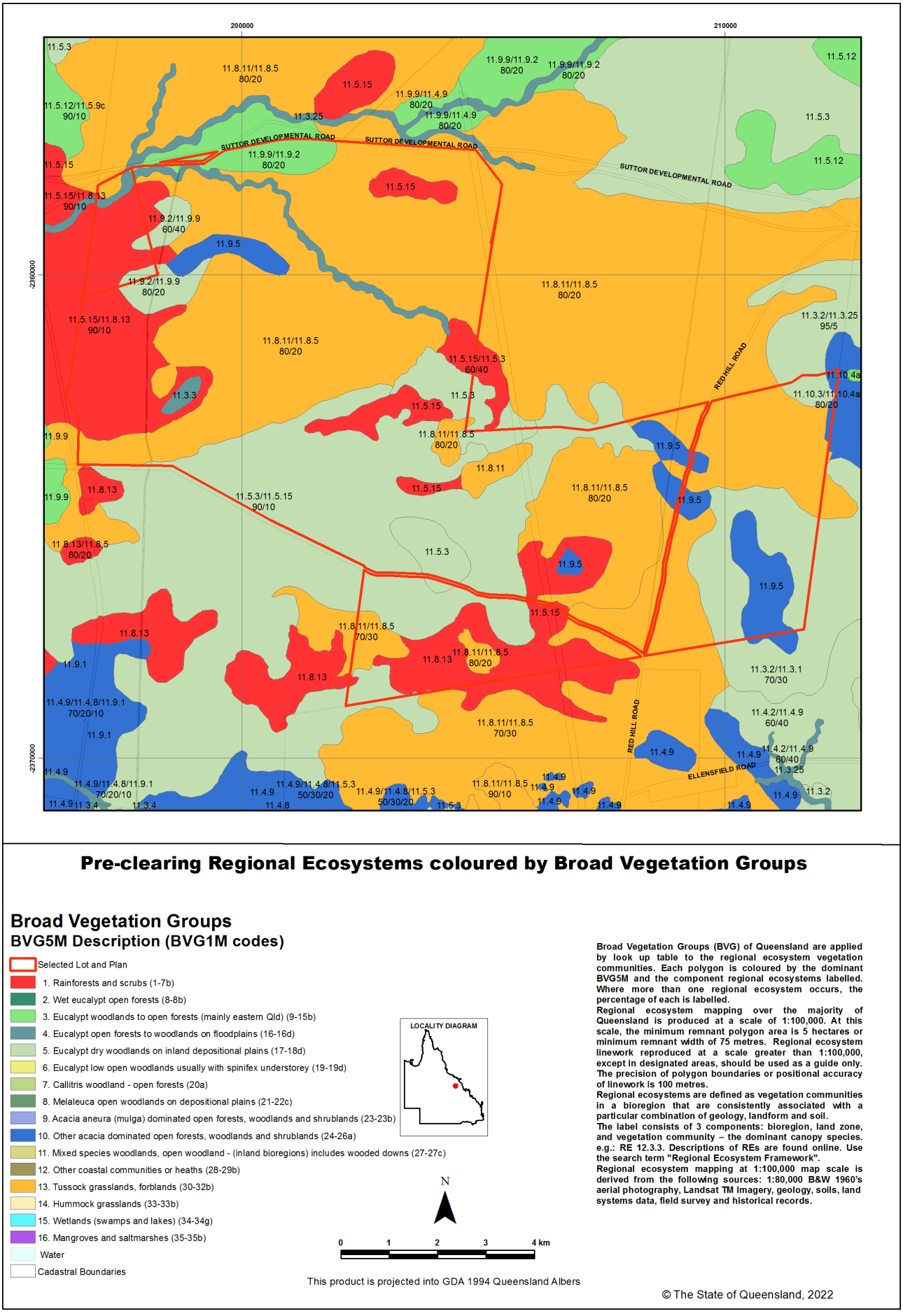
N

0 1 2 3 4 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.
Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
Non-remnant vegetation includes regrowth and disturbed native vegetation.

Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- Selected Lot and Plan
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
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- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries

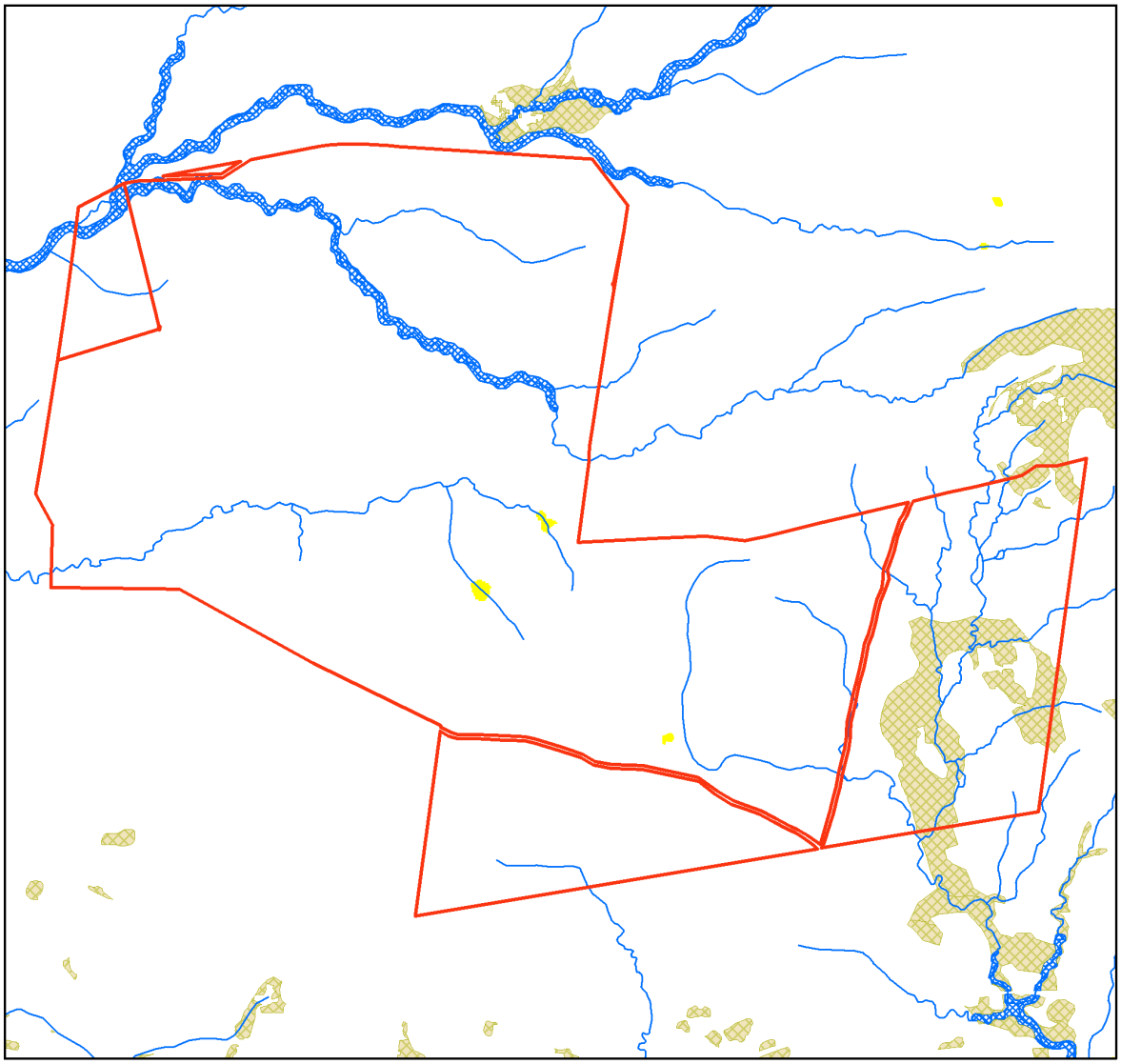
N

0 1 2 3 4 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 6 - Wetlands and waterways



Queensland Wetland Data

Legend

- Selected Lot and Plan
- Towns

Queensland Wetland Data

- Riverine Drainage Lines
- Springs

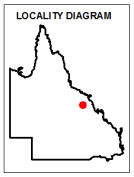
Wetland System - Water Bodies

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies

Wetland System - Regional Ecosystems

- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)

LOCALITY DIAGRAM



N

0 920 1840 2760 3680 4600 m

This product is projected into GDA 1994 Queensland Albers

Accuracy information: The positional accuracy of wetland data mapped at a scale of 1:100,000 is +/-100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coa st which are mapped at the 1:50,000 scale with a positional accuracy of +/-50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data. Consideration of the effects of mapped scale is necessary when interpret ing data at a larger scale, e.g. 1:25,000. For property assessment, digital linework should be used as a guide only. The extent of wetlands depicted on this map is based on rectified 2013 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Environment and Science. The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2013 imagery.

Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

https://qldglobe.information.qld.gov.au/

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

(https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

(https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4)

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

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

WildNet Records
Conservation Significant Species List

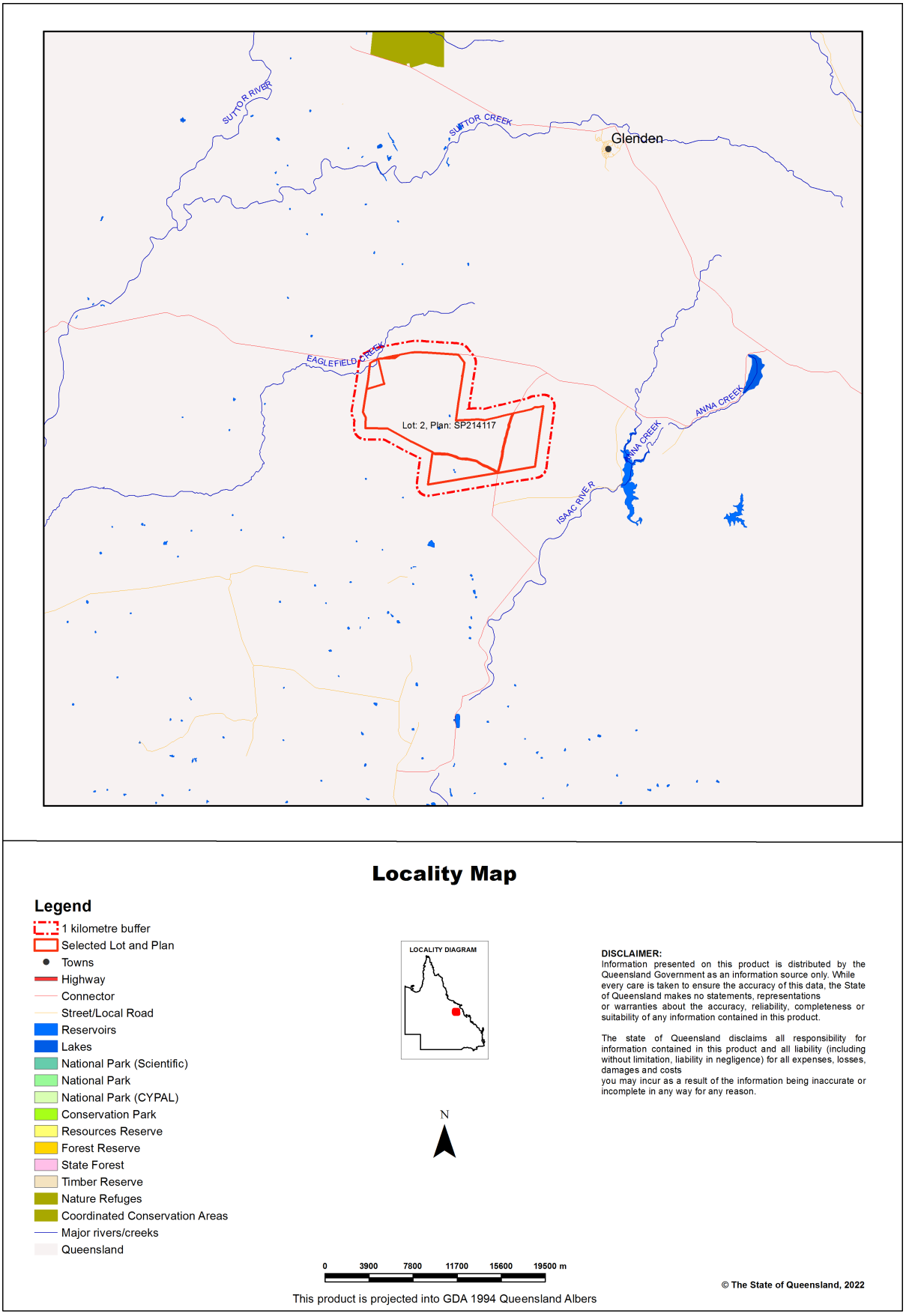
For the selected area of interest 10472.15ha Lot: 2 Plan: SP214117

Current as at 04/10/2022

WildNetCSSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 2 Plan: SP214117.

Table 1. Area of interest details

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Conservation Significant Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

Conservation significant species are species listed:

- as threatened or near threatened under the Nature Conservation Act 1992;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
  - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
  - China-Australia Migratory Bird Agreement
  - Japan-Australia Migratory Bird Agreement
  - Republic of Korea-Australia Migratory Bird Agreement

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the species recorded within the area of interest and its one kilometre buffer.

Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
33856	Plantae	Equisetopsida	Campanulaceae	*Lobelia concolor*	None	SL	None	1	1	27/01/1996
15918	Plantae	Equisetopsida	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell	SL	None	1	1	11/11/1997
11064	Plantae	Equisetopsida	Poaceae	*Dichanthium queenslandicum*	None	V	E	11	11	12/04/2018

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
14599	Plantae	Equisetopsida	Poaceae	*Digitaria porrecta*	None	NT	None	4	4	14/04/2018

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Pest List

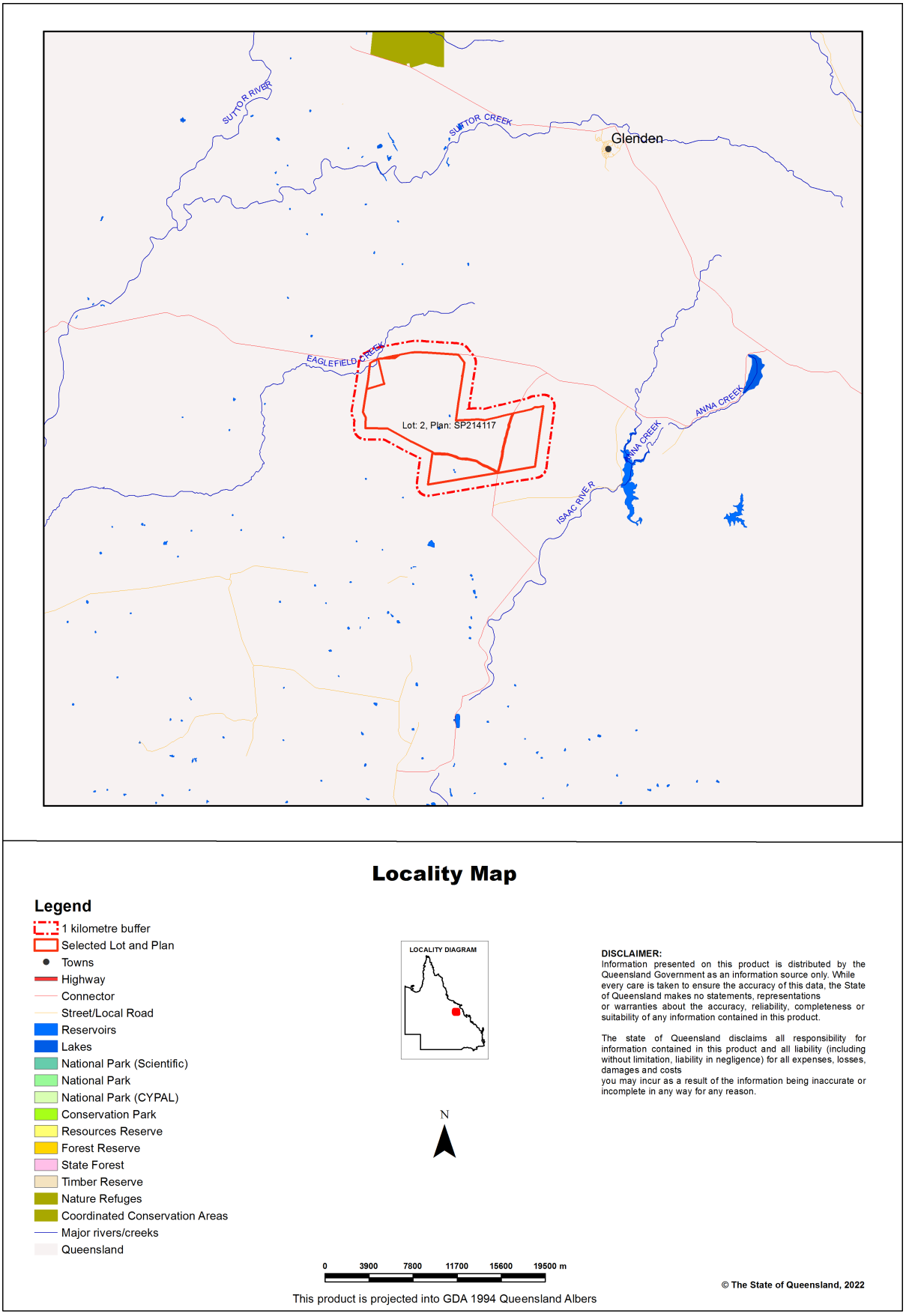
For the selected area of interest 10472.15ha Lot: 2 Plan: SP214117

Current as at 04/10/2022

WildNetPestList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 2 Plan: SP214117.

Table 1. Area of interest details

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)

No estates or reserves are located within the area of interest.

World Heritage Area(s)

No World Heritage Areas are located within the area of interest.

Ramsar Area(s)

No Ramsar Areas are located within the area of interest.

Pest List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Species Data

Contextual location information is presented in Map 1.

A summary of the pests recorded within the area of interest and its one kilometre buffer is presented in Table 2.

Table 2. Pests recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	Specimens	Records	Last record	Endemicity
716	Animalia	Amphibia	Bufonidae	*Rhinella marina*	cane toad	0	2	21/10/2011	II
764	Animalia	Mammalia	Muridae	*Mus musculus*	house mouse	0	1	28/09/2006	II
1080	Animalia	Mammalia	Suidae	*Sus scrofa*	pig	0	1	21/10/2011	II
411	Animalia	Reptilia	Gekkonidae	*Hemidactylus frenatus*	house gecko	0	1	02/04/2004	II
14687	Plantae	Equisetopsida	Leguminosae	*Crotalaria juncea*	sunhemp	1	1	30/06/2011	IU

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Endemicity: The endemicity code for the taxon (Introduced (Intranational) (IA), Introduced (International) (II), Introduced (Unknown), Exotic (Intranational) (XA), Exotic (International) (XI) and Exotic (Unknown) (XU)).

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
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- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Species List

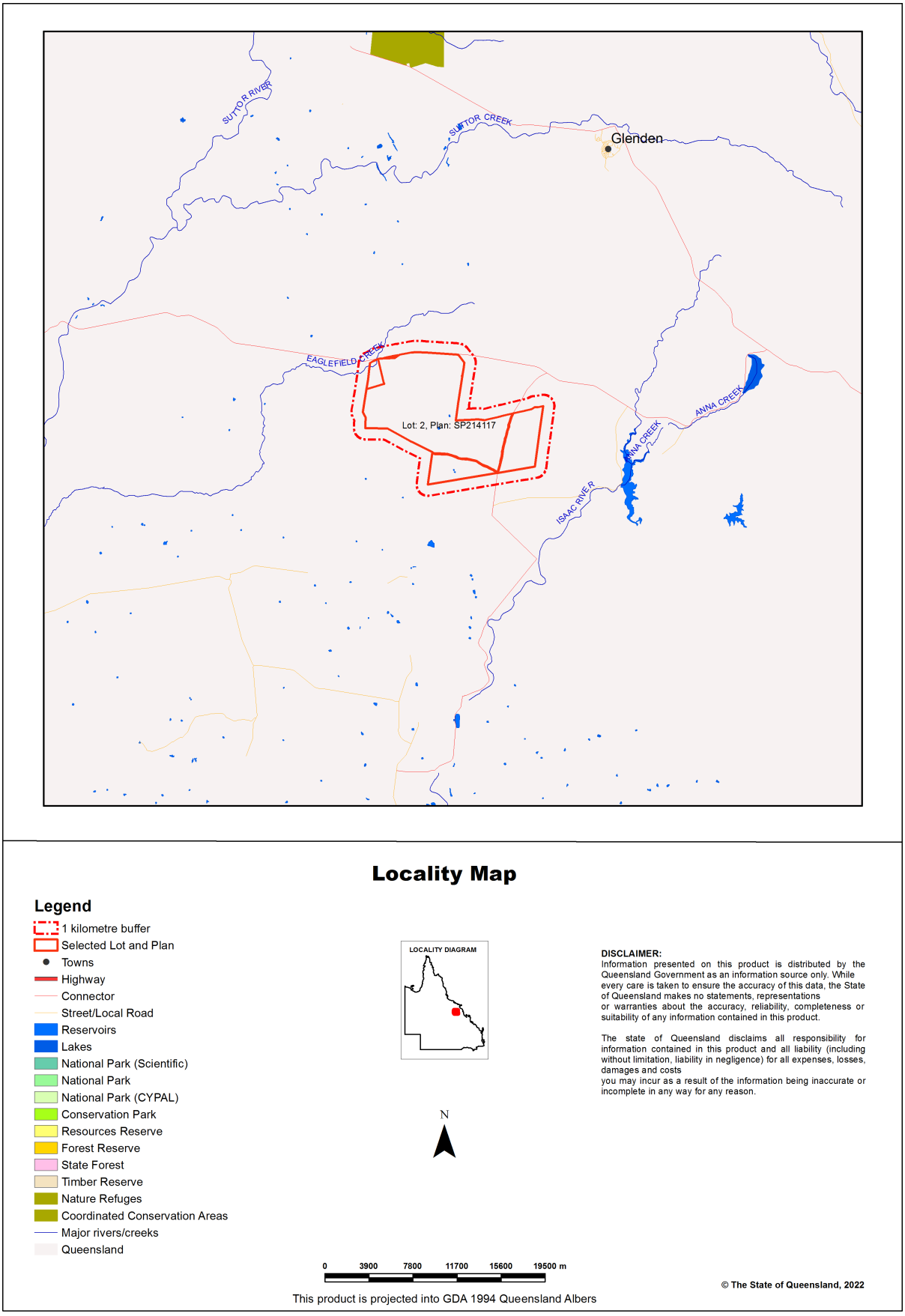
For the selected area of interest 10472.15ha Lot: 2 Plan: SP214117

Current as at 04/10/2022

WildNetSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 2 Plan: SP214117.

Table 1. Area of interest details

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
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Ramsar Area(s)
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Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

Table 2. Animals recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
716	Amphibia	Bufonidae	*Rhinella marina*	cane toad	None	None	0	2	21/10/2011
627	Amphibia	Hylidae	*Litoria caerulea*	common green treefrog	C	None	0	2	25/03/2015
1425	Aves	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill	C	None	0	1	21/10/2011
1396	Aves	Acanthizidae	*Gerygone olivacea*	white-throated gerygone	C	None	0	1	21/10/2011
1403	Aves	Acanthizidae	*Pyrrholaemus sagittatus*	speckled warbler	C	None	0	1	21/10/2011
1371	Aves	Acanthizidae	*Smicrornis brevirostris*	weebill	C	None	0	3	05/05/2012

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1729	Aves	Accipitridae	*Accipiter fasciatus*	brown goshawk	C	None	0	1	04/05/2012
1732	Aves	Accipitridae	*Aquila audax*	wedge-tailed eagle	C	None	0	1	05/05/2012
1725	Aves	Accipitridae	*Elanus axillaris*	black-shouldered kite	C	None	0	1	19/10/2011
1652	Aves	Alaudidae	*Mirafra javanica*	Horsfield's bushlark	C	None	0	1	19/10/2011
1658	Aves	Artamidae	*Artamus cinereus*	black-faced woodswallow	C	None	0	1	04/05/2012
1654	Aves	Artamidae	*Cracticus nigrogularis*	pied butcherbird	C	None	0	4	05/05/2012
1656	Aves	Artamidae	*Cracticus torquatus*	grey butcherbird	C	None	0	5	05/05/2012
1191	Aves	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo	C	None	0	1	19/10/2011
1193	Aves	Cacatuidae	*Eolophus roseicapilla*	galah	C	None	0	2	21/10/2011
1636	Aves	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike	C	None	0	3	05/05/2012
1642	Aves	Campephagidae	*Lalage tricolor*	white-winged triller	C	None	0	1	21/10/2011
1089	Aves	Casuariidae	*Dromaius novaehollandiae*	emu	C	None	0	1	20/10/2011
1294	Aves	Cisticolidae	*Cisticola exilis*	golden-headed cisticola	C	None	0	1	19/10/2011
1605	Aves	Corcoracidae	*Struthidea cinerea*	apostlebird	C	None	0	2	21/10/2011
1609	Aves	Corvidae	*Corvus orru*	Torresian crow	C	None	0	5	05/05/2012
1750	Aves	Cuculidae	*Cacomantis pallidus*	pallid cuckoo	C	None	0	1	21/10/2011
1751	Aves	Cuculidae	*Centropus phasianinus*	pheasant coucal	C	None	0	2	21/10/2011
1744	Aves	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo	C	None	0	1	21/10/2011
1745	Aves	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo	C	None	0	1	05/05/2012
1342	Aves	Estrildidae	*Taeniopygia bichenovii*	double-barred finch	C	None	0	2	05/05/2012
1704	Aves	Falconidae	*Falco cenchroides*	nankeen kestrel	C	None	0	1	19/10/2011
1766	Aves	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra	C	None	0	1	19/10/2011
1572	Aves	Hirundinidae	*Hirundo neoxena*	welcome swallow	C	None	0	1	04/05/2012
1573	Aves	Hirundinidae	*Petrochelidon nigricans*	tree martin	C	None	0	1	19/10/2011
18459	Aves	Maluridae	*Malurus assimilis*	purple-backed fairy-wren	C	None	0	1	05/05/2012
1558	Aves	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren	C	None	0	7	05/05/2012

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1539	Aves	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater	C	None	0	1	05/05/2012
1496	Aves	Meliphagidae	*Gavicalis virescens*	singing honeyeater	C	None	0	7	05/05/2012
1497	Aves	Meliphagidae	*Lichmera indistincta*	brown honeyeater	C	None	0	1	05/05/2012
1499	Aves	Meliphagidae	*Manorina flavigula*	yellow-throated miner	C	None	0	1	04/05/2012
1500	Aves	Meliphagidae	*Manorina melanocephala*	noisy miner	C	None	0	2	21/10/2011
1504	Aves	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater	C	None	0	2	05/05/2012
1507	Aves	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater	C	None	0	1	05/05/2012
1493	Aves	Meliphagidae	*Philemon citreogularis*	little friarbird	C	None	0	4	05/05/2012
1494	Aves	Meliphagidae	*Philemon corniculatus*	noisy friarbird	C	None	0	1	05/05/2012
1471	Aves	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater	C	None	0	1	05/05/2012
1764	Aves	Meropidae	*Merops ornatus*	rainbow bee-eater	C	None	0	2	20/10/2011
1586	Aves	Monarchidae	*Myiagra rubecula*	leaden flycatcher	C	None	0	1	21/10/2011
1611	Aves	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird	C	None	0	3	05/05/2012
1453	Aves	Neosittidae	*Daphoenositta chrysoptera*	varied sittella	C	None	0	1	20/10/2011
1680	Aves	Otididae	*Ardeotis australis*	Australian bustard	C	None	0	2	22/10/2011
1449	Aves	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush	C	None	0	1	19/10/2011
1437	Aves	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	C	None	0	3	05/05/2012
1392	Aves	Pardalotidae	*Pardalotus striatus*	striated pardalote	C	None	0	1	05/05/2012
1339	Aves	Petroicidae	*Microeca fascinans*	jacky winter	C	None	0	1	21/10/2011
1699	Aves	Phasianidae	*Coturnix pectoralis*	stubble quail	C	None	0	1	19/10/2011
1687	Aves	Phasianidae	*Synoicus ypsilophorus*	brown quail	C	None	0	1	19/10/2011
1318	Aves	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler	C	None	0	1	19/10/2011
1182	Aves	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot	C	None	0	1	21/10/2011
1136	Aves	Psittacidae	*Platycercus adscitus*	pale-headed rosella	C	None	0	5	04/05/2012
1125	Aves	Psittacidae	*Trichoglossus moluccanus*	rainbow lorikeet	C	None	0	1	05/05/2012
1160	Aves	Ptilonorhynchidae	*Chlamydera maculata*	spotted bowerbird	C	None	0	2	05/05/2012

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1575	Aves	Rhipiduridae	*Rhipidura albiscapa*	grey fantail	C	None	0	1	05/05/2012
1576	Aves	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	C	None	0	2	05/05/2012
1091	Aves	Turnicidae	*Turnix maculosus*	red-backed button-quail	C	None	0	2	21/10/2011
901	Mammalia	Macropodidae	*Macropus giganteus*	eastern grey kangaroo	C	None	0	3	05/05/2012
764	Mammalia	Muridae	*Mus musculus*	house mouse	None	None	0	1	28/09/2006
1080	Mammalia	Suidae	*Sus scrofa*	pig	None	None	0	1	21/10/2011
938	Mammalia	Vespertilionidae	*Nyctophilus sp.*	None	C	None	0	1	05/05/2012
556	Reptilia	Agamidae	*Pogona barbata*	bearded dragon	C	None	0	1	06/10/2006
537	Reptilia	Boidae	*Antaresia maculosa*	spotted python	C	None	0	1	30/03/2004
512	Reptilia	Colubridae	*Dendrelaphis punctulatus*	green tree snake	C	None	0	2	05/05/2012
426	Reptilia	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko	C	None	0	5	03/10/2006
18294	Reptilia	Diplodactylidae	*Oedura monilis sensu lato*	ocellated velvet gecko	C	None	0	1	20/10/2011
369	Reptilia	Diplodactylidae	*Strophurus williamsi*	soft-spined gecko	C	None	0	1	19/10/2011
493	Reptilia	Elapidae	*Demansia psammophis*	yellow-faced whipsnake	C	None	0	4	05/10/2006
454	Reptilia	Elapidae	*Pseudonaja textilis*	eastern brown snake	C	None	0	2	06/10/2006
441	Reptilia	Elapidae	*Suta suta*	myall snake	C	None	0	2	03/10/2006
444	Reptilia	Elapidae	*Vermicella annulata*	bandy-bandy	C	None	0	2	06/10/2006
432	Reptilia	Gekkonidae	*Gehyra catenata*	chain-backed dtella	C	None	0	2	05/05/2012
420	Reptilia	Gekkonidae	*Gehyra dubia*	dubious dtella	C	None	0	8	05/05/2012
410	Reptilia	Gekkonidae	*Gehyra versicolor*	None	C	None	0	1	19/10/2011
411	Reptilia	Gekkonidae	*Hemidactylus frenatus*	house gecko	None	None	0	1	02/04/2004
413	Reptilia	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko	C	None	0	2	21/10/2011
325	Reptilia	Pygopodidae	*Lialis burtonis*	Burton's legless lizard	C	None	0	5	05/10/2006
26886	Reptilia	Pygopodidae	*Pygopus schraderi*	eastern hooded scaly-foot	C	None	0	1	06/10/2006
31898	Reptilia	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink	C	None	0	1	21/10/2011
240	Reptilia	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus	C	None	0	1	19/10/2011
243	Reptilia	Scincidae	*Ctenotus taeniolatus*	copper-tailed skink	C	None	0	1	05/05/2012
134	Reptilia	Scincidae	*Morethia boulengeri*	south-eastern morethia skink	C	None	0	2	05/05/2012

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
317	Reptilia	Scincidae	*Praeteropus brevicollis*	short-necked worm-skink	C	None	0	1	30/03/2004
91	Reptilia	Typhlopidae	*Anilios ligatus*	robust blind snake	C	None	0	1	05/10/2006

Table 3. Plants recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
16262	Equisetopsida	Acanthaceae	*Rostellularia adscendens*	None	C	None	1	1	01/02/1997
13971	Equisetopsida	Apiaceae	*Daucus glochidiatus*	Australian carrot	C	None	1	1	22/10/2011
12419	Equisetopsida	Apocynaceae	*Cynanchum pedunculatum*	None	C	None	1	1	22/10/2011
41644	Equisetopsida	Apocynaceae	*Leichhardtia viridiflora subsp. viridiflora*	None	C	None	1	1	11/01/1993
16521	Equisetopsida	Apocynaceae	*Parsonsia lanceolata*	northern silkpod	C	None	1	1	11/01/1993
41655	Equisetopsida	Asphodelaceae	*Bulbine fraseri*	None	C	None	1	1	11/03/1995
18905	Equisetopsida	Asteraceae	*Calotis cuneata*	None	C	None	1	1	20/10/2011
8401	Equisetopsida	Asteraceae	*Euchiton sphaericus*	None	C	None	2	2	19/10/2011
10484	Equisetopsida	Asteraceae	*Rutidosis leucantha*	None	C	None	1	1	22/10/2011
15393	Equisetopsida	Boraginaceae	*Ehretia membranifolia*	weeping koda	C	None	1	1	01/10/1993
15968	Equisetopsida	Boraginaceae	*Trichodesma zeylanicum*	None	C	None	1	1	11/03/1995
35886	Equisetopsida	Boraginaceae	*Trichodesma zeylanicum var. latisepaleum*	None	C	None	1	1	19/10/2011
33856	Equisetopsida	Campanulaceae	*Lobelia concolor*	None	SL	None	1	1	27/01/1996
15918	Equisetopsida	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell	SL	None	1	1	11/11/1997
14775	Equisetopsida	Capparaceae	*Capparis shanesiana*	None	C	None	1	1	11/01/1993
17707	Equisetopsida	Casuarinaceae	*Casuarina cristata*	belah	C	None	1	1	11/01/1993
22225	Equisetopsida	Celastraceae	*Elaeodendron australe var. integrifolium*	None	C	None	1	1	20/10/2011
16026	Equisetopsida	Combretaceae	*Terminalia oblongata subsp. oblongata*	None	C	None	1	1	20/10/2011
11105	Equisetopsida	Commelinaceae	*Commelina ensifolia*	scurvy grass	C	None	1	1	11/03/1995
14468	Equisetopsida	Convolvulaceae	*Ipomoea lonchophylla*	None	C	None	1	1	11/03/1995
11601	Equisetopsida	Elatinaceae	*Bergia trimera*	None	C	None	1	1	21/10/2011
18091	Equisetopsida	Euphorbiaceae	*Acalypha eremorum*	soft acalypha	C	None	1	1	20/10/2011
6716	Equisetopsida	Euphorbiaceae	*Adriana tomentosa var. tomentosa*	None	C	None	2	2	22/10/2011
5514	Equisetopsida	Euphorbiaceae	*Euphorbia coghlanii*	None	C	None	1	1	01/02/1997

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
11252	Equisetopsida	Euphorbiaceae	*Ricinocarpos ledifolius*	scrub wedding bush	C	None	1	1	01/10/1993
17061	Equisetopsida	Goodeniaceae	*Goodenia grandiflora*	None	C	None	1	1	30/09/1993
9820	Equisetopsida	Haloragaceae	*Haloragis stricta*	None	C	None	1	1	19/10/2011
12122	Equisetopsida	Hypoxidaceae	*Hypoxis arillacea*	None	C	None	1	1	11/03/1995
21809	Equisetopsida	Leguminosae	*Acacia burdekensis*	None	C	None	1	1	26/08/2002
15785	Equisetopsida	Leguminosae	*Acacia catenulata*	bendee	C	None	1	1	30/04/2015
6117	Equisetopsida	Leguminosae	*Alysicarpus muelleri*	None	C	None	1	1	11/03/1995
15628	Equisetopsida	Leguminosae	*Bossiaea carinalis*	None	C	None	1	1	30/09/1993
21988	Equisetopsida	Leguminosae	*Cassia brewsteri*	None	C	None	1	1	17/11/2020
14687	Equisetopsida	Leguminosae	*Crotalaria juncea*	sunhemp	None	None	1	1	30/06/2011
15455	Equisetopsida	Leguminosae	*Desmodium campylocaulon*	None	C	None	1	1	11/03/1995
15354	Equisetopsida	Leguminosae	*Glycine falcata*	None	C	None	1	1	22/10/2011
14484	Equisetopsida	Leguminosae	*Hardenbergia perbrevidens*	None	C	None	1	1	30/09/1993
15327	Equisetopsida	Leguminosae	*Hovea longipes*	brush hovea	C	None	1	1	01/10/1993
15234	Equisetopsida	Leguminosae	*Lysiphyllum hookeri*	Queensland ebony	C	None	1	1	11/01/1993
9204	Equisetopsida	Leguminosae	*Vigna radiata var. sublobata*	None	C	None	1	1	11/03/1995
33742	Equisetopsida	Malvaceae	*Sida laevis*	None	C	None	1	1	11/03/1995
15998	Equisetopsida	Menispermaceae	*Tinospora smilacina*	snakevine	C	None	1	1	11/01/1993
16684	Equisetopsida	Myrtaceae	*Melaleuca bracteata*	None	C	None	1	1	01/02/1997
9317	Equisetopsida	Oxalidaceae	*Oxalis chnoodes*	None	C	None	2	2	19/10/2011
16474	Equisetopsida	Phyllanthaceae	*Phyllanthus*	None	None	None	1	1	22/10/2011
15656	Equisetopsida	Poaceae	*Aristida leptopoda*	white speargrass	C	None	1	1	11/03/1995
15635	Equisetopsida	Poaceae	*Astrebla elymoides*	hoop mitchell grass	C	None	1	1	27/01/1996
15636	Equisetopsida	Poaceae	*Astrebla lappacea*	curly mitchell grass	C	None	1	1	11/03/1995
9929	Equisetopsida	Poaceae	*Bothriochloa erianthoides*	satintop grass	C	None	1	1	27/01/1996
15415	Equisetopsida	Poaceae	*Dichanthium*	None	None	None	3	3	26/04/2017
11064	Equisetopsida	Poaceae	*Dichanthium queenslandicum*	None	V	E	11	11	12/04/2018
9620	Equisetopsida	Poaceae	*Dichanthium sericeum*	None	C	None	1	1	30/09/2019
10410	Equisetopsida	Poaceae	*Digitaria ammophila*	silky umbrella grass	C	None	1	1	27/01/1996
15419	Equisetopsida	Poaceae	*Digitaria brownii*	None	C	None	1	1	27/01/1996
14599	Equisetopsida	Poaceae	*Digitaria porrecta*	None	NT	None	4	4	14/04/2018
15407	Equisetopsida	Poaceae	*Enneapogon truncatus*	None	C	None	1	1	27/01/1996
15330	Equisetopsida	Poaceae	*Eriochloa crebra*	spring grass	C	None	1	1	27/01/1996

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
15173	Equisetopsida	Poaceae	*Panicum decompositum var. decompositum*	None	C	None	1	1	27/01/1996
10870	Equisetopsida	Poaceae	*Panicum queenslandicum var. queenslandicum*	None	C	None	1	1	19/10/2011
34422	Equisetopsida	Polygalaceae	*Polygala crassitesta*	None	C	None	3	3	15/04/2003
15950	Equisetopsida	Rhamnaceae	*Ventilago viminalis*	supplejack	C	None	1	1	01/02/1997
41445	Equisetopsida	Rubiaceae	*Dolichocarpa argillacea*	None	C	None	1	1	19/10/2011
21791	Equisetopsida	Rubiaceae	*Everistia vacciniifolia forma crassa*	None	C	None	1	1	21/10/2011
29823	Equisetopsida	Rubiaceae	*Psydrax oleifolia*	None	C	None	1	1	20/10/2011
16140	Equisetopsida	Rubiaceae	*Spermacoce*	None	None	None	1	1	15/04/2003
29150	Equisetopsida	Rubiaceae	*Spermacoce sp. (Dislyn A.R.Bean 14098)*	None	C	None	1	1	27/01/1996
17382	Equisetopsida	Sapindaceae	*Dodonaea stenophylla*	None	C	None	1	1	11/01/1993
29802	Equisetopsida	Solanaceae	*Solanum parvifolium subsp. parvifolium*	None	C	None	1	1	27/01/2011
16488	Equisetopsida	Thymelaeaceae	*Pimelea haematostachya*	None	C	None	2	2	15/04/2003
12350	Equisetopsida	Verbenaceae	*Verbena macrostachya*	None	C	None	1	1	19/10/2011

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates

- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Weed List

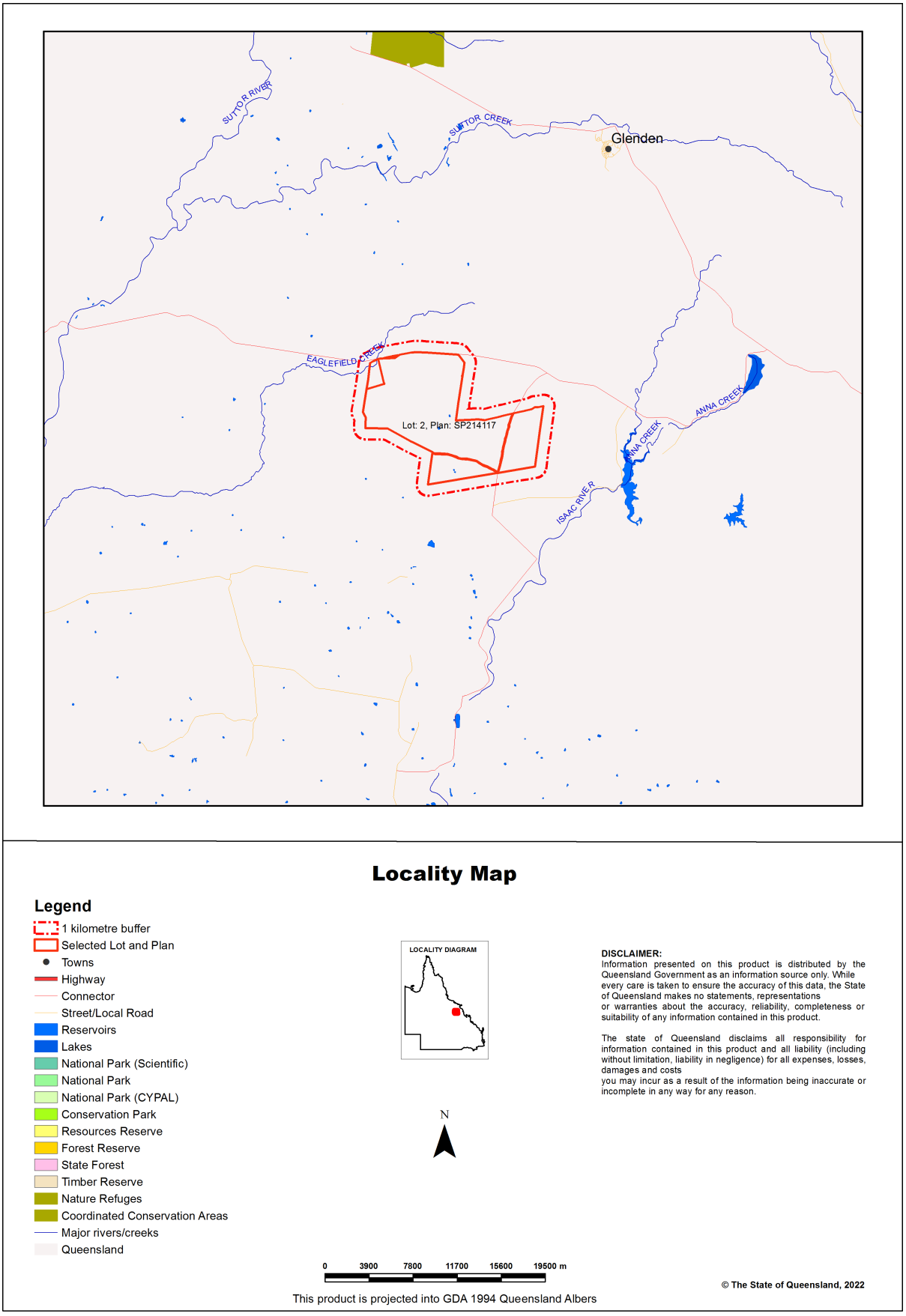
For the selected area of interest 10472.15ha Lot: 2 Plan: SP214117

Current as at 04/10/2022

WildNetWeedList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 2 Plan: SP214117.

Table 1. Area of interest details

Size (ha)	10,472.15
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)

No estates or reserves are located within the area of interest.

World Heritage Area(s)

No World Heritage Areas are located within the area of interest.

Ramsar Area(s)

No Ramsar Areas are located within the area of interest.

Weed List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Species Data

Contextual location information is presented in Map 1.

A summary of the weeds recorded within the area of interest and its one kilometre buffer is presented in Table 2.

Table 2. Weeds recorded within the area of interest and its one kilometre buffer

Taxon Id	Family	Scientific Name	Common Name	Specimens	Records	Last record	Endemicity
14687	Leguminosae	*Crotalaria juncea*	sunhemp	1	1	30/06/2011	IU

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Endemicity: The endemicity code for the taxon (Introduced (Intranational) (IA), Introduced (International) (II), Introduced (Unknown), Exotic (Intranational) (XA), Exotic (International) (XI) and Exotic (Unknown) (XU)).

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

Queensland Government

Department of Environment and Science

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest
Lot: 11 Plan: SP262530

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 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 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: Area of interest details: Lot: 11 Plan: SP262530

Size (ha)	5,827.61
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

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

Assessment Type	Assessment Area and Version
Biodiversity Planning Assessment(s)	Brigalow Belt v2.1
Aquatic Conservation Assessment(s) (riverine)	Great Barrier Reef Catchments v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Great Barrier Reef Catchments v1.3

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

Biodiversity Status	Area (Ha)	% of AOI
Endangered	355.38	6.1
Of concern	115.24	1.98
No concern at present	1,491.78	25.6

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 and Science's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	184.69	3.17
State	1,710.81	29.36
Regional	215.25	3.69
Local or Other Values	44.32	0.76

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Palustrine wetlands	0
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

Name	Permanency
GUM TREE CREEK	Non-perennial

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 and Science'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
Very High	0.0	0.0
High	0.0	0.0
Medium	5,827.60	100.0
Low	0.0	0.0
Very Low	0.0	0.0

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

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	0.0	0.0
High	0.0	0.0
Medium	1.82	0.03
Low	0.0	0.0
Very Low	0.0	0.0

Biodiversity Planning Assessments

Introduction

The Department of Environment and Science (DES) 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 DES.

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:

http://qspatial.information.qld.gov.au/geoportal/

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 significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	184.69	3.17
State	1,710.81	29.36
Regional	215.25	3.69
Local or Other Values	44.32	0.76

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	Nat. Threatened Ecol. Community (B1) & Remnant contains at least one Of Concern RE (B1)	101.94	1.75
State	Remnant contains at least 1 Endangered or 2 Vulnerable or Near Threatened species (A) & Nat. Threatened Ecol. Community (B1)	184.69	3.17
State	Remnant contains at least 1 Endangered RE (B1) & Nat. Threatened Ecol. Community (B1)	191.98	3.29
State	Remnant contains at least 1 Vulnerable or Near Threatened species (A) & Nat. Threatened Ecol. Community (B1)	1,416.90	24.31
Regional	Remnant contains at least 1 Vulnerable or Near Threatened species (A)	215.25	3.69
Local or Other Values	Refer to diagnostic data for additional information	42.51	0.73

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	184.7	3.2	1,748.27	30.0	120.01	2.1	100.29	1.7
B1: Ecosystem Value (Bioregion)	1,895.50	32.5	35.15	0.6	36.83	0.6		
B2: Ecosystem Value (Subregion)			197.61	3.4	1,769.87	30.4		
C: Tract Size	1,159.46	19.9			320.59	5.5	487.43	8.4
D1: Relative RE Size (Bioregion)					99.81	1.7	1,867.67	32.0
D2: Relative RE Size (Subregion)			725.71	12.5			1,241.77	21.3
F: Ecosystem Diversity			287.65	4.9	1,245.07	21.4	434.76	7.5
G: Context and Connection	185.09	3.2	79.67	1.4	1,579.51	27.1	123.21	2.1

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
State	Remnant forms part of a bioregional corridor (J)	99.81	1.71
Local	Refer to Expert Panel data for additional information	285.76	4.9
Local	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	1.82	0.03

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					285.76	4.9		
Ia: Centres of Endemism								
Ib: Wildlife Refugia					1.82			
Ic: Disjunct Populations								

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								
Ie: High Species Richness								
If: Relictual Populations								
Ig: Variation in Species Composition								
Ih: Artificial Wetland								
Ii: Hollow Bearing Trees								
Ij: Breeding or Roosting Site								
Ik: Climate Refugia								

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
State	99.81	1.71
Regional	0.0	0.0
Local	0.0	0.0

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

Decision Number	Description	Panel Recommended Significance	Criteria Values
brbn_l_17a	None	None	None
brbn_l_93	Locally significant natural palustrine & lacustrine wetlands	Local	Ib (refugia): M

Expert panel decision descriptions:

brbn_l_17a

None

brbn_l_93

The panel considered that relatively natural palustrine and lacustrine wetlands and waterbodies within the Brigalow Belt bioregion act as important refugia, especially during periods of drought.

Whilst State significant wetlands are captured under Criterion B1, and regionally significant wetlands under the decision brbn_l_92, the panel agreed that all remaining relatively natural wetland complexes of less than 5ha in size be classed as being of at least local significance.

Refer to brbn_l_48 for the southern BRB implementation of this decision.

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 prcesses

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:

http://qspatial.information.qld.gov.au/geoportal/

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
Very High	0.0	0.0

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	0.0	0.0
Medium	5,827.60	100.0
Low	0.0	0.0
Very Low	0.0	0.0

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	5,805.97	99.6					21.63	0.4
2. Naturalness catchment			5,827.60	100.0				
3. Diversity and richness			21.63	0.4	4,859.85	83.4	946.12	16.2
4. Threatened species and ecosystems			5,827.60	100.0				
5. Priority species and ecosystems								
6. Special features								
7. Connectivity					1.56		5,826.04	100.0
8. Representative-ness								

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:

(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 High	0.0	0.0
High	0.0	0.0
Medium	1.82	0.03
Low	0.0	0.0
Very Low	0.0	0.0

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					1.82			
2. Naturalness catchment			1.82					
3. Diversity and richness	1.82							
4. Threatened species and ecosystems	1.82							
5. Priority species and ecosystems								
6. Special features								
7. Connectivity								
8. Representative-ness								

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:

(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

Species	Common name	NCA status	EPBC status	Back on Track rank	Migratory species*	Wetland species**	Identified flora/fauna
Denisonia maculata	ornamental snake	V	V	Medium			FA
Dichanthium queenslandicum		V	E	Low			FL
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V	Medium			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DES 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

Species	Common name	Back on Track rank	Identified flora/fauna
Lagorchestes conspicillatus	Spectacled Hare-wallaby	L	FA
Paradelma orientalis	Brigalow Scaly-foot	M	FA
Pyrrholaemus sagittatus	Speckled Warbler	L	FA

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 results)

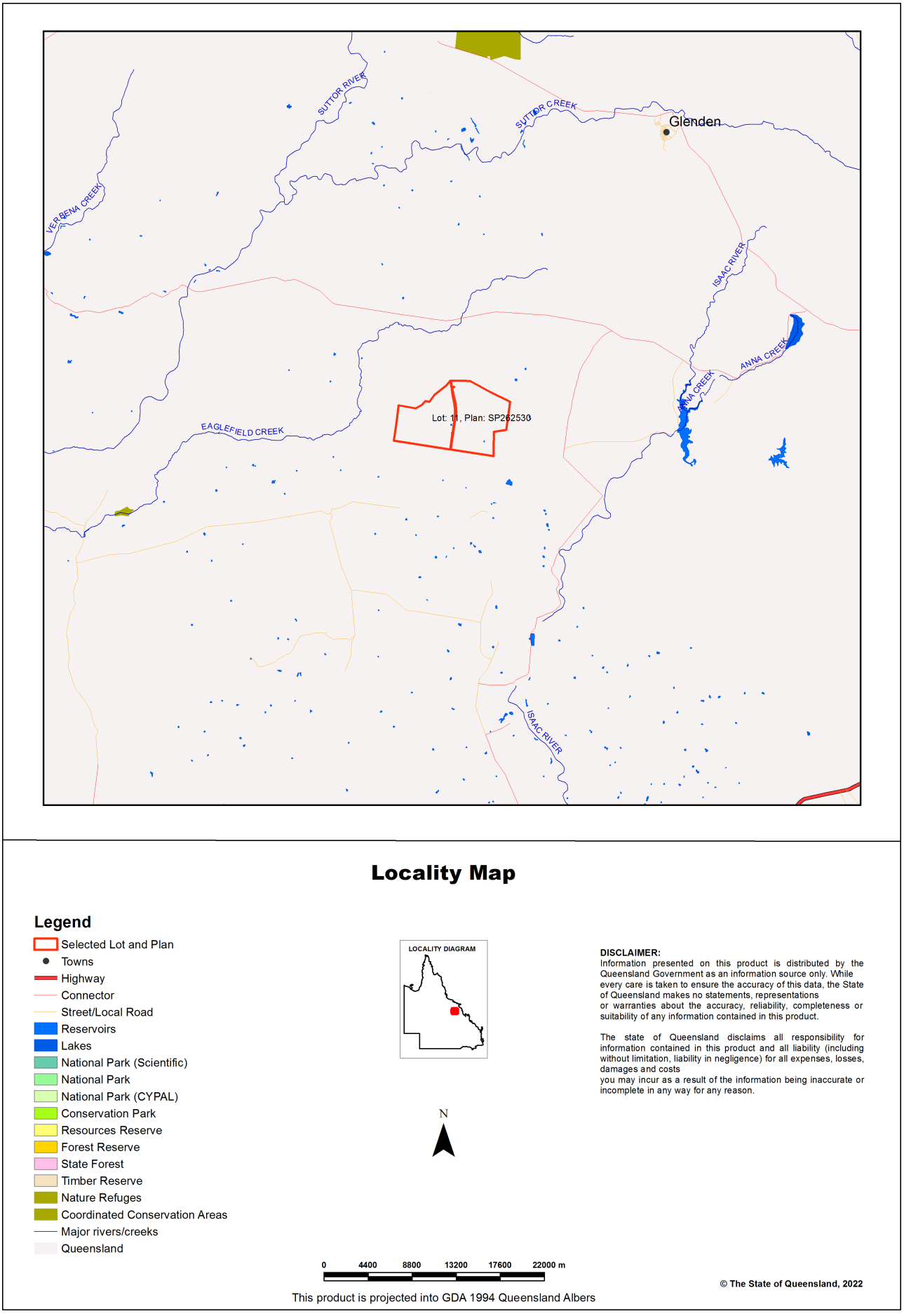
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(no results)

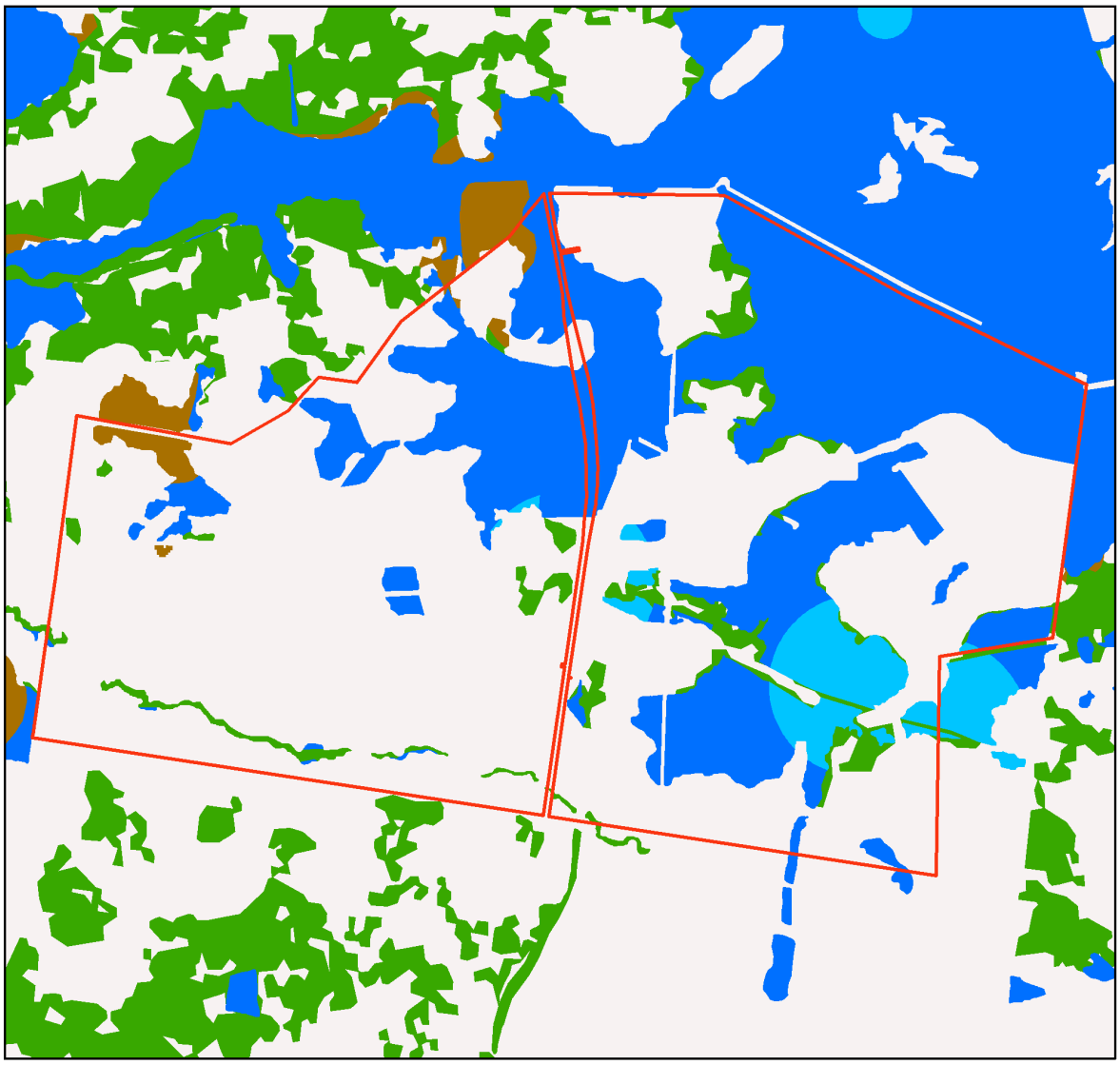
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details 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)



Biodiversity Planning Assessments

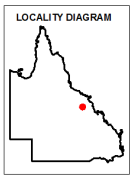
Legend

- Selected Lot and Plan
- Towns
- Roads
- Major rivers/creeks
- Queensland

Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem

LOCALITY DIAGRAM



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0 660 1320 1980 2640 3300 m

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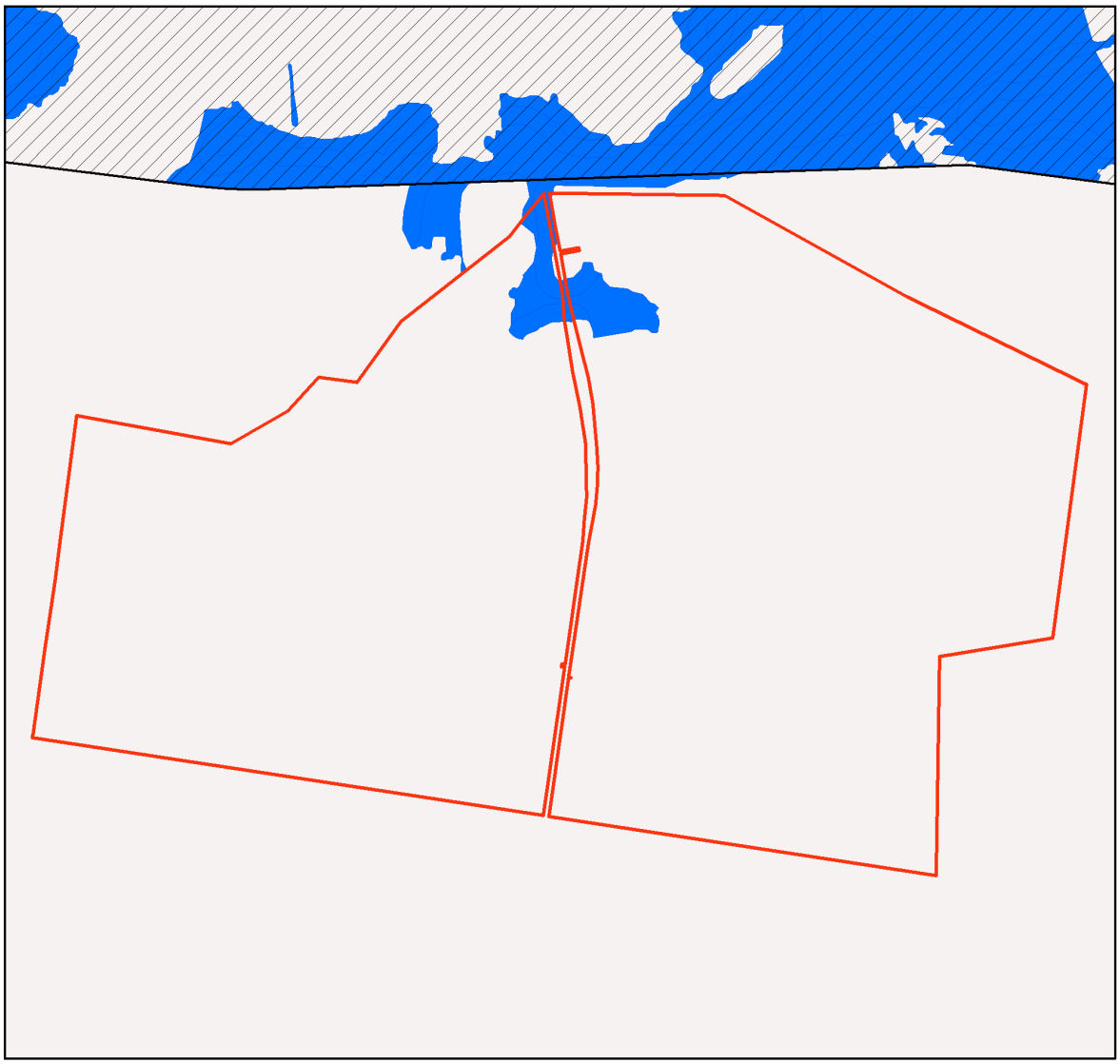
Map 3 - Corridors



Corridors

Legend

- Selected Lot and Plan
- Towns
- Roads
- Major rivers/creeks
- Queensland

Corridors

- State
- Regional

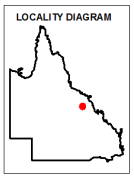
Corridor Triggered Vegetation

- State
- Regional
- Local

Core Area Vegetation

- Brigalow Belt only

LOCALITY DIAGRAM



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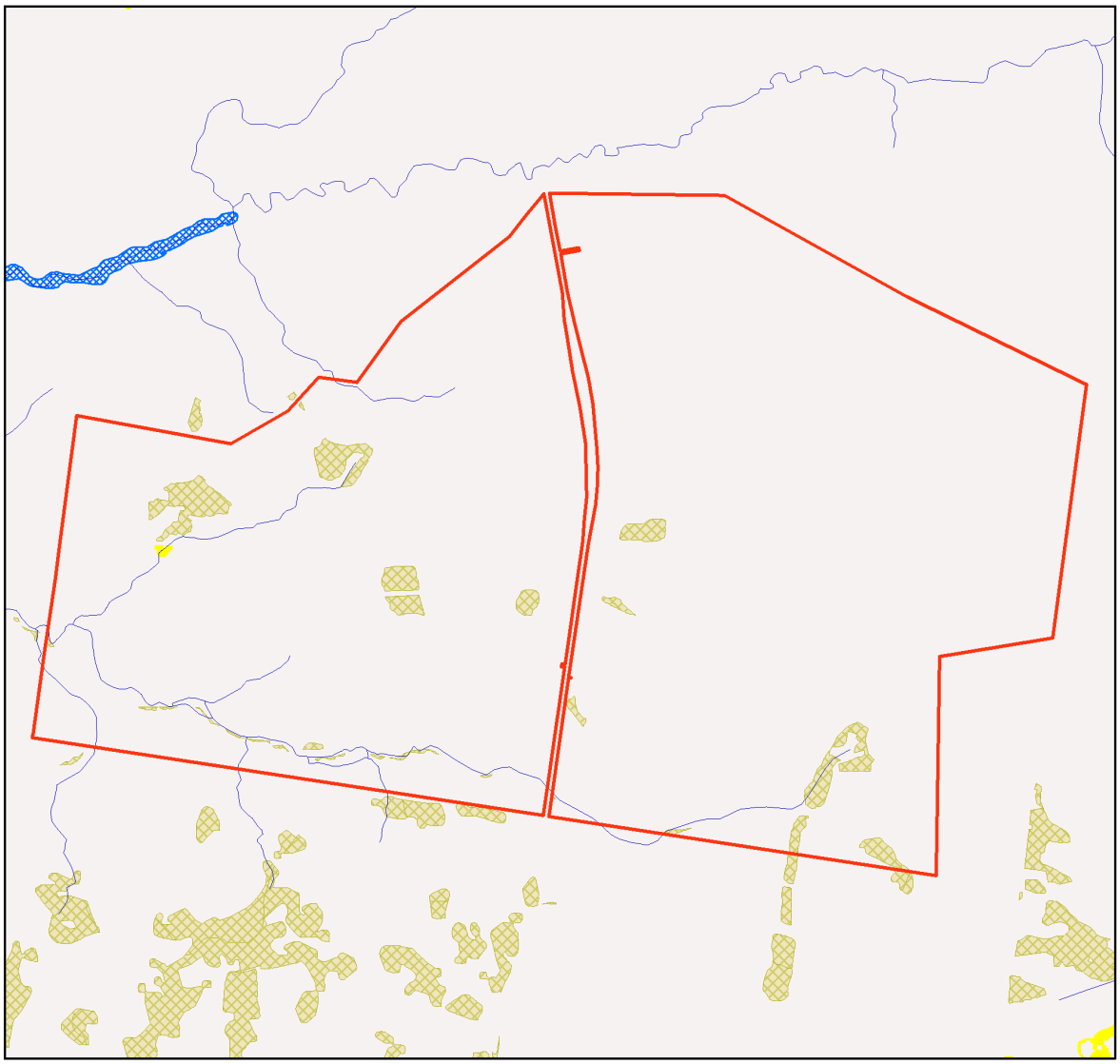
Map 4 - Wetlands and waterways



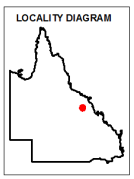
Wetlands and Waterways

Legend

- Selected Lot and Plan
- Towns
- Roads
- Springs
- Rivers/Creeks
- Directory of Important Wetlands
- Ramsar Sites - QLD
- Queensland

Wetland Type

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies
- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)



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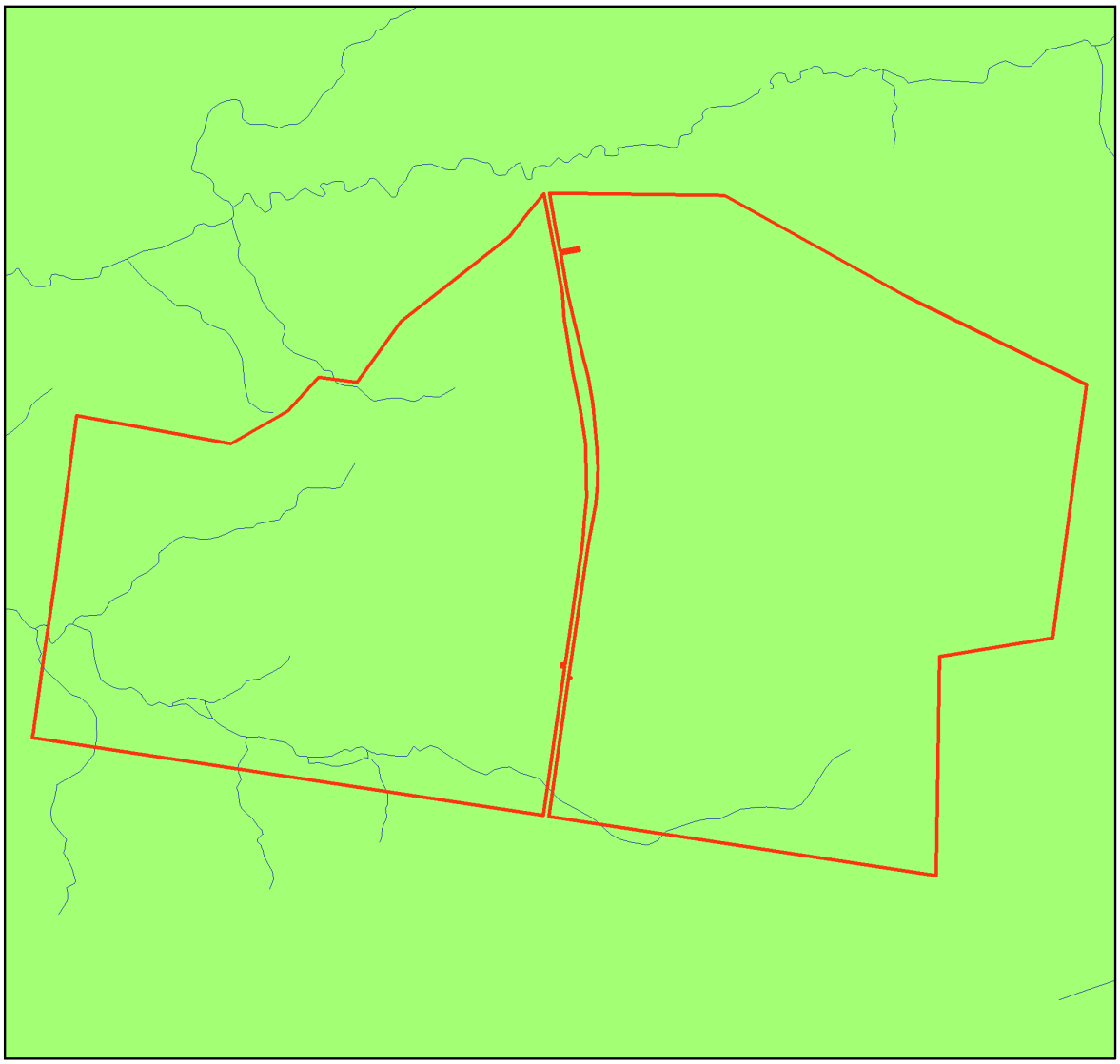
Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

Legend

- Selected Lot and Plan
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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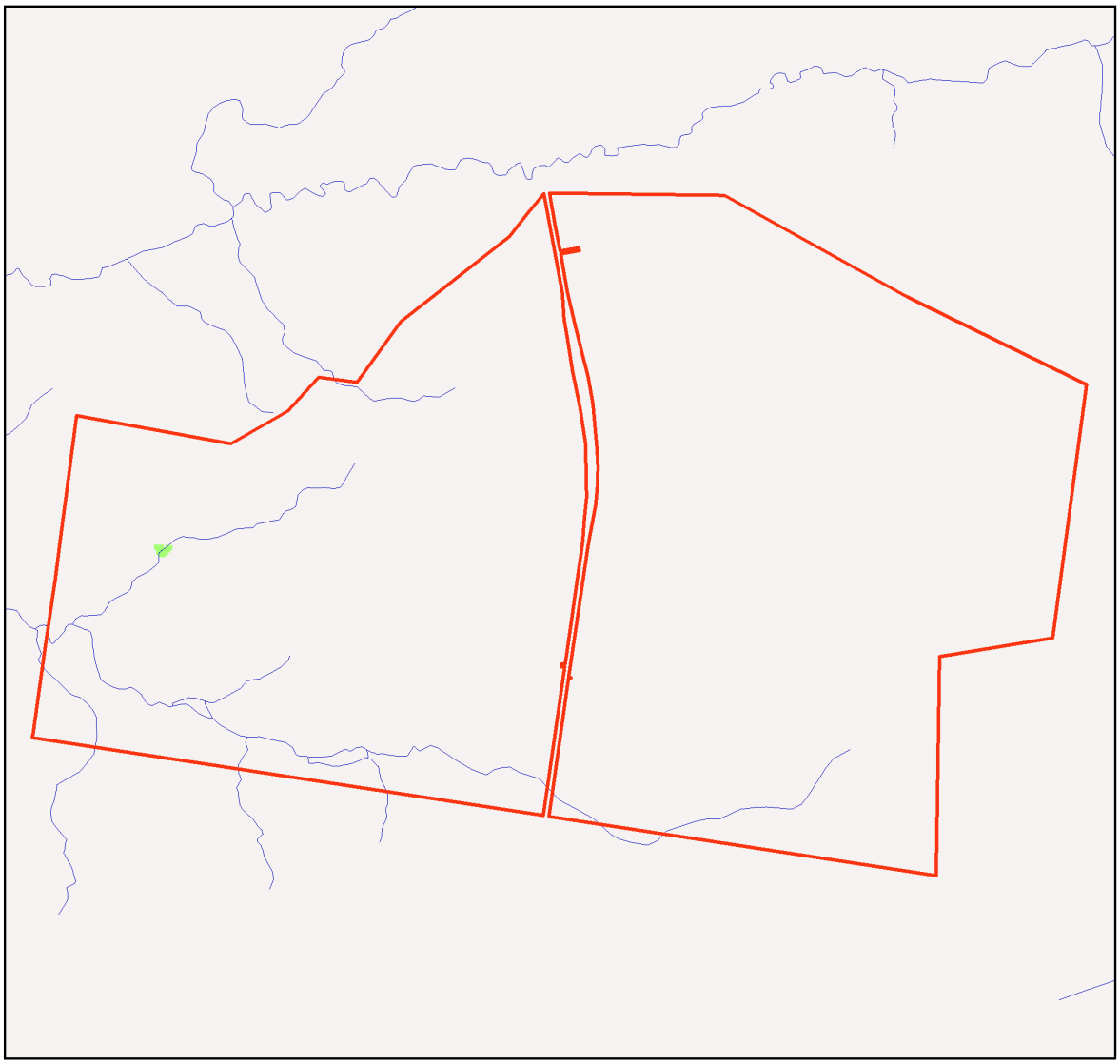
Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



Aquatic Conservation Assessment (ACA) - nonriverine

Legend

- Selected Lot and Plan
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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0 660 1320 1980 2640 3300 m

This product is projected into GDA 1994 Queensland Albers

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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 QMDB Non-riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1
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 QMDB Riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1
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 Einasleigh 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 DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, 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
DES	- Department of Environment and Science
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
Lot: 11 Plan: SP262530

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 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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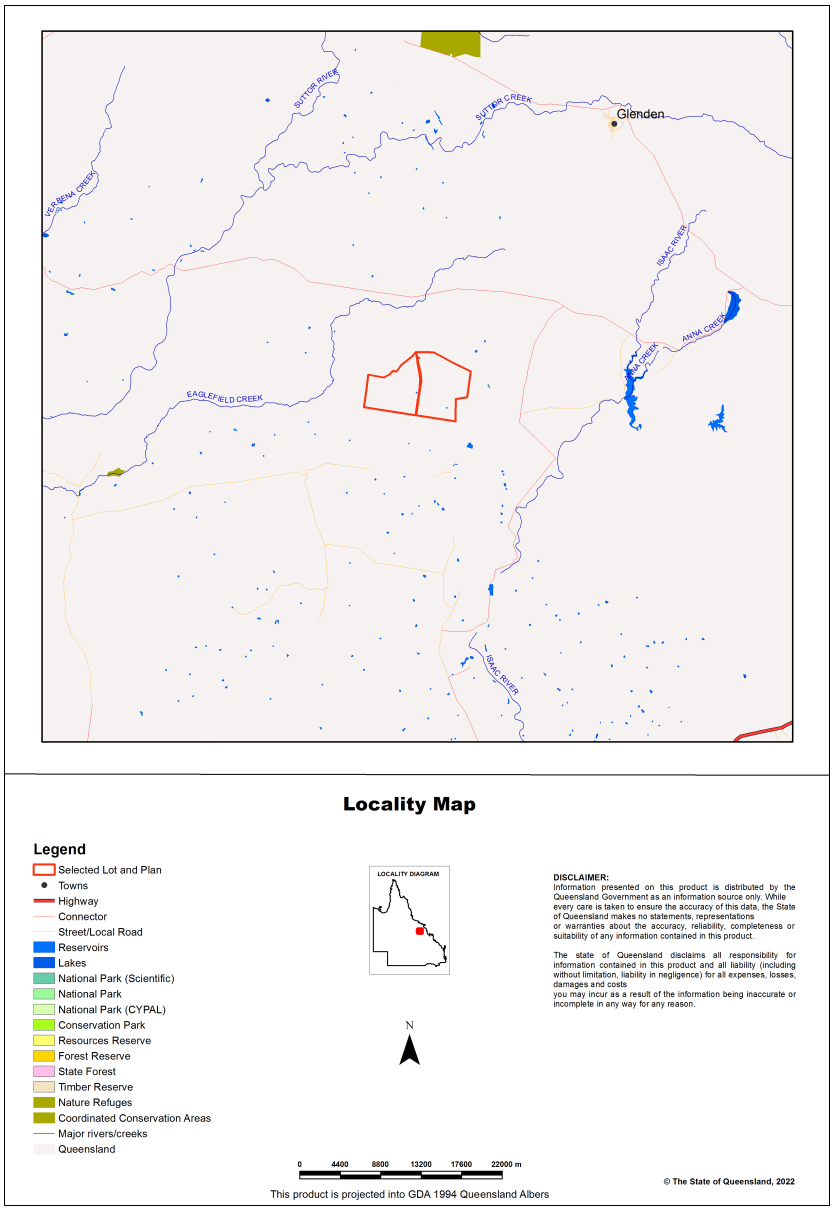
Table of Contents

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 Lot: 11 Plan: SP262530

Size (ha)	5,827.61
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin



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 planning and development assessment decision-making. Its primary purpose is to support 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. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts 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	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	0.0 ha	0.0 %
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	1866.96 ha	32.0%
7b Special least concern animals	387.6 ha	6.7%
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
7d Sea turtle nesting areas	0.0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	113.03 ha	1.9%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	13.62 ha	0.2%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	43.03 ha	0.7%
8d Regulated Vegetation - Essential habitat	1628.94 ha	28.0%
8e Regulated Vegetation - intersecting a watercourse	19.9 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0.0 ha	0.0 %
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 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

Values are present

7b. Special least concern animals

Values are present

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
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Macadamia ternifolia		V	None
Macadamia tetraphylla		V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	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

Scientific name	Common name	NCA status	EPBC status	Migratory status
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V	

Special least concern animal species records

Scientific name	Common name	Migratory status
Tachyglossus aculeatus	short-beaked echidna	None

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, 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)

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.8.11/11.8.5	O-dom	rem_oc
11.8.13	E-dom	rem_end
11.4.9/11.4.8/11.9.1	E-dom	rem_end
11.3.4	O-dom	rem_oc
11.4.9	E-dom	rem_end
11.9.1	E-dom	rem_end
11.4.11/11.4.8/11.4.9	E-subdom	rem_end
11.4.8	E-dom	rem_end
11.8.13/11.8.5	E-dom	rem_end

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.4.9	E-dom	hvr_end

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

Regulated vegetation map category	Map number
R	8454

8d. Regulated Vegetation - Essential habitat

Values are present

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

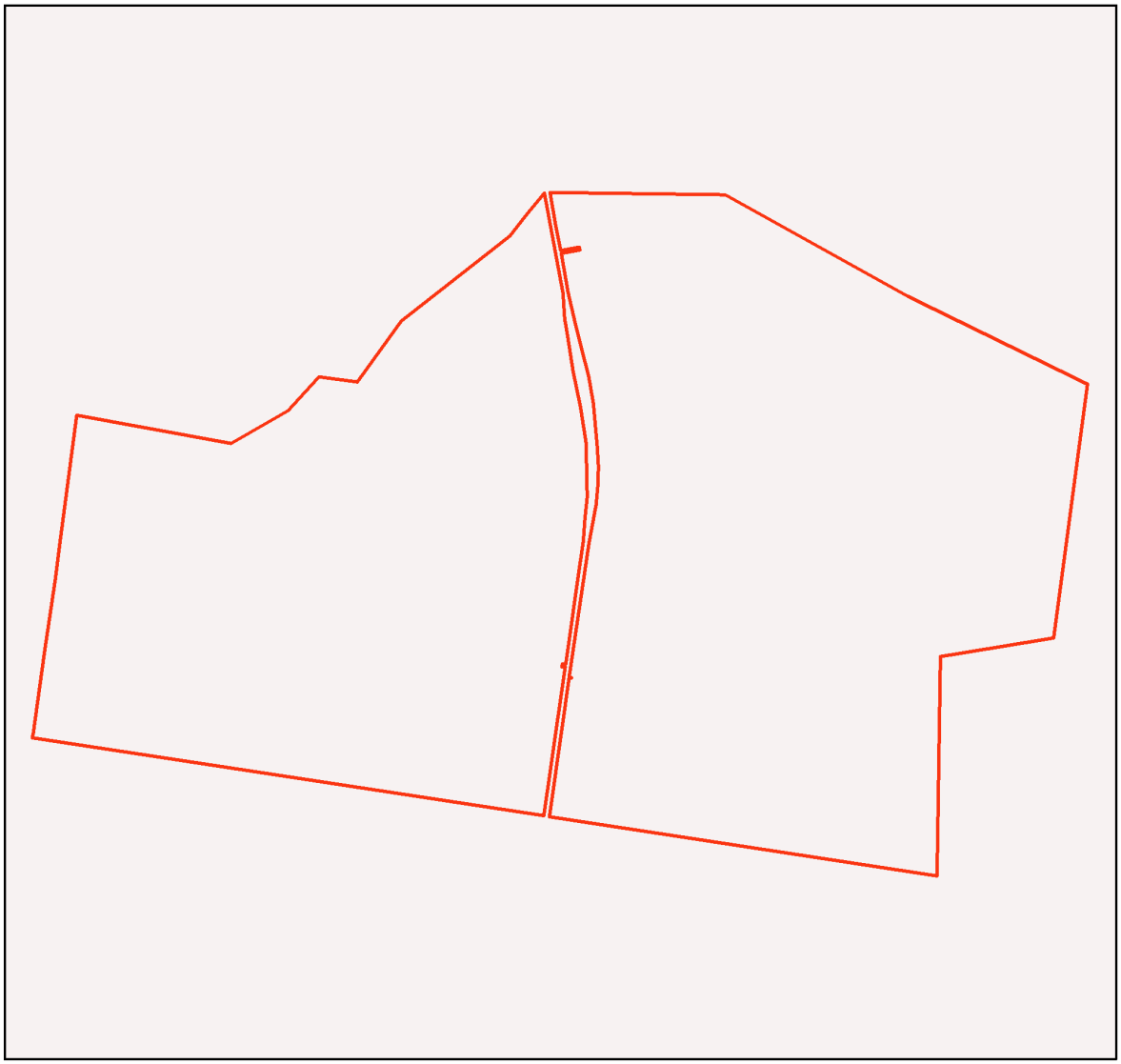
(no results)

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.

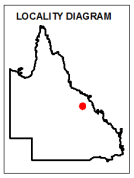
Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

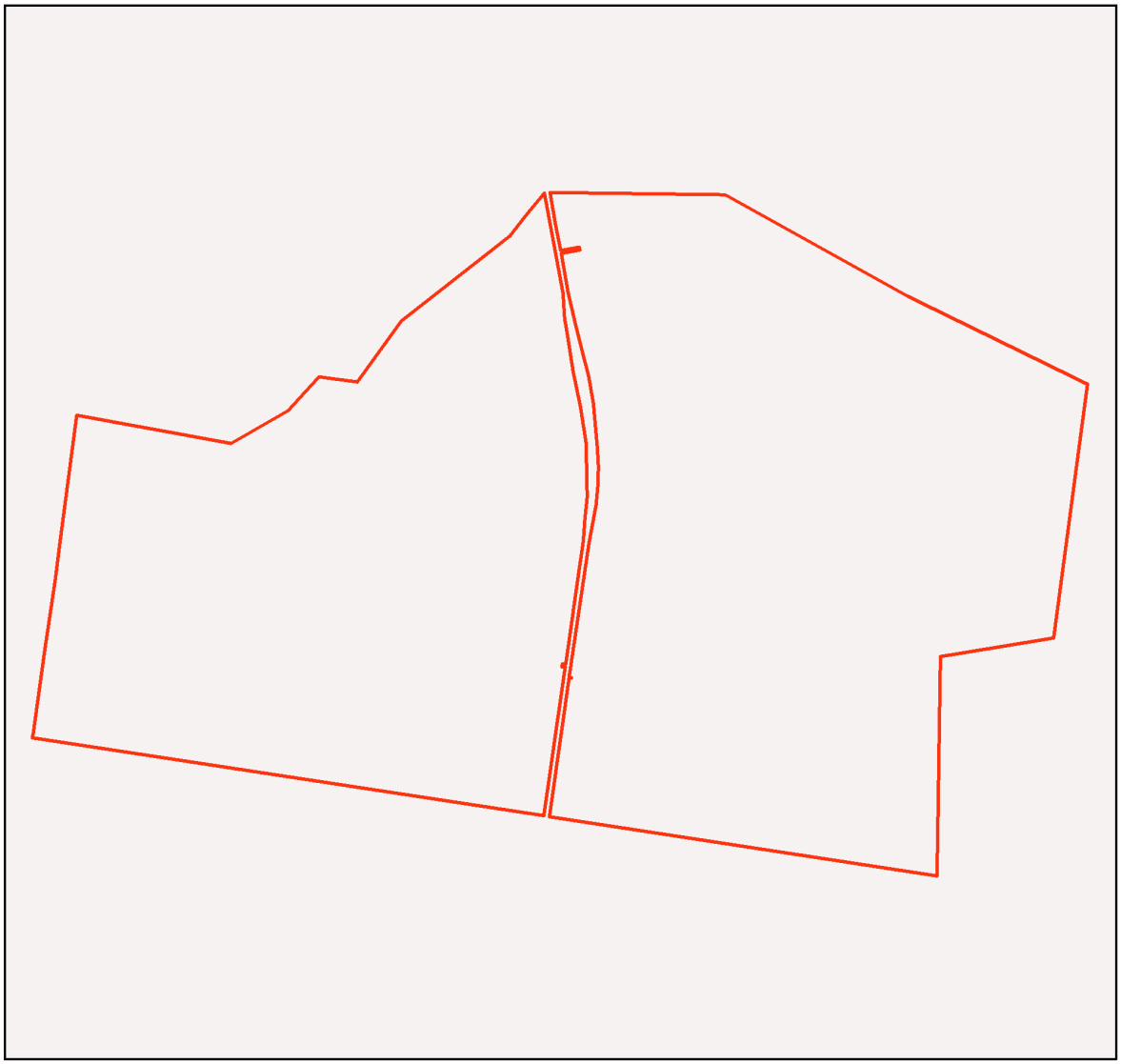
Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates, nature refuges, special wildlife reserves)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)



This product is projected into GDA 1994 Queensland Albers

Map 2 - MSES - Wetlands and Waterways

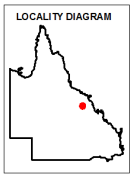


MSES - Wetlands and Waterways

Area of Interest

- Selected Lot and Plan
- 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

LOCALITY DIAGRAM



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0 660 1320 1980 2640 3300 m

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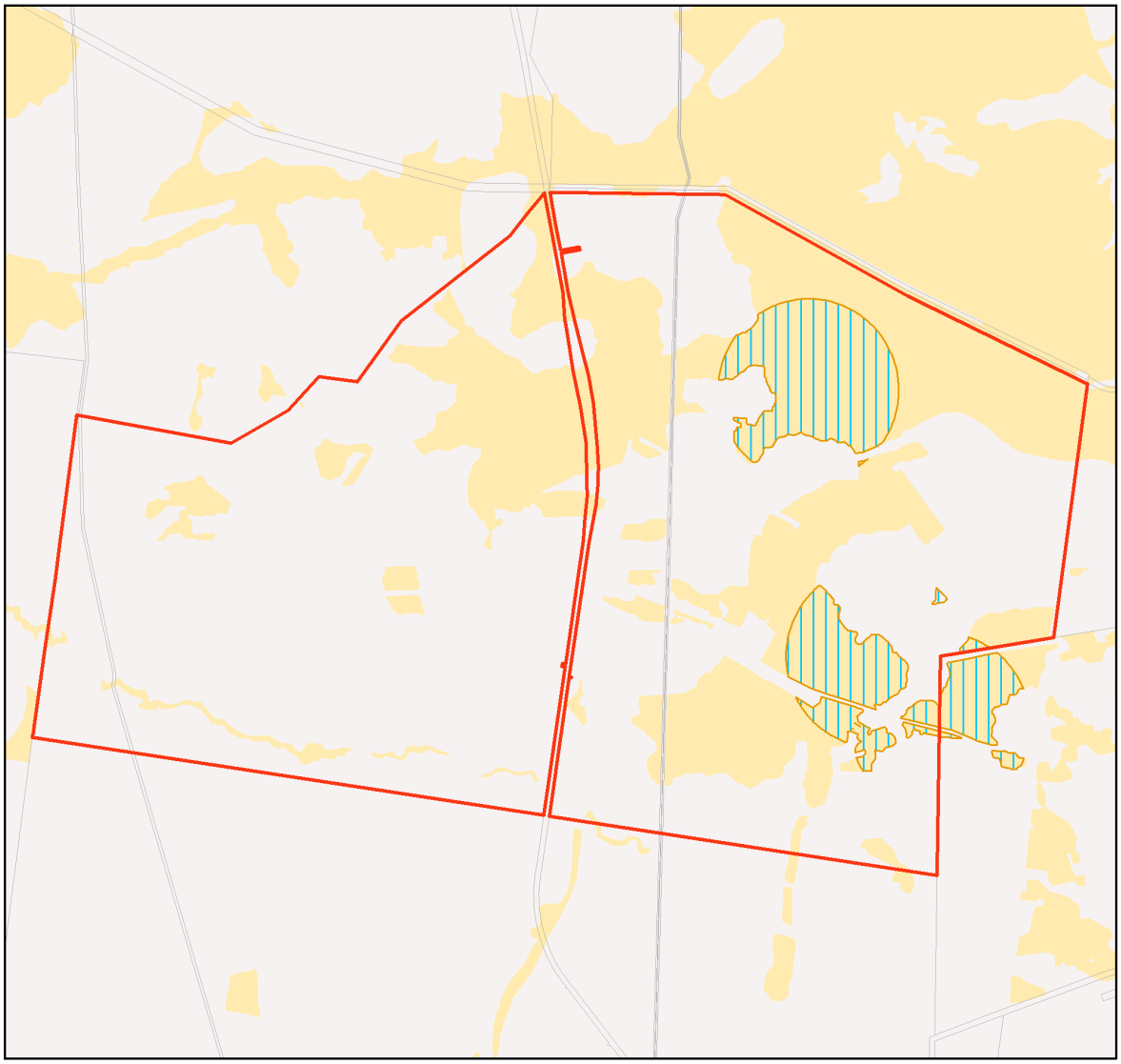
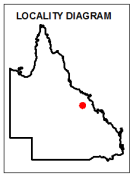
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



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

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)

LOCALITY DIAGRAM



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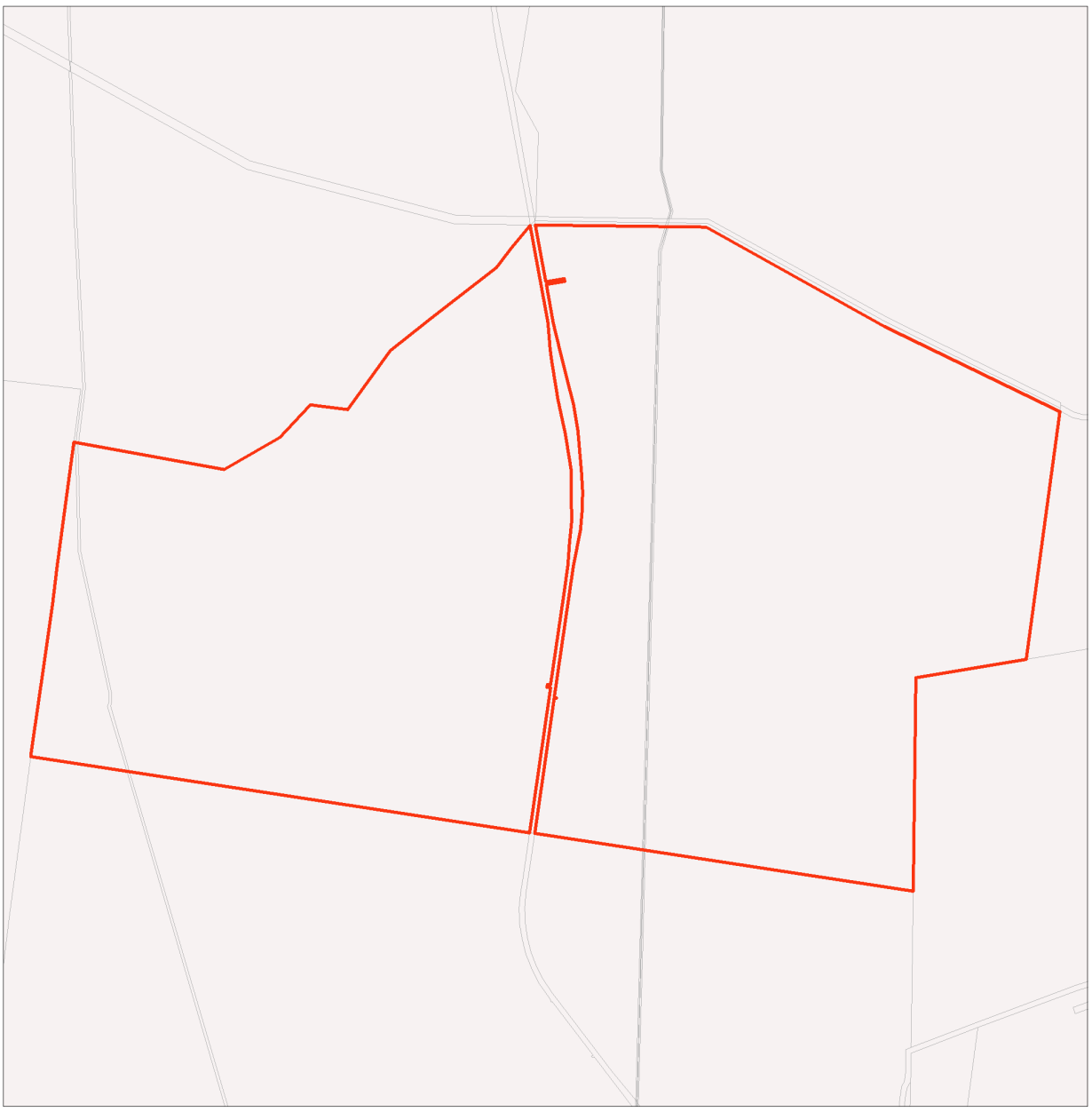
0 660 1320 1980 2640 3300 m

This product is projected into GDA 1994 Queensland Albers

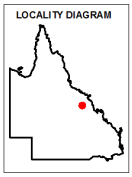
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)

LOCALITY DIAGRAM



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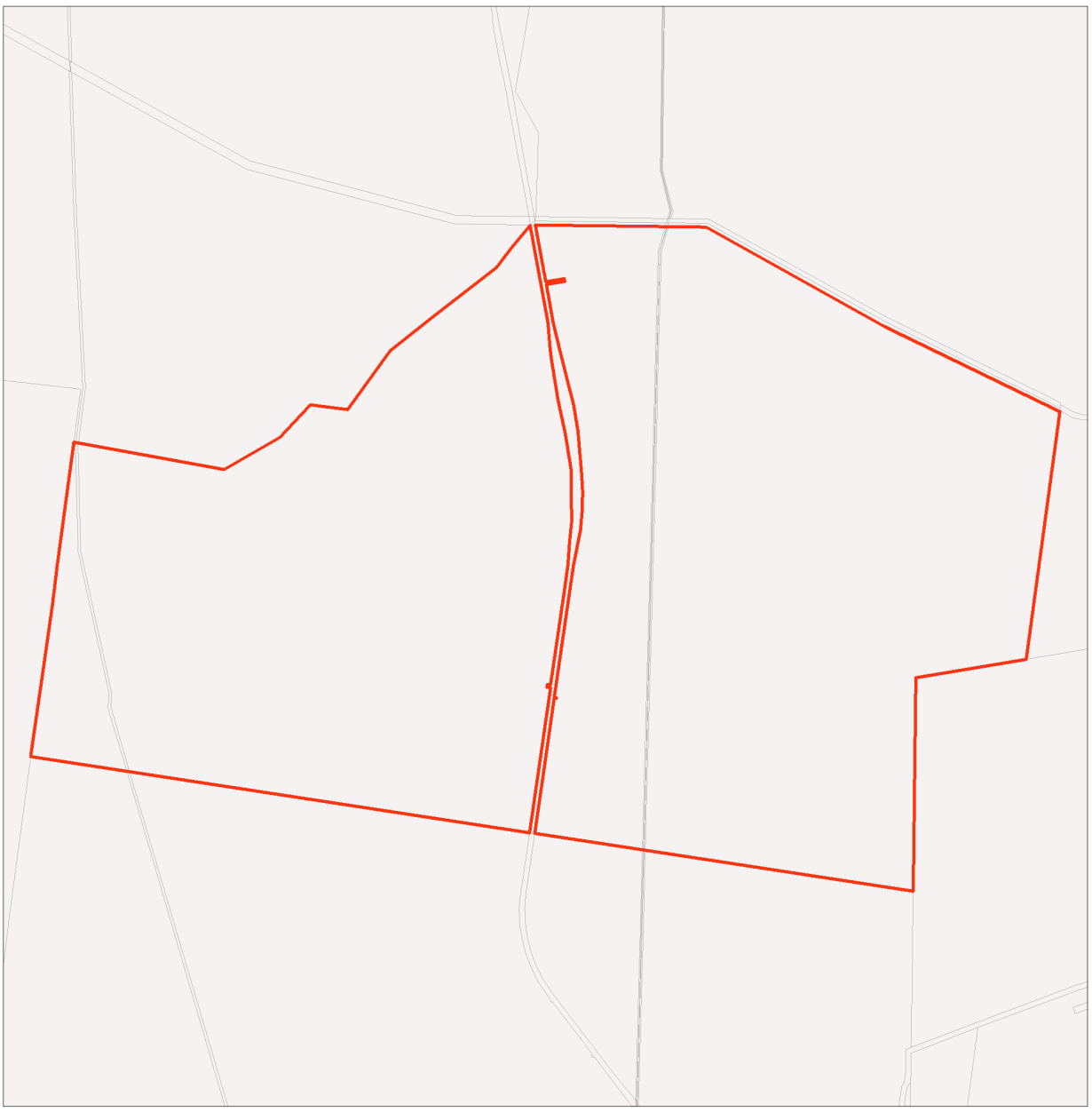
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be 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.

0 630 1,260 1,890 2,520 3,150 m

This product is projected into GDA 1994 Queensland Albers

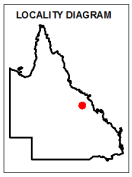
Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)

LOCALITY DIAGRAM



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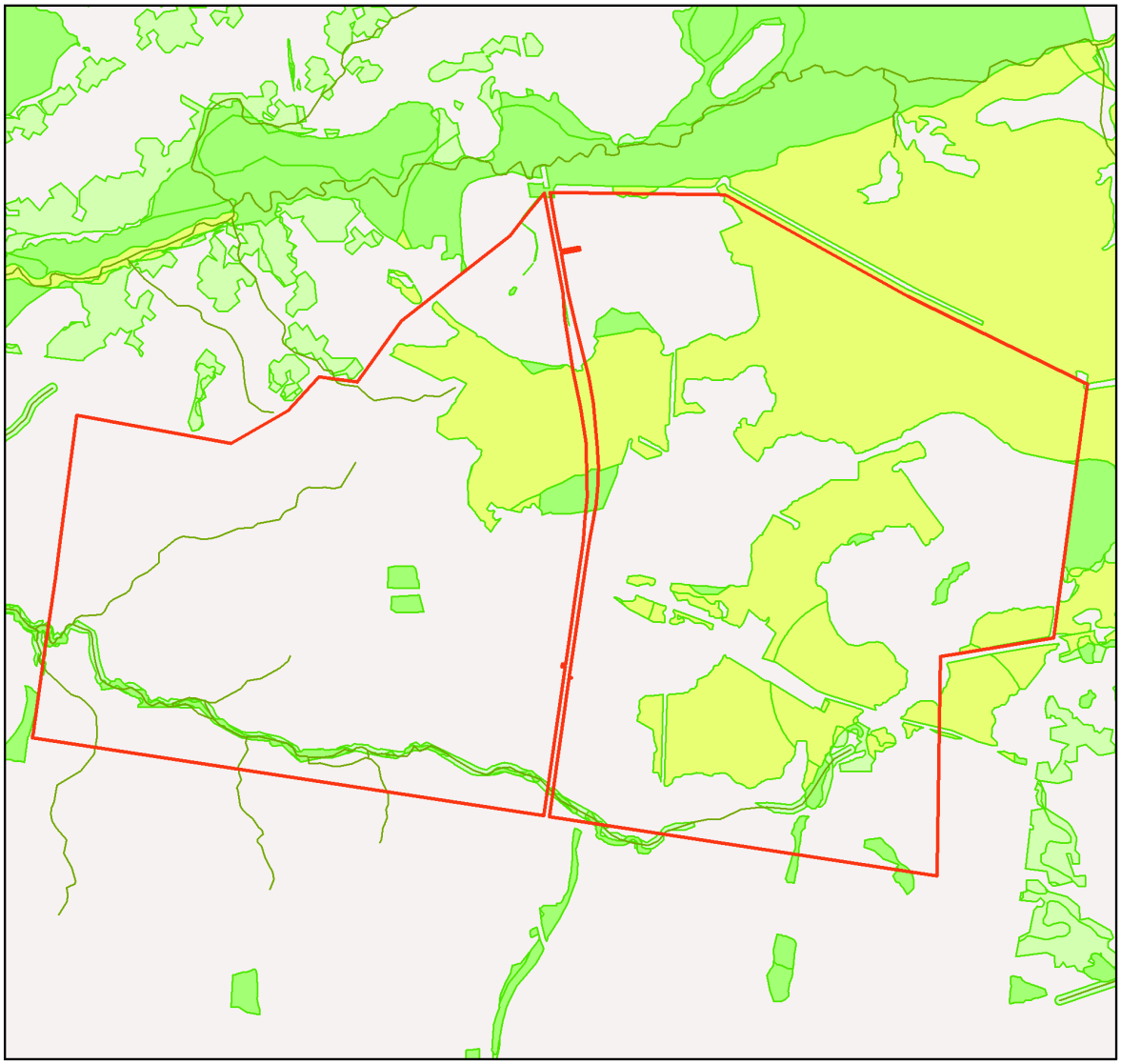
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.

0 630 1,260 1,890 2,520 3,150 m

This product is projected into GDA 1994 Queensland Albers

Map 4 - MSES - Regulated Vegetation

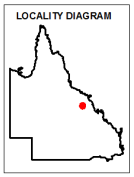


MSES - Regulated Vegetation

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)

LOCALITY DIAGRAM



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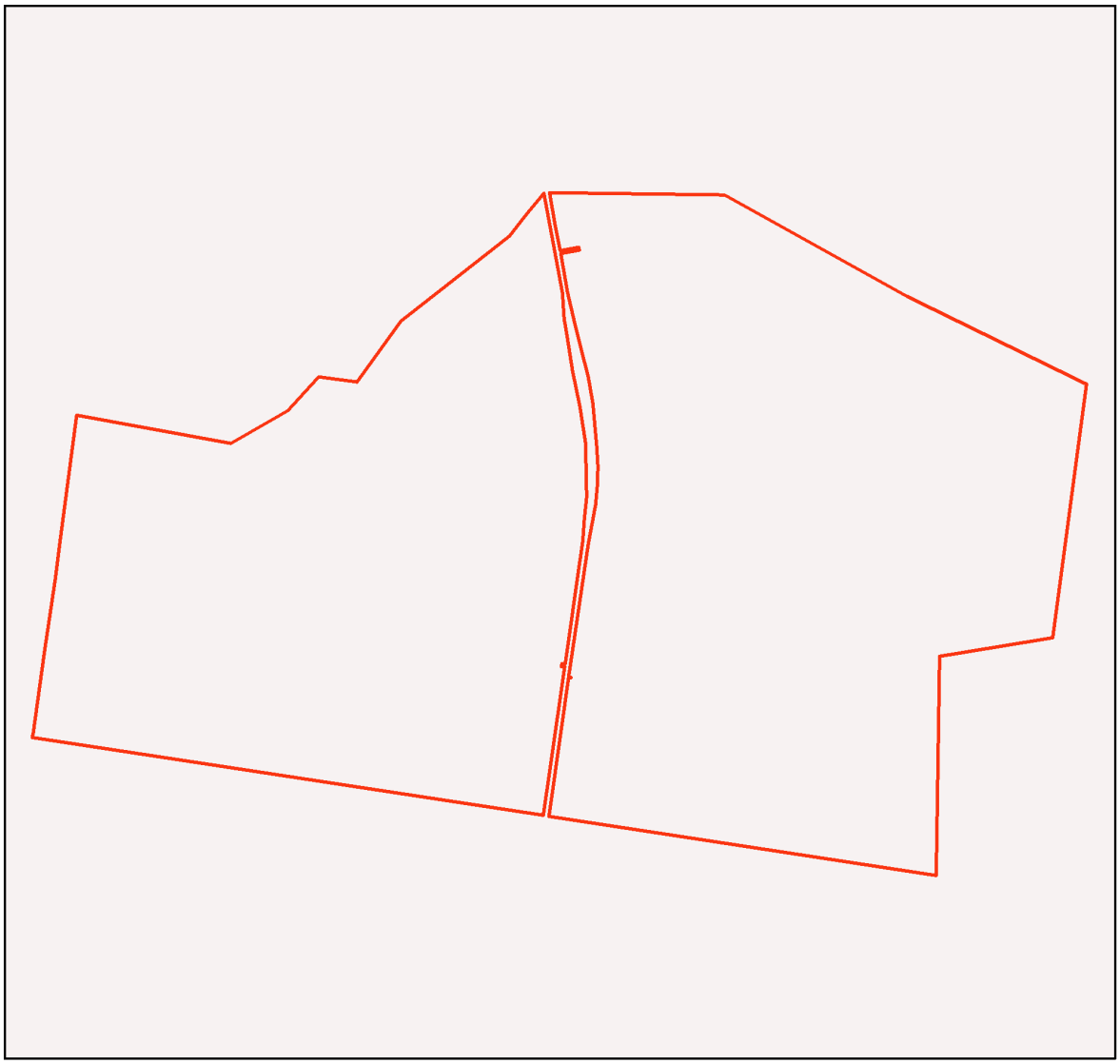
0 660 1320 1980 2640 3300 m

This product is projected into GDA 1994 Queensland Albers

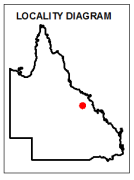
Map 5 - MSES - Offset Areas



MSES - Offsets

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)



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0 660 1320 1980 2640 3300 m

This product is projected into GDA 1994 Queensland Albers

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). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support 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. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" 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 - Sea Turtle Nesting Areas records
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
DES	- Department of Environment and Science
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 and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
Lot: 11 Plan: SP262530

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 input coordinates.

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 matters of interest 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.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.resources.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@qld.gov.au

Disclaimer

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Table of Contents

Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details: Lot: 11 Plan: SP262530

Size (ha)	5,827.61
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	355.38	6.1
Of concern	115.24	1.98
No concern at present	1,491.78	25.6
Total remnant vegetation	1,962.39	33.67

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

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.resources.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
11.3.1	Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains	Endangered	0.6	0.01
11.3.4	Eucalyptus tereticornis and/or Eucalyptus spp. woodland on alluvial plains	Of concern	33.37	0.57
11.4.11	Dichanthium sericeum and Astrebla spp. grassland with patchy Acacia harpophylla or Eucalyptus coolabah on Cainozoic clay plains	Of concern	0.37	0.01
11.4.8	Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains	Endangered	24.31	0.42
11.4.9	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains	Endangered	69.99	1.2
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces	Endangered	159.2	2.73
11.5.3	Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces	No concern at present	1,432.76	24.59
11.8.11	Dichanthium sericeum grassland on Cainozoic igneous rocks	Of concern	81.49	1.4
11.8.13	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks	Endangered	90.44	1.55
11.8.5	Eucalyptus orgadophila open woodland on Cainozoic igneous rocks	No concern at present	50.05	0.86
11.9.1	Acacia harpophylla-Eucalyptus cambageana woodland to open forest on fine-grained sedimentary rocks	Endangered	10.84	0.19
11.9.9	Eucalyptus crebra woodland on fine-grained sedimentary rocks	No concern at present	8.97	0.15
non-remnant	None	None	3,865.19	66.33

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
11.3.1	Pre-clearing 784000 ha; Remnant 2019 81000 ha	25a	Not a Wetland	Low
11.3.4	Pre-clearing 684000 ha; Remnant 2019 179000 ha	16c	Not a Wetland	Low
11.4.11	Pre-clearing 74000 ha; Remnant 2019 24000 ha	30b	Not a Wetland	Low
11.4.8	Pre-clearing 726000 ha; Remnant 2019 67000 ha	25a	Contains Palustrine	Low
11.4.9	Pre-clearing 998000 ha; Remnant 2019 90000 ha	25a	Contains Palustrine	Low
11.5.15	Pre-clearing 44000 ha; Remnant 2019 15000 ha	7a	Not a Wetland	Low
11.5.3	Pre-clearing 976000 ha; Remnant 2019 369000 ha	17a	Not a Wetland	Low
11.8.11	Pre-clearing 602000 ha; Remnant 2019 170000 ha	30b	Not a Wetland	Low
11.8.13	Pre-clearing 50000 ha; Remnant 2019 6000 ha	7a	Not a Wetland	Low
11.8.5	Pre-clearing 632000 ha; Remnant 2019 346000 ha	11a	Not a Wetland	Low
11.9.1	Pre-clearing 564000 ha; Remnant 2019 53000 ha	25a	Not a Wetland	Low
11.9.9	Pre-clearing 258000 ha; Remnant 2019 127000 ha	13c	Not a Wetland	Low
non-remnant	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
11.3.1	Habitat for threatened fauna species including painted honeyeater, Grantiella picta particularly in subregion 35 (Oliver et al. 2003).
11.3.4	Potential habitat for NCA listed species: Acacia pedleyi, Callicarpa thozetii, Cycas megacarpa, Cycas ophiolitica, Digitaria porrecta, Eriocaulon carsonii subsp. orientale, Livistona nitida, Rhaponticum australe, Samadera bidwillii, Sannantha brachypoda. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.4.11	None
11.4.8	Larger gilgai provides ephemeral wetland habitat.

Regional Ecosystem	Special Values
11.4.9	Potential habitat for NCA listed species: Cadellia pentastylis, Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea
11.5.15	Habitat for threatened plant species including Fontainea fugax, Pomaderris clivicola and Cadellia pentastylis and the near threatened species Macropteranthes leiocaulis; a wide range of flora and fauna species with disjunct distributions.
11.5.3	Potential habitat for NCA listed species: Sannantha brachypoda
11.8.11	Habitat for threatened plant species including Trioncinia retroflexa and Dichanthium queenslandicum. T. retroflexa is currently known from three small populations.
11.8.13	Habitat for threatened plant species Croton magneticus.
11.8.5	In southern part of bioregion, habitat for a number of threatened plant species including Picris evae and Thesium australe and near threatened species Digitaria porrecta and Discaria pubescens. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus). 11.8.5a: This ecosystem is known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.9.1	Potential habitat for NCA listed species: Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea
11.9.9	Potential habitat for NCA listed species: Capparis humistrata, Leucopogon sp. (Coolmunda D.Halford Q1635), Omphalea celata. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
non-remnant	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	3,865.19	66.33
11a	Moist to dry open forests to woodlands dominated by Eucalyptus orgadophila (mountain coolibah). Some areas dominated by E. tereticornis (blue gum), E. melliodora (yellow box), E. albens (white box), E. crebra (narrow-leaved red ironbark) or E. melanophloia (silver-leaved ironbark). (land zones 8, 11, 4, [3]) (BRB, SEQ, EIU)	50.05	0.86

BVG (1 Million)	Description	Area (Ha)	% of AOI
13c	Woodlands of Eucalyptus crebra (sens. lat.) (narrow-leaved red ironbark), E. drepanophylla (grey ironbark), E. fibrosa (dusky-leaved ironbark), E. shirleyi (shirley's silver-leaved ironbark) on granitic and metamorphic ranges (land zones 12, 11, 9, [5]) (BRB, EIU, SEQ, NET, CQC)	8.97	0.15
16c	Woodlands and open woodlands dominated by Eucalyptus coolabah (coolabah) or E. microtheca (coolabah) or E. largiflorens (black box) or E. tereticornis (blue gum) or E. chlorophylla on floodplains. Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (All bioregions except WET, principally GUP, BRB, MUL).	33.37	0.57
17a	Woodlands dominated by Eucalyptus populnea (poplar box) (or E. brownii (Reid River box)) on alluvium, sand plains and footslopes of hills and ranges. (land zones 3, 5, 10, 9, 4, 11, 12, [8]) (BRB, MUL, DEU, MUL, EIU)	1,432.76	24.59
25a	Open forests to woodlands dominated by Acacia harpophylla (brigalow) sometimes with Casuarina cristata (belah) on heavy clay soils. Includes areas co-dominated with A. cambagei (gidgee) and/or emergent eucalypts (land zones 4, 9, 3, 11, 7, 12, [5, 8]) (BRB, MUL, MGD, DEU, [SEQ])	105.74	1.81
30b	Tussock grasslands dominated by Astrebla spp. (mitchell grass) or Dichanthium spp. (bluegrass) often with Iseilema spp. on undulating downs or clay plains. (land zones 9, 3, 4, 8, [5]) (MGD, CHC, GUP, BRB, [EIU, DEU, NWH])	81.86	1.4
7a	Semi-evergreen vine thickets on wide range of substrates. (land zones 8, 9, 11, 12, 5, 4, 3, 10, [7]) (BRB, EIU, SEQ, CQC, [WET, GUP]) (Tracey 1982 11)	249.63	4.28

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

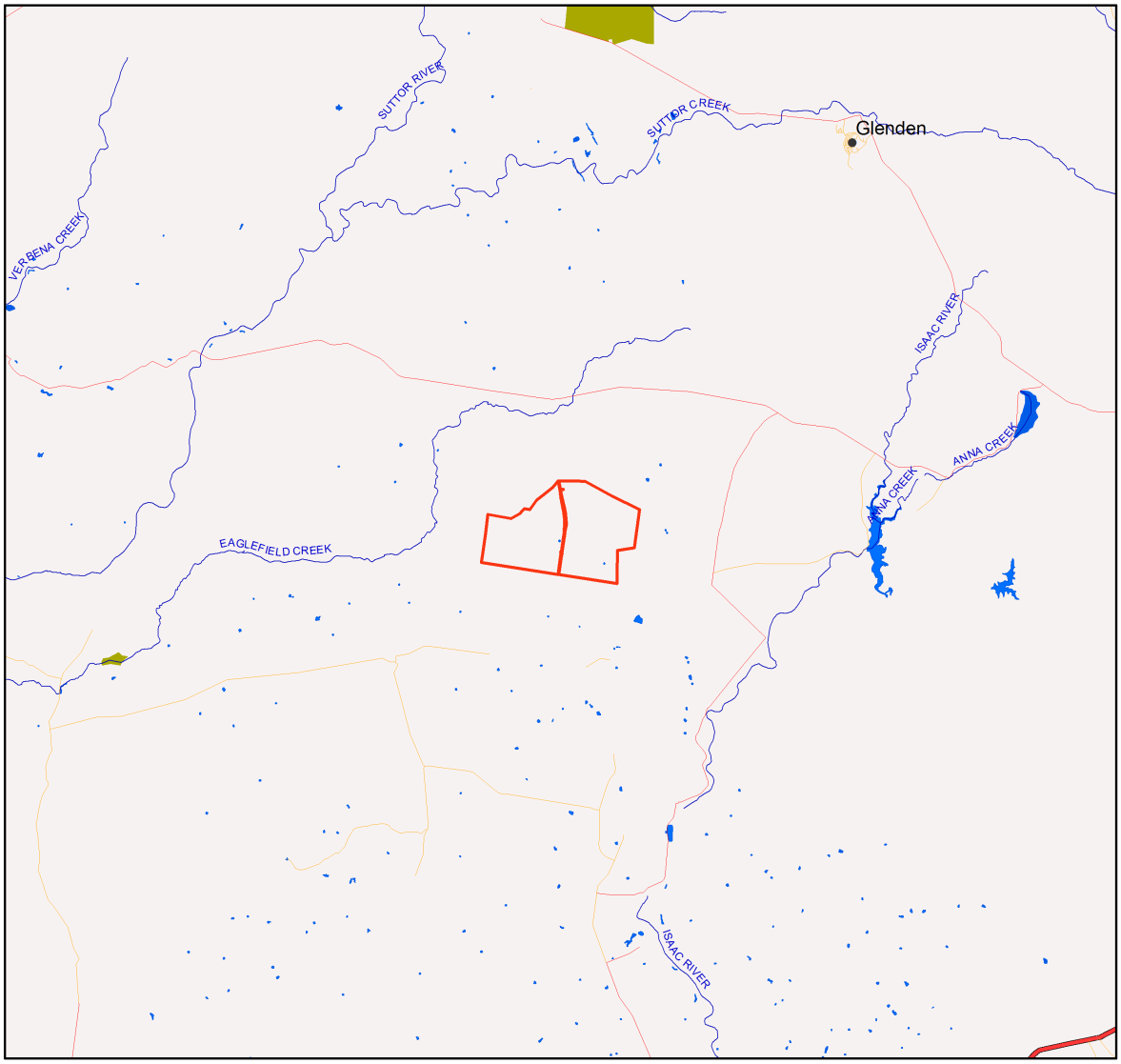
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
11.3.1	Available	Available
11.3.4	Available	Available
11.4.11	Available	Not currently available
11.4.8	Available	Available
11.4.9	Available	Not currently available
11.5.15	Available	Available
11.5.3	Available	Available
11.8.11	Available	Available
11.8.13	Available	Not currently available
11.8.5	Available	Not currently available
11.9.1	Available	Available
11.9.9	Available	Available
non-remnant	Not currently available	Not currently available

Maps

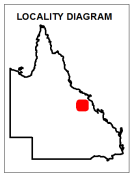
Map 1 - Location



Locality Map

Legend

- Selected Lot and Plan
- Towns
- Highway
- 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



N

0 4400 8800 13200 17600 22000 m

This product is projected into GDA 1994 Queensland Albers

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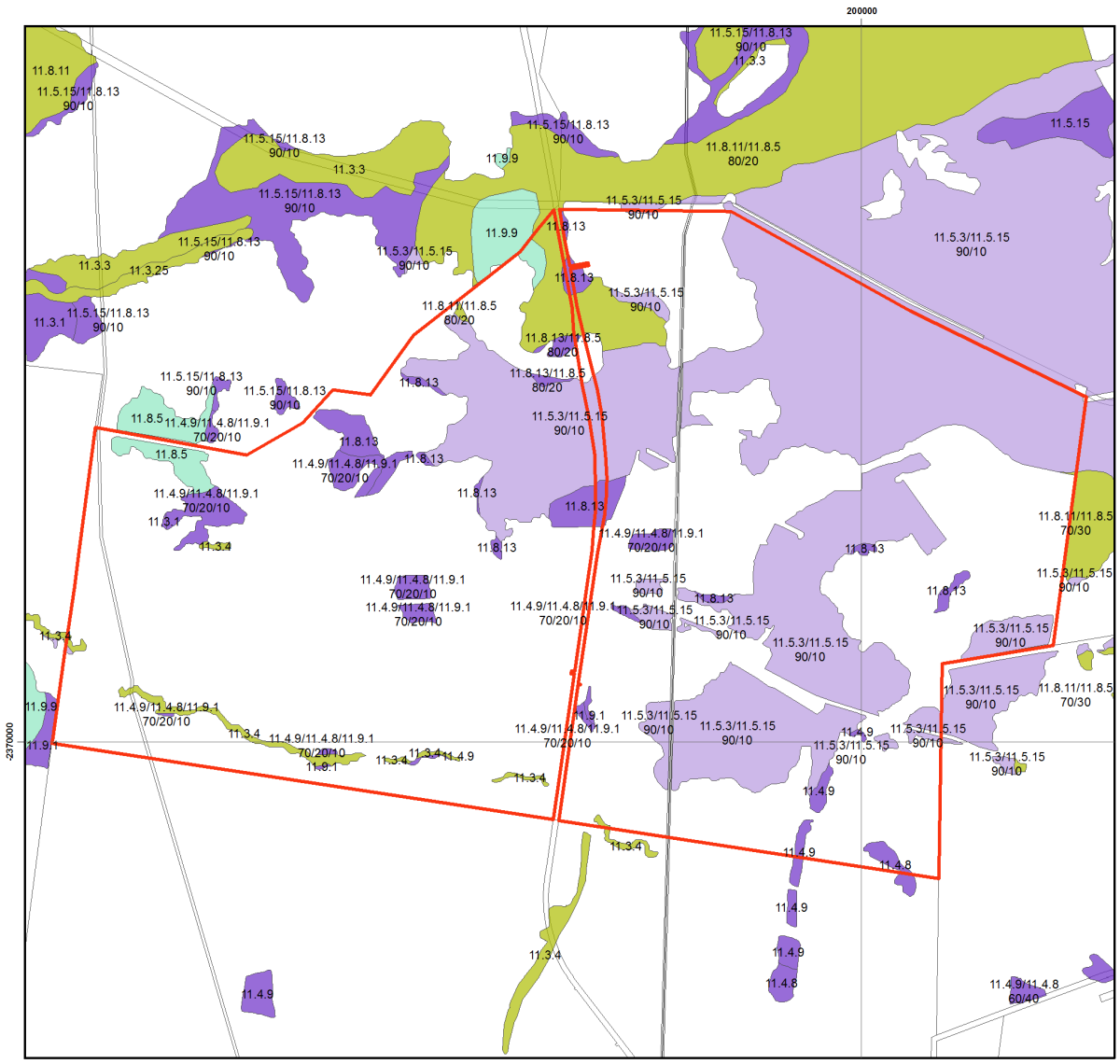
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

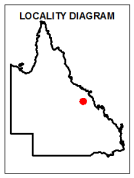
Map 2 - Remnant 2019 regional ecosystems



Remnant 2019 Regional Ecosystems

Biodiversity Status

- Selected Lot and Plan
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant vegetation, cultivated or built environment
- Plantation
- Water
- Cadastral Boundaries



N

0 0.7 1.4 2.1 2.8 km

This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

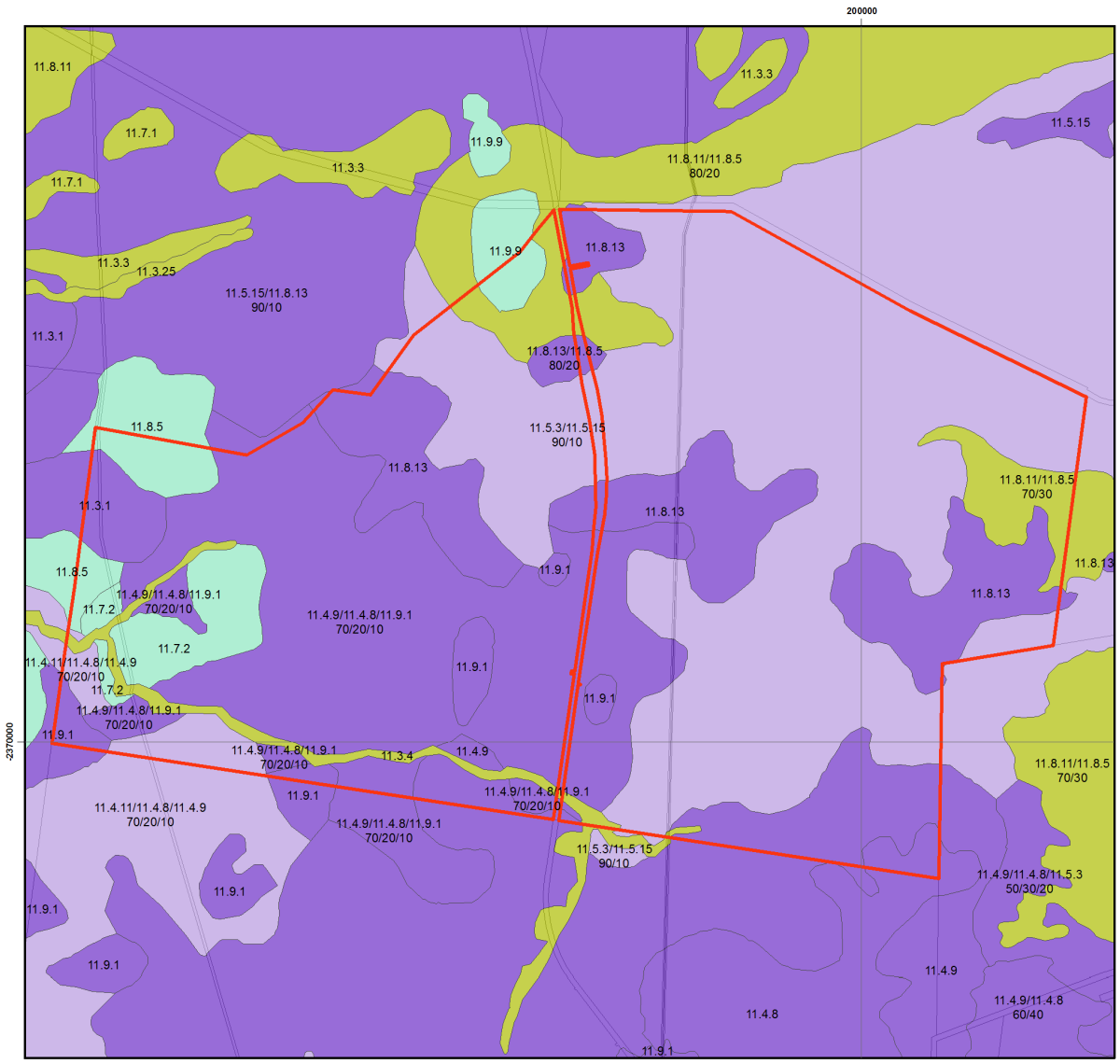
The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

Non-remnant vegetation includes regrowth and disturbed native vegetation.

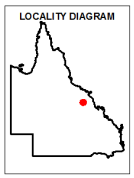
Map 3 - Pre-clearing regional ecosystems

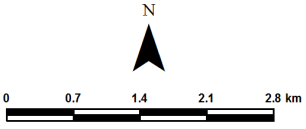


Pre-clearing Regional Ecosystems

Biodiversity Status

- Selected Lot and Plan
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries

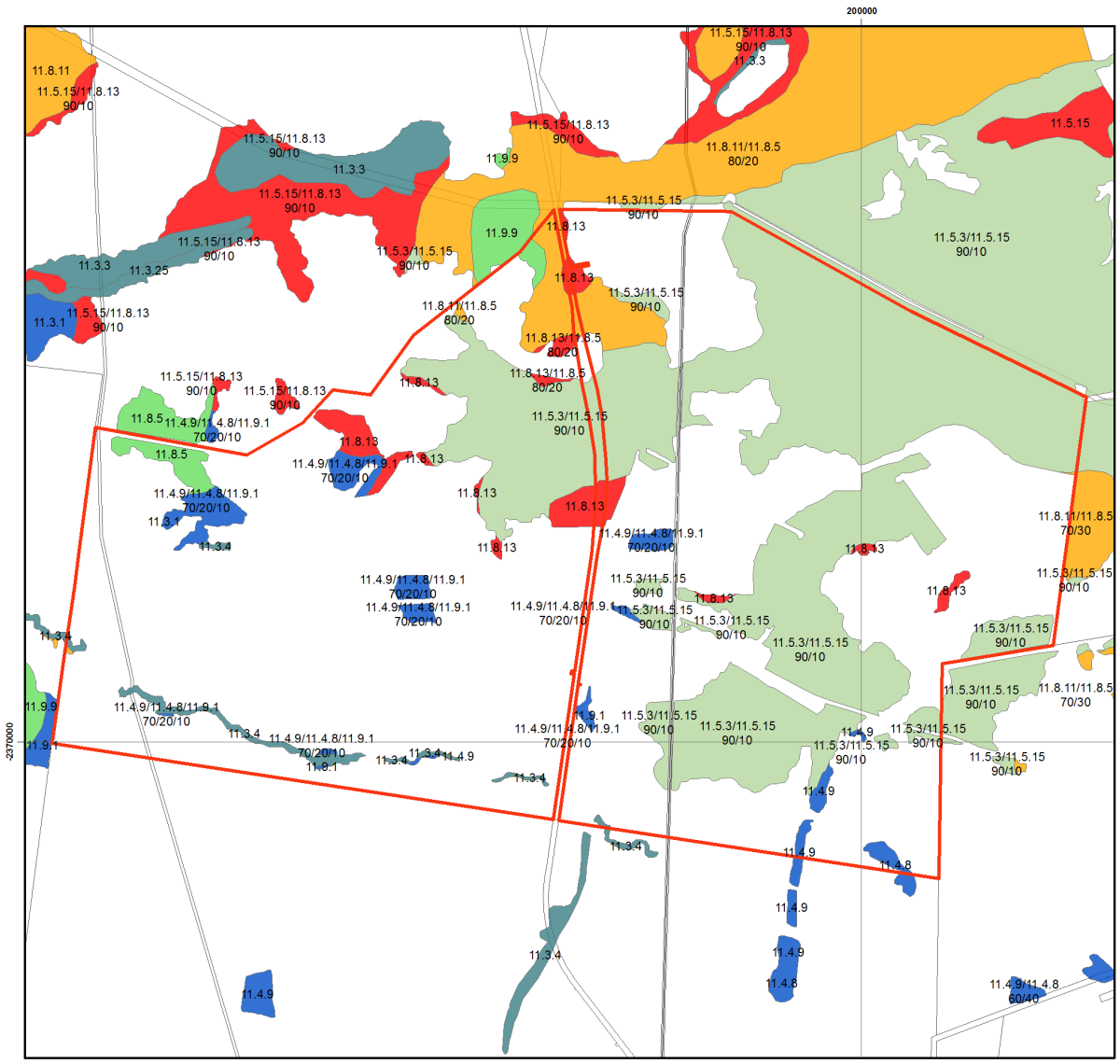




This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

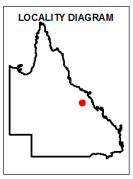
Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Remnant 2019 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- Selected Lot and Plan
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries



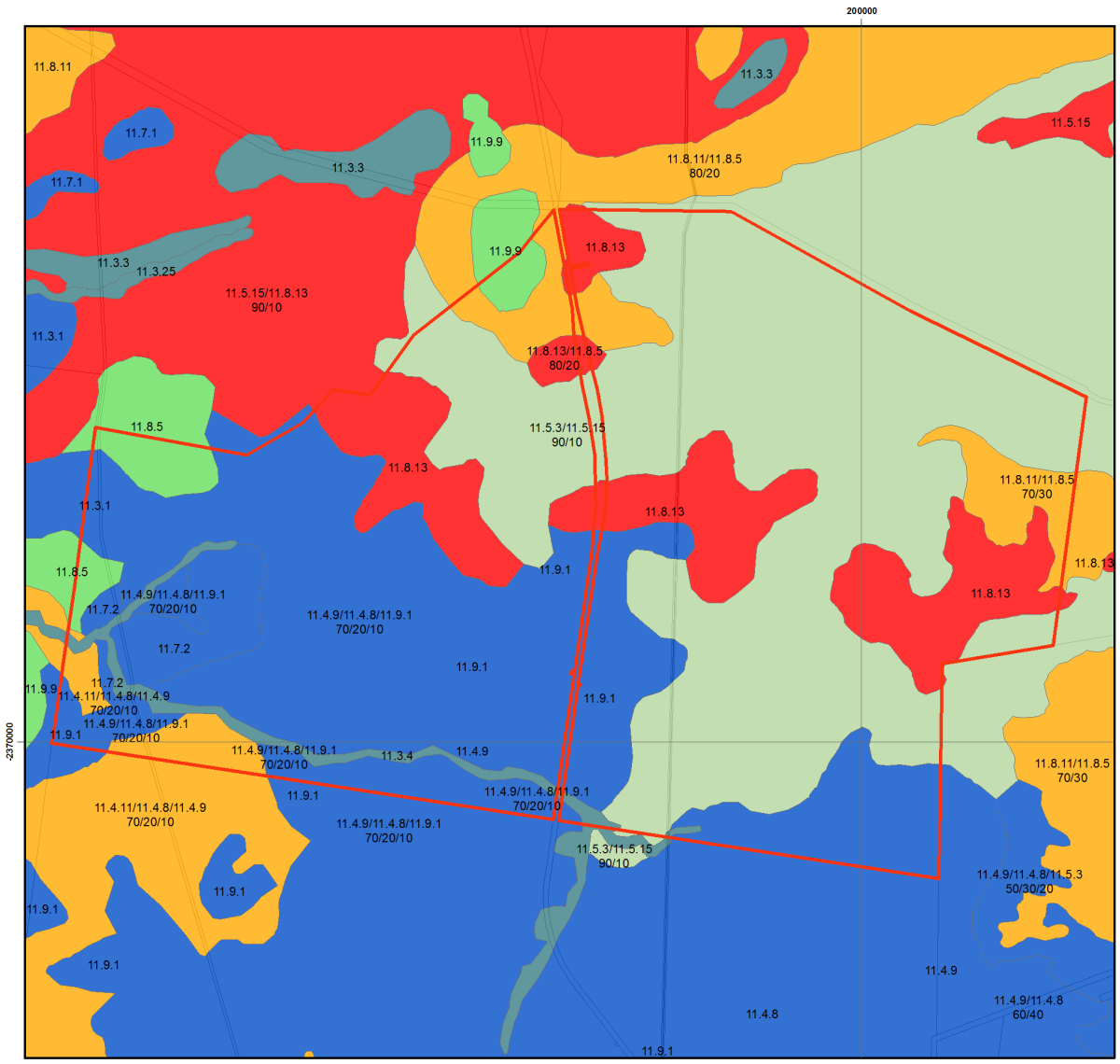
N

0 0.7 1.4 2.1 2.8 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.
Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
Non-remnant vegetation includes regrowth and disturbed native vegetation.

Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- Selected Lot and Plan
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
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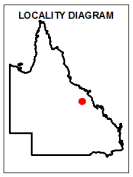
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries



N

0 0.7 1.4 2.1 2.8 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
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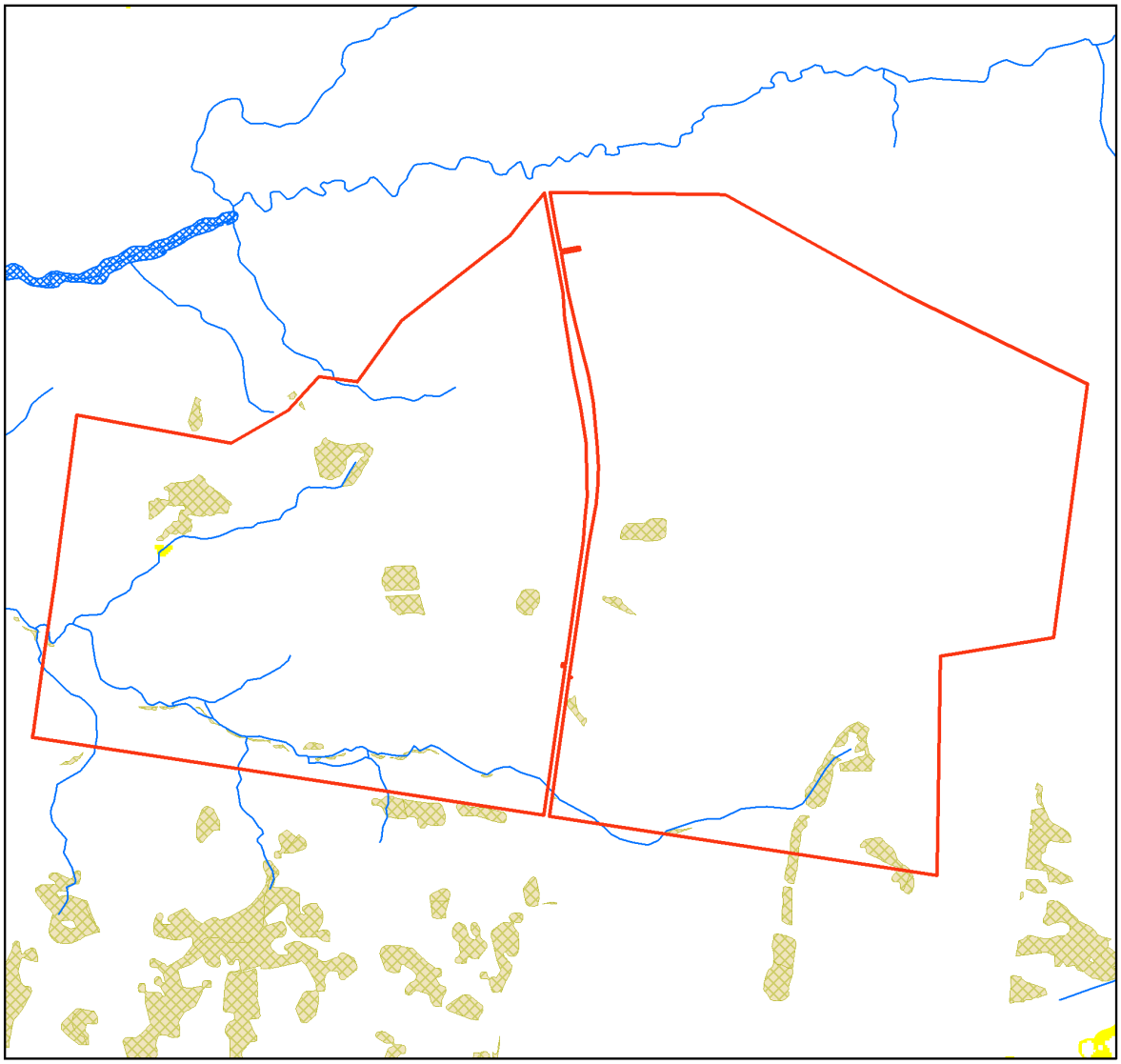
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 6 - Wetlands and waterways



Queensland Wetland Data

Legend

- Selected Lot and Plan
- Towns

Queensland Wetland Data

- Riverine Drainage Lines
- Springs

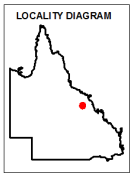
Wetland System - Water Bodies

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies

Wetland System - Regional Ecosystems

- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)

LOCALITY DIAGRAM



N

0 660 1320 1980 2640 3300 m

This product is projected into GDA 1994 Queensland Albers

Accuracy information: The positional accuracy of wetland data mapped at a scale of 1:100,000 is +/-100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coa st which are mapped at the 1:50,000 scale with a positional accuracy of +/-50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data. Consideration of the effects of mapped scale is necessary when interpret ing data at a larger scale, e.g. 1:25,000. For property assessment, digital linework should be used as a guide only. The extent of wetlands depicted on this map is based on rectified 2013 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Environment and Science. The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2013 imagery.

Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

https://qldglobe.information.qld.gov.au/

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

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Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

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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

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

WildNet Records
Conservation Significant Species List

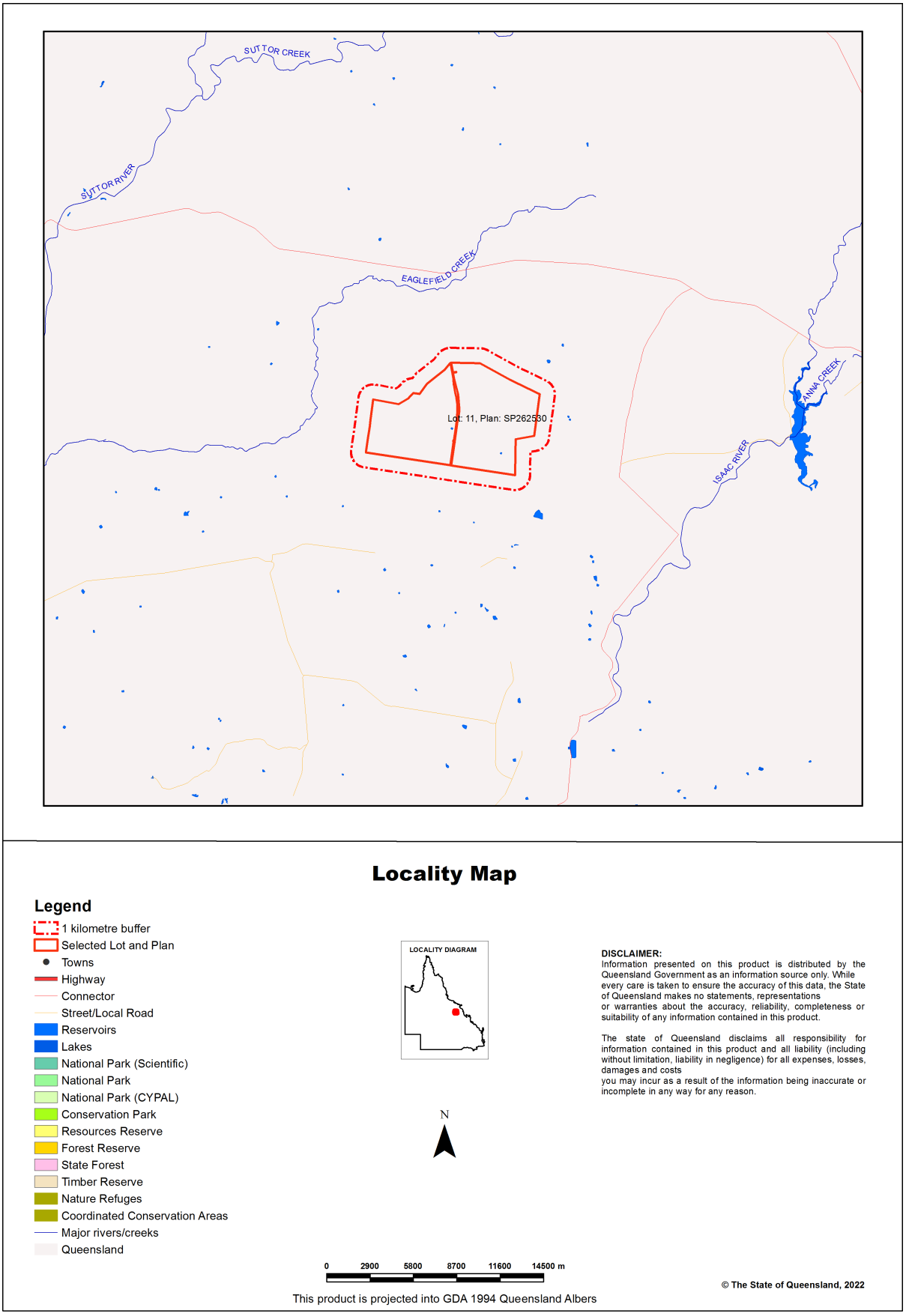
For the selected area of interest 5827.61ha Lot: 11 Plan: SP262530

Current as at 04/10/2022

WildNetCSSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 11 Plan: SP262530.

Table 1. Area of interest details

Size (ha)	5,827.61
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Conservation Significant Species List

Introduction

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Conservation significant species are species listed:

- as threatened or near threatened under the Nature Conservation Act 1992;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
  - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
  - China-Australia Migratory Bird Agreement
  - Japan-Australia Migratory Bird Agreement
  - Republic of Korea-Australia Migratory Bird Agreement

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the species recorded within the area of interest and its one kilometre buffer.

Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
483	Animalia	Reptilia	Elapidae	*Denisonia maculata*	ornamental snake	V	V	0	3	20/10/2006

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

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Links and Support

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WildNet Records
Pest List

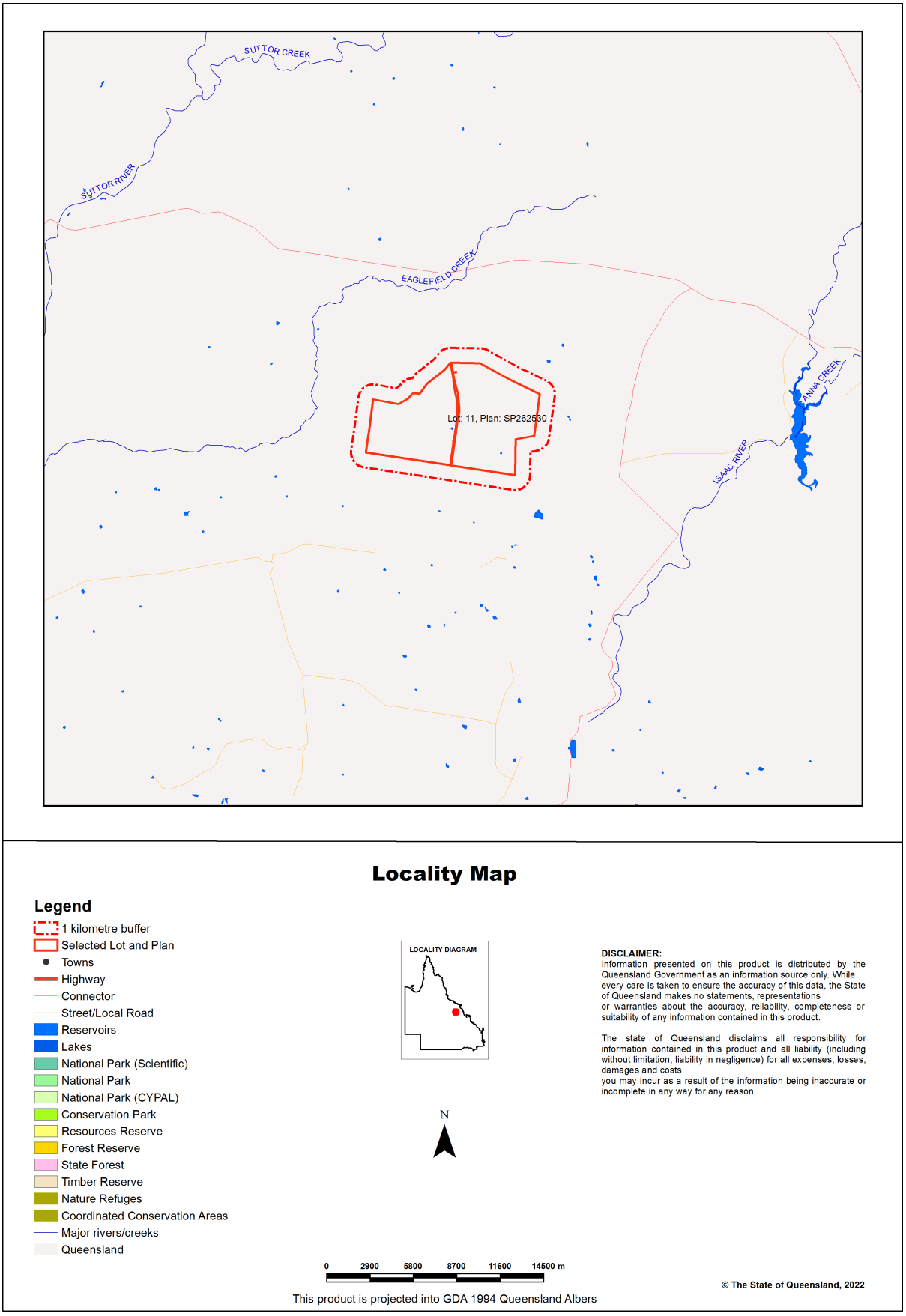
For the selected area of interest 5827.61ha Lot: 11 Plan: SP262530

Current as at 04/10/2022

WildNetPestList

Queensland Government

Map 1. Locality Map



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Species Data

Contextual location information is presented in Map 1.

A summary of the pests recorded within the area of interest and its one kilometre buffer is presented in Table 2.

Table 2. Pests recorded within the area of interest and its one kilometre buffer

No pests found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

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WildNet Records
Species List

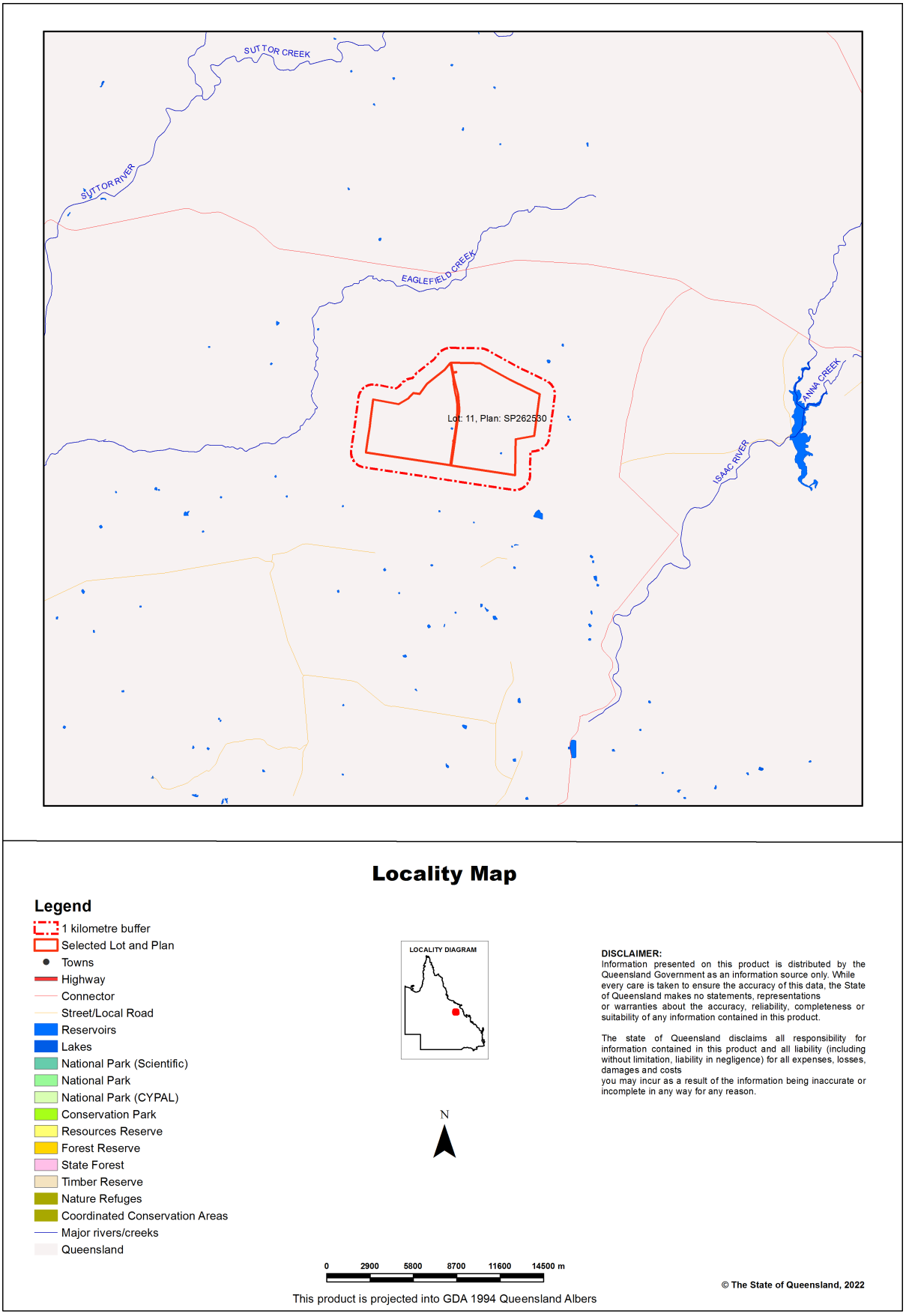
For the selected area of interest 5827.61ha Lot: 11 Plan: SP262530

Current as at 04/10/2022

WildNetSpeciesList

Queensland Government

Map 1. Locality Map



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Species List

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Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

Table 2. Animals recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
624	Amphibia	Hylidae	*Cyclorana alboguttata*	greenstripe frog	C	None	0	2	03/05/2004
644	Amphibia	Hylidae	*Cyclorana cultripes*	grassland collared frog	C	None	0	1	27/04/2004
620	Amphibia	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog	C	None	0	4	20/04/2004
627	Amphibia	Hylidae	*Litoria caerulea*	common green treefrog	C	None	0	12	03/05/2004
600	Amphibia	Hylidae	*Litoria rubella*	ruddy treefrog	C	None	0	1	28/04/2004
680	Amphibia	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog	C	None	0	1	28/04/2004

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1089	Aves	Casuariidae	*Dromaius novaehollandiae*	emu	C	None	0	1	07/10/2006
1500	Aves	Meliphagidae	*Manorina melanocephala*	noisy miner	C	None	0	1	04/10/2006
1437	Aves	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	C	None	1	1	31/12/1979
811	Mammalia	Dasyuridae	*Planigale maculata*	common planigale	C	None	0	2	25/04/2004
792	Mammalia	Dasyuridae	*Sminthopsis macroura*	stripe-faced dunnart	C	None	0	3	19/10/2006
901	Mammalia	Macropodidae	*Macropus giganteus*	eastern grey kangaroo	C	None	0	1	07/10/2006
747	Mammalia	Muridae	*Pseudomys delicatulus*	delicate mouse	C	None	0	1	20/10/2006
734	Mammalia	Muridae	*Rattus tunneyi*	pale field-rat	C	None	0	1	19/10/2006
862	Mammalia	Potoroidae	*Aepyprymnus rufescens*	rufous bettong	C	None	0	3	25/04/2004
556	Reptilia	Agamidae	*Pogona barbata*	bearded dragon	C	None	0	4	18/10/2006
537	Reptilia	Boidae	*Antaresia maculosa*	spotted python	C	None	0	1	20/04/2004
426	Reptilia	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko	C	None	0	4	17/10/2006
369	Reptilia	Diplodactylidae	*Strophurus williamsi*	soft-spined gecko	C	None	0	5	19/10/2006
460	Reptilia	Elapidae	*Brachyurophis australis*	coral snake	C	None	0	1	20/10/2006
455	Reptilia	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake	C	None	0	3	01/05/2004
493	Reptilia	Elapidae	*Demansia psammophis*	yellow-faced whipsnake	C	None	0	1	17/10/2006
483	Reptilia	Elapidae	*Denisonia maculata*	ornamental snake	V	V	0	3	20/10/2006
454	Reptilia	Elapidae	*Pseudonaja textilis*	eastern brown snake	C	None	0	7	19/10/2006
441	Reptilia	Elapidae	*Suta suta*	myall snake	C	None	0	4	28/04/2004
444	Reptilia	Elapidae	*Vermicella annulata*	bandy-bandy	C	None	0	1	06/10/2006
420	Reptilia	Gekkonidae	*Gehyra dubia*	dubious dtella	C	None	0	1	05/10/2006
325	Reptilia	Pygopodidae	*Lialis burtonis*	Burton's legless lizard	C	None	0	12	19/10/2006
327	Reptilia	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot	C	None	0	1	20/10/2006
26886	Reptilia	Pygopodidae	*Pygopus schraderi*	eastern hooded scaly-foot	C	None	0	1	06/10/2006
240	Reptilia	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus	C	None	0	1	30/04/2004
167	Reptilia	Scincidae	*Lerista fragilis*	eastern mulch slider	C	None	0	1	18/10/2006
91	Reptilia	Typhlopidae	*Anilios ligatus*	robust blind snake	C	None	0	1	05/10/2006

Table 3. Plants recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
6117	Equisetopsida	Leguminosae	*Alysicarpus muelleri*	None	C	None	1	1	29/04/2010
15371	Equisetopsida	Poaceae	*Eragrostis parviflora*	weeping lovegrass	C	None	1	1	06/03/2008
10817	Equisetopsida	Poaceae	*Paspalidium globoideum*	sago grass	C	None	1	1	29/04/2010
15054	Equisetopsida	Poaceae	*Sporobolus australasicus*	None	C	None	1	1	07/03/2008
14220	Equisetopsida	Poaceae	*Sporobolus contiguus*	None	C	None	1	1	06/03/2008
29802	Equisetopsida	Solanaceae	*Solanum parvifolium subsp. parvifolium*	None	C	None	1	1	27/01/2011

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

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WildNet Records
Weed List

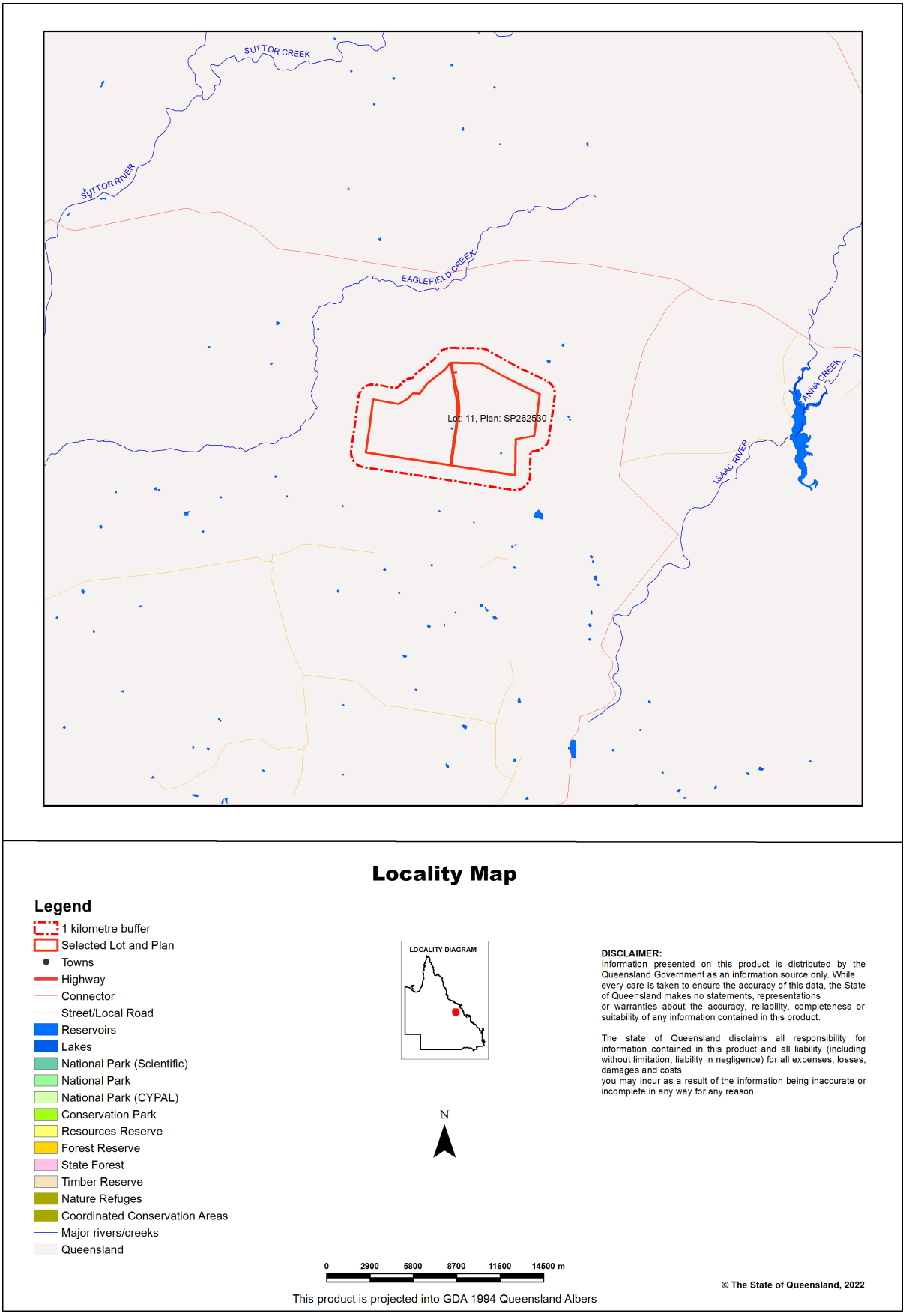
For the selected area of interest 5827.61ha Lot: 11 Plan: SP262530

Current as at 04/10/2022

WildNetWeedList

Queensland Government

Map 1. Locality Map



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No estates or reserves are located within the area of interest.

World Heritage Area(s)

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Ramsar Area(s)

No Ramsar Areas are located within the area of interest.

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Species Data

Contextual location information is presented in Map 1.

A summary of the weeds recorded within the area of interest and its one kilometre buffer is presented in Table 2.

Table 2. Weeds recorded within the area of interest and its one kilometre buffer

No weeds found within the area of interest and its one kilometre buffer.

Species table headings and codes

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Records: The total number of records of the taxon.

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Queensland Government

Department of Environment and Science

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest
Lot: 23 Plan: SP262530

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 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 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.

Table of Contents

Summary Information

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

Table 1: Area of interest details: Lot: 23 Plan: SP262530

Size (ha)	5,998.66
Local Government(s)	Isaac Regional
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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

Assessment Type	Assessment Area and Version
Biodiversity Planning Assessment(s)	Brigalow Belt v2.1
Aquatic Conservation Assessment(s) (riverine)	Great Barrier Reef Catchments v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Great Barrier Reef Catchments v1.3

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

Biodiversity Status	Area (Ha)	% of AOI
Endangered	53.17	0.89
Of concern	245.28	4.09
No concern at present	453.72	7.56

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 and Science's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	0.0	0.0
State	265.79	4.43
Regional	1,184.15	19.74
Local or Other Values	6.72	0.11

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
(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

Name	Permanency
GUM TREE CREEK	Non-perennial
MABBIN CREEK	Non-perennial

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 and Science'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
Very High	0.0	0.0
High	0.0	0.0
Medium	5,998.57	100.0
Low	0.0	0.0
Very Low	0.0	0.0

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

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
(No Records)		

Biodiversity Planning Assessments

Introduction

The Department of Environment and Science (DES) 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 DES.

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:

http://qspatial.information.qld.gov.au/geoportal/

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 significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	0.0	0.0
State	265.79	4.43
Regional	1,184.15	19.74
Local or Other Values	6.72	0.11

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 at least 1 Endangered RE (B1) & Nat. Threatened Ecol. Community (B1)	50.41	0.84
State	Remnant contains at least 1 Vulnerable or Near Threatened species (A) & Nat. Threatened Ecol. Community (B1)	9.19	0.15
Regional	Remnant contains at least 1 Vulnerable or Near Threatened species (A)	1,390.34	23.18
Local or Other Values	Refer to diagnostic data for additional information	6.72	0.11

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			1,449.95	24.2			6.72	0.1
B1: Ecosystem Value (Bioregion)	59.61	1.0	321.84	5.4	370.81	6.2		
B2: Ecosystem Value (Subregion)			59.61	1.0	692.65	11.5		
C: Tract Size			600.77	10.0			151.49	2.5
D1: Relative RE Size (Bioregion)							752.26	12.5
D2: Relative RE Size (Subregion)							752.26	12.5
F: Ecosystem Diversity			401.15	6.7	68.99	1.2	282.12	4.7
G: Context and Connection	33.16	0.6	67.28	1.1	591.26	9.9	60.56	1.0

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
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	238.34	3.97
Local	Refer to Expert Panel data for additional information	9.24	0.15

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					9.25	0.2		
Ia: Centres of Endemism								
Ib: Wildlife Refugia	238.35	4.0						
Ic: Disjunct Populations								
Id: Limits of Geographic Ranges								

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
Ie: High Species Richness								
If: Relictual Populations								
Ig: Variation in Species Composition								
Ih: Artificial Wetland								
Ii: Hollow Bearing Trees								
Ij: Breeding or Roosting Site	238.35	4.0						
Ik: Climate Refugia								

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
State	0.0	0.0
Regional	0.0	0.0
Local	0.0	0.0

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

Decision Number	Description	Panel Recommended Significance	Criteria Values
brbn_l_75	Gilgai Remnants	State	Ib (refugia): VH; Ij (aggregation site):VH

Expert panel decision descriptions:

brbn_l_75

The gilgai wetland systems in the Brigalow Belt tend to be dominated by acacia and casuarina (mostly brigalow Acacia harpophylla and belah Casuarina cristata). Melaleuca, Corymbia and Eucalyptus species are also common along with Astrebla or Dichanthium spp. grassland. Gilgai systems are widespread and some are in good condition while others are largely cleared. The range of threatened wildlife present may use inundated gilgai as a water source at some stage of their life or are closely associated with the cracking clay soil habitat and wetlands.

Gilgai reptiles include the death adder Acanthophis antarcticus, De Vis' banded snake Denisonia devisi and ornamental snake D. maculata. Amphibians that use gilgai include salmon striped frog Limnodynastes salmini, scarlet-sided pobblebonk L. terraereginae and striped burrowing frog Cyclorana alboguttata. Other fauna which may use gilgai habitat at various times include bridled nailtail wallaby Onychogalea fraenata, black-striped wallaby Macropus dorsalis and the glossy black cockatoo Calyptorhynchus lathami.

(Source: WetlandInfo https://wetlandinfo.des.qld.gov.au/wetlands/).

Refer to brbs_l_49 for the southern BRB implementation of this decision.

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 prcesses

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:

http://qspatial.information.qld.gov.au/geoportal/

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
Very High	0.0	0.0

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	0.0	0.0
Medium	5,998.57	100.0
Low	0.0	0.0
Very Low	0.0	0.0

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	5,406.56	90.1					592.0	9.9
2. Naturalness catchment			5,602.14	93.4	396.42	6.6		
3. Diversity and richness			195.58	3.3	2,418.80	40.3	3,384.18	56.4
4. Threatened species and ecosystems	396.42	6.6	5,602.14	93.4				
5. Priority species and ecosystems								
6. Special features								
7. Connectivity					99.75	1.7	5,898.81	98.3
8. Representative-ness								

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:

(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
(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
(No Records)								

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:

(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

Species	Common name	NCA status	EPBC status	Back on Track rank	Migratory species*	Wetland species**	Identified flora/fauna
Denisonia maculata	ornamental snake	V	V	Medium			FA
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V	Medium			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DES 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

Species	Common name	Back on Track rank	Identified flora/fauna
Paradelma orientalis	Brigalow Scaly-foot	M	FA

Species	Common name	Back on Track rank	Identified flora/fauna
Pyrrholaemus sagittatus	Speckled Warbler	L	FA

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 results)

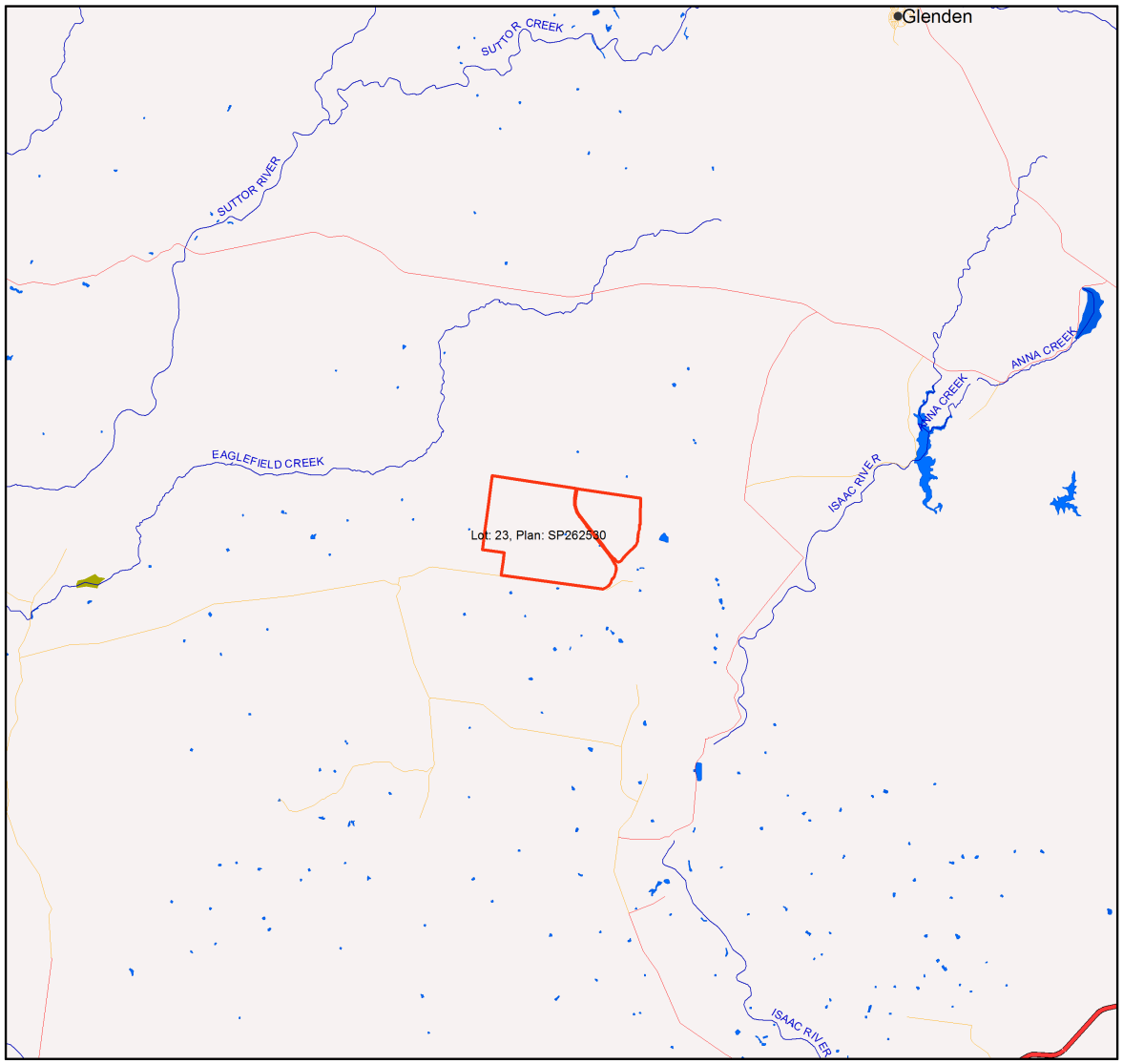
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(no results)

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

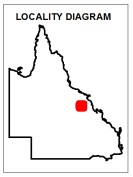
Map 1 - Locality Map



Locality Map

Legend

- Selected Lot and Plan
- Towns
- Highway
- 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



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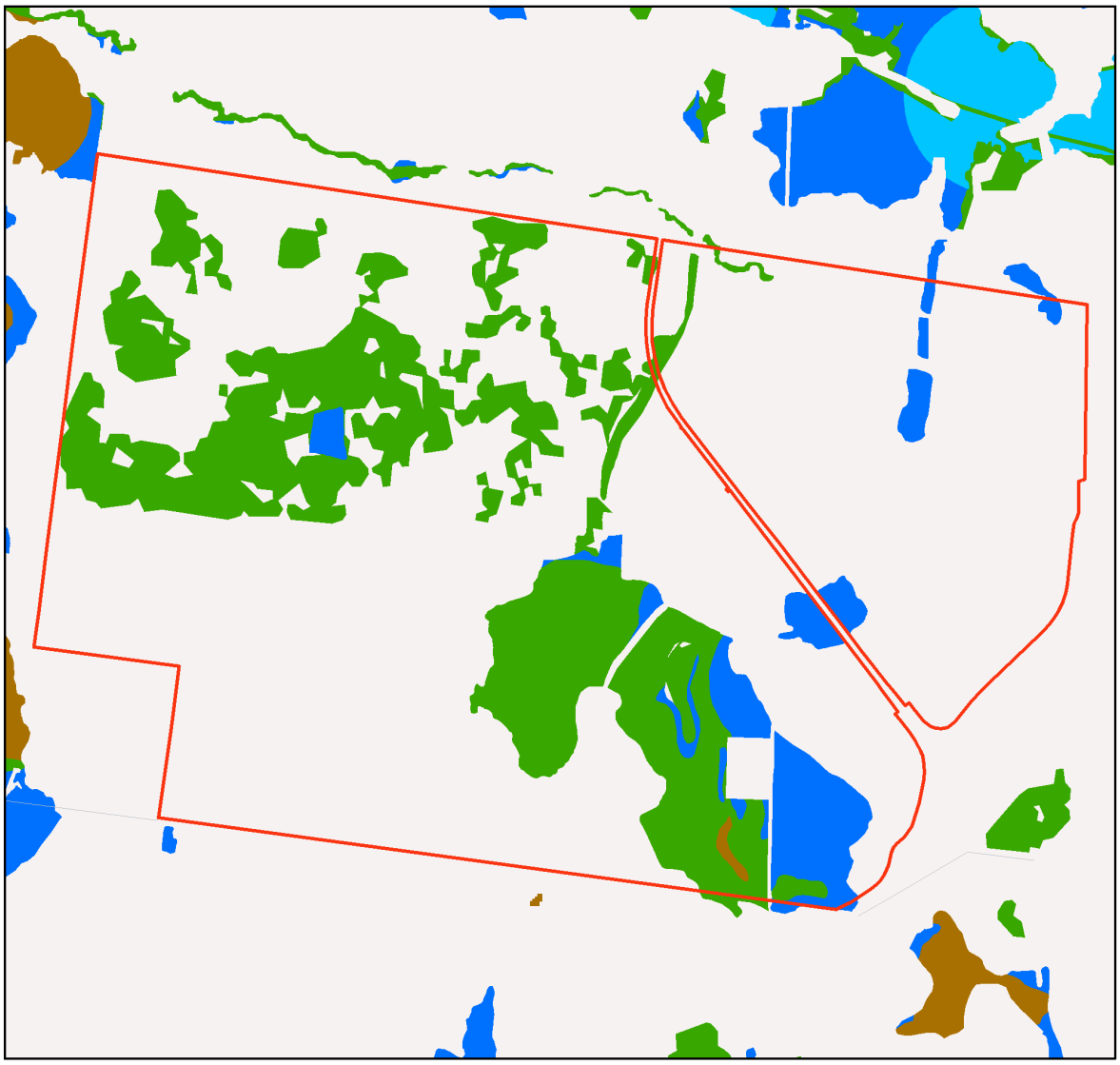
Map 2 - Biodiversity Planning Assessment (BPA)



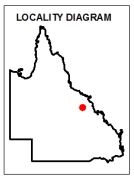
Biodiversity Planning Assessments

Legend

- Selected Lot and Plan
- Towns
- Roads
- Major rivers/creeks
- Queensland

Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem



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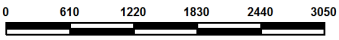

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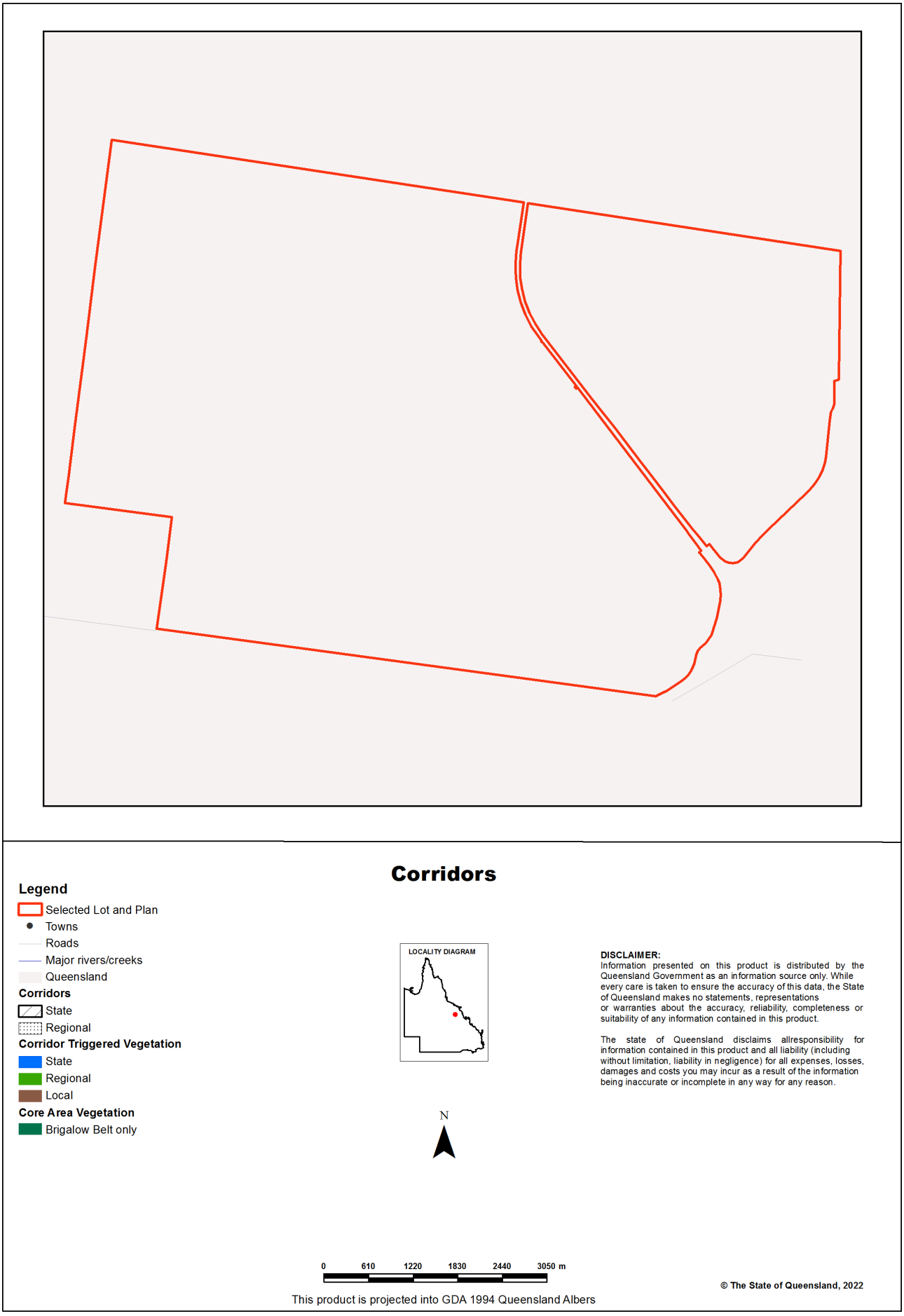
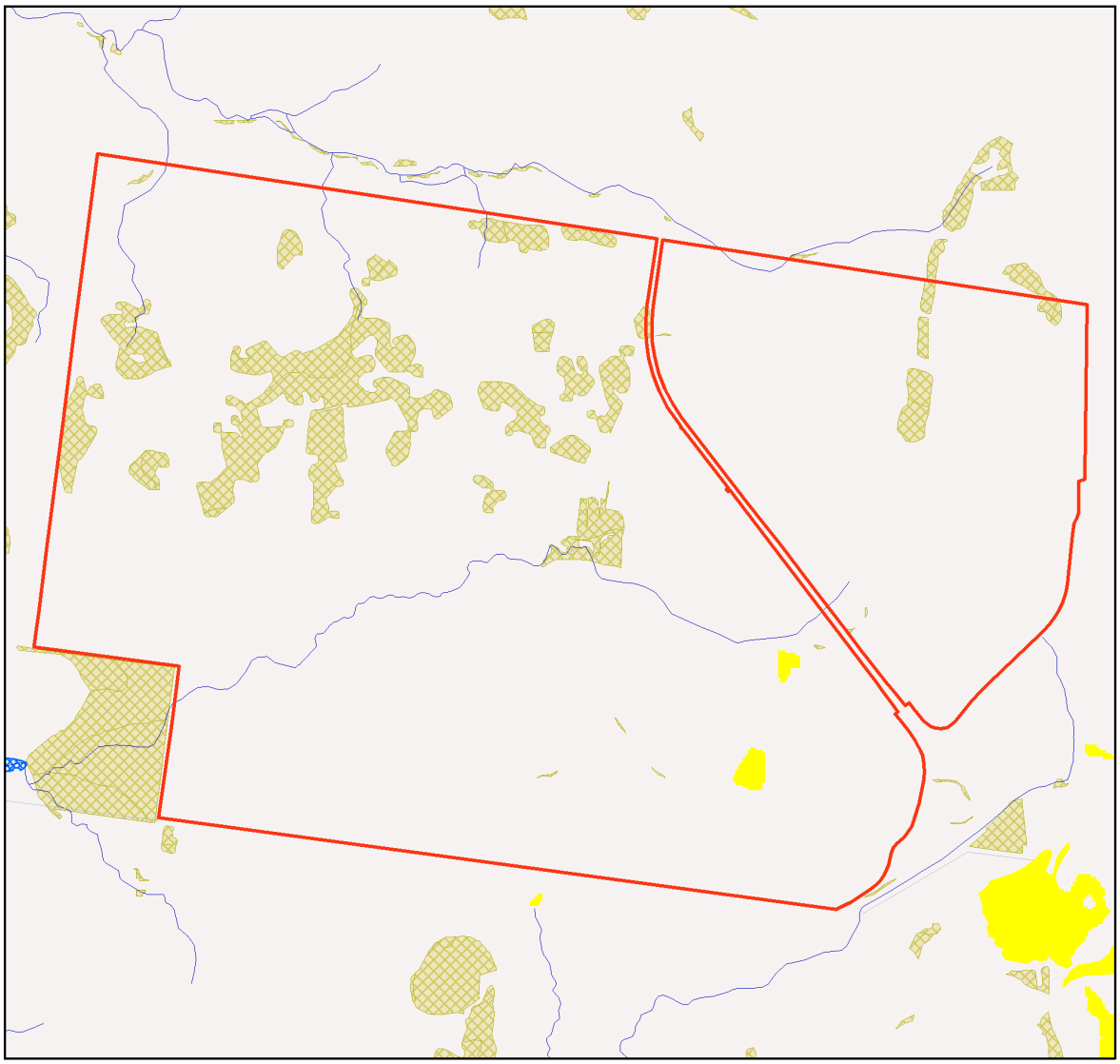
Map 3 - Corridors



Map 4 - Wetlands and waterways



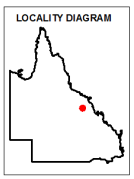
Wetlands and Waterways

Legend

- Selected Lot and Plan
- Towns
- Roads
- Springs
- Rivers/Creeks
- Directory of Important Wetlands
- Ramsar Sites - QLD
- Queensland

Wetland Type

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies
- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)



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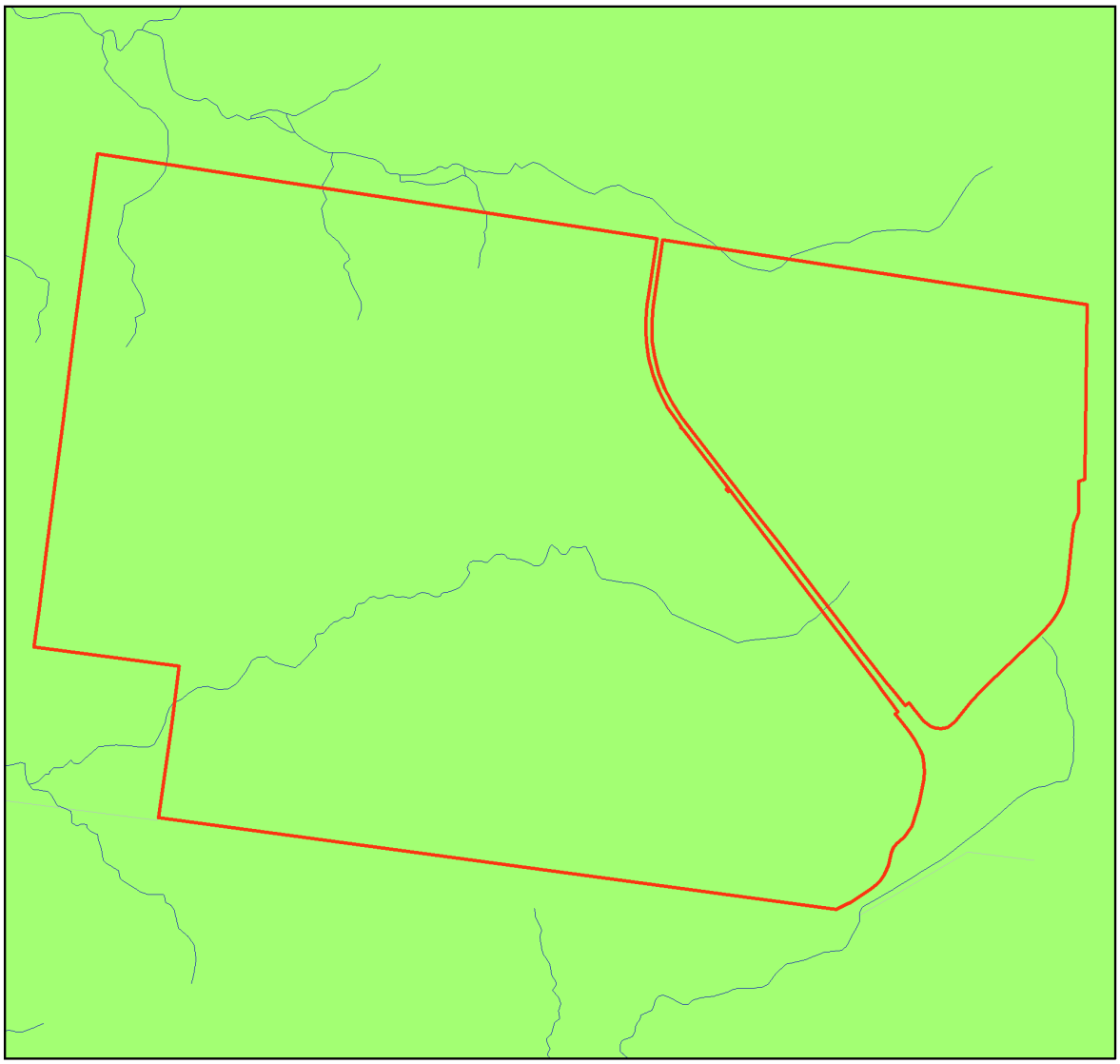
Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

Legend

- Selected Lot and Plan
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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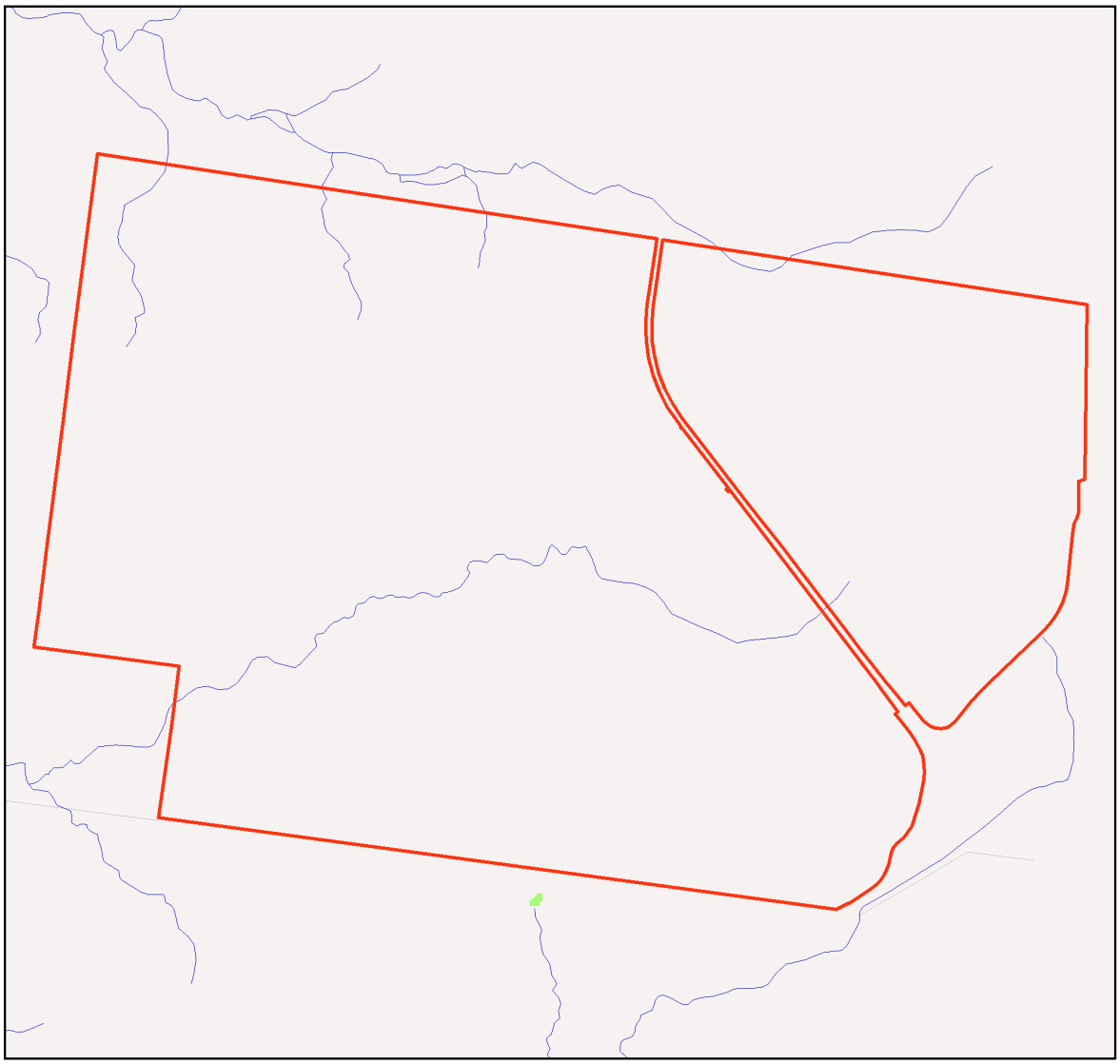
Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



Aquatic Conservation Assessment (ACA) - nonriverine

Legend

- Selected Lot and Plan
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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0 610 1220 1830 2440 3050 m

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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/

Environmental Protection Agency (2002) *Biodiversity Assessment and Mapping Methodology. Version 2.1, July 2002.* (Environmental Protection Agency, 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 QMDB Non-riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1
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 QMDB Riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1
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 Einasleigh 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 DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, 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
DES	- Department of Environment and Science
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
Lot: 23 Plan: SP262530

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 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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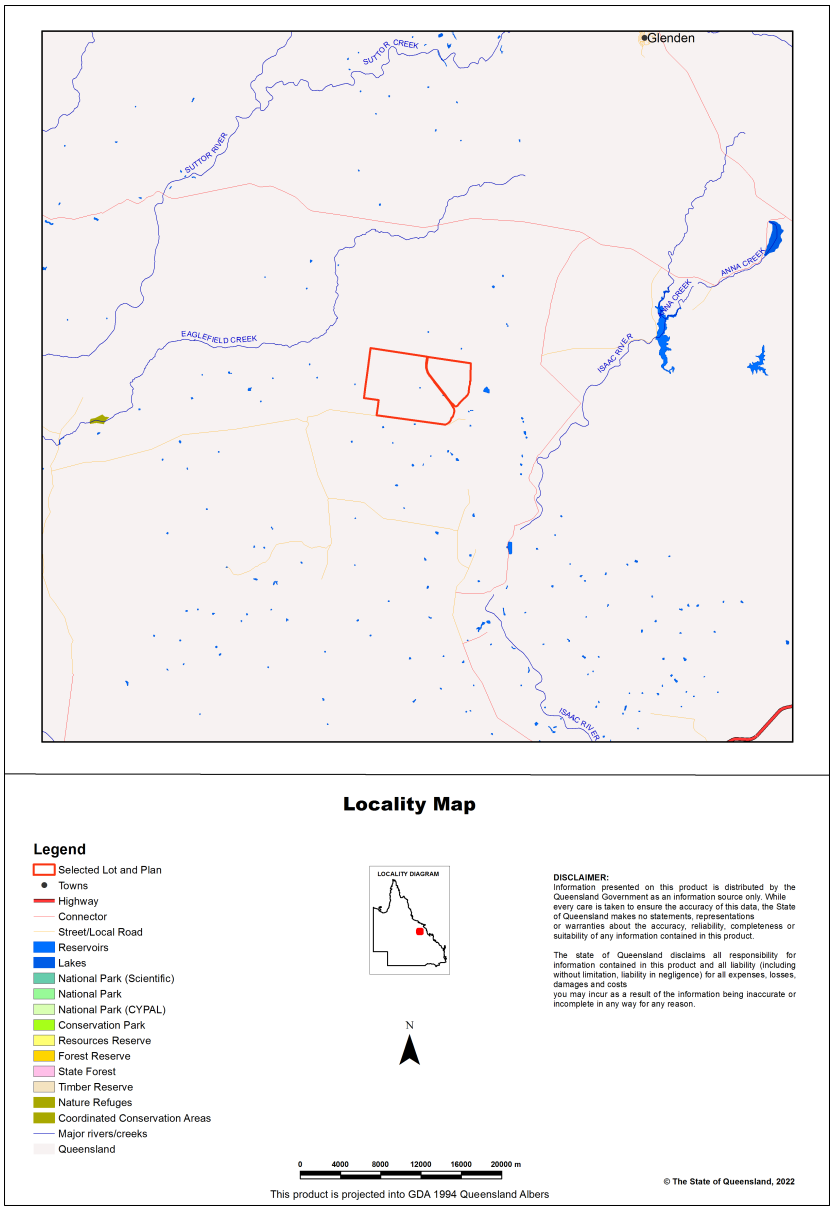
Table of Contents

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 Lot: 23 Plan: SP262530

Size (ha)	5,998.66
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin



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 planning and development assessment decision-making. Its primary purpose is to support 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. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts 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	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	0.0 ha	0.0 %
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	837.88 ha	14.0%
7b Special least concern animals	0.0 ha	0.0 %
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
7d Sea turtle nesting areas	0.0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	375.89 ha	6.3%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	2.0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	6.86 ha	0.1%
8d Regulated Vegetation - Essential habitat	732.67 ha	12.2%
8e Regulated Vegetation - intersecting a watercourse	13.7 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0.0 ha	0.0 %
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 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

Values are present

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
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Macadamia ternifolia		V	None
Macadamia tetraphylla		V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	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, 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)

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.4.9	E-dom	rem_end
11.9.7a/11.7.2	O-dom	rem_oc
11.9.7a	O-dom	rem_oc
11.9.1	E-dom	rem_end
11.4.11/11.4.8/11.4.9	E-subdom	rem_end
11.3.4	O-dom	rem_oc
11.4.8	E-dom	rem_end

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.4.9	E-dom	hvr_end
11.4.11/11.4.8/11.4.9	E-subdom	hvr_end
11.4.9/11.4.8	E-dom	hvr_end

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

Regulated vegetation map category	Map number
R	8454

8d. Regulated Vegetation - Essential habitat

Values are present

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

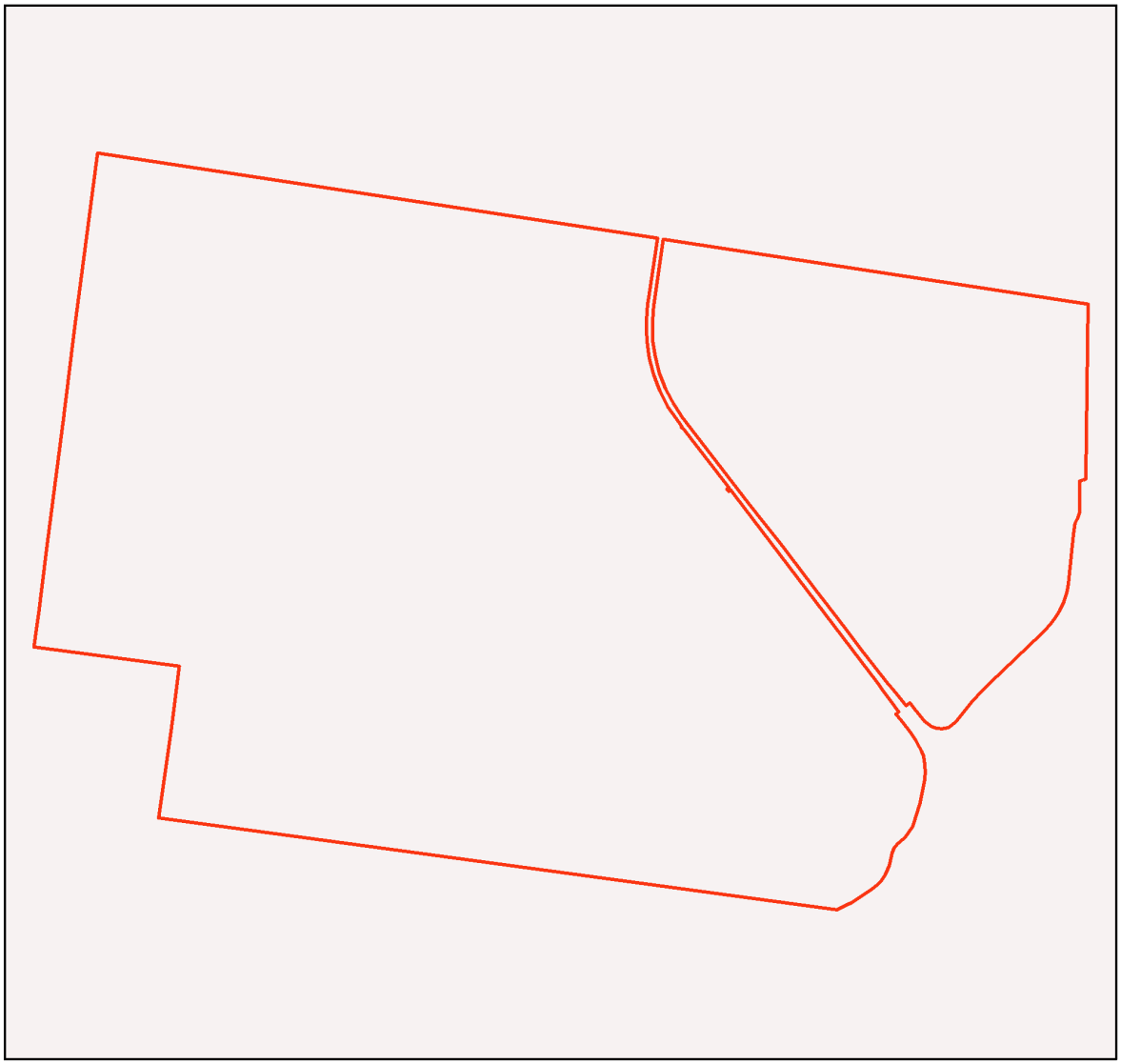
(no results)

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.

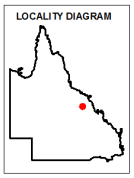
Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates, nature refuges, special wildlife reserves)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)



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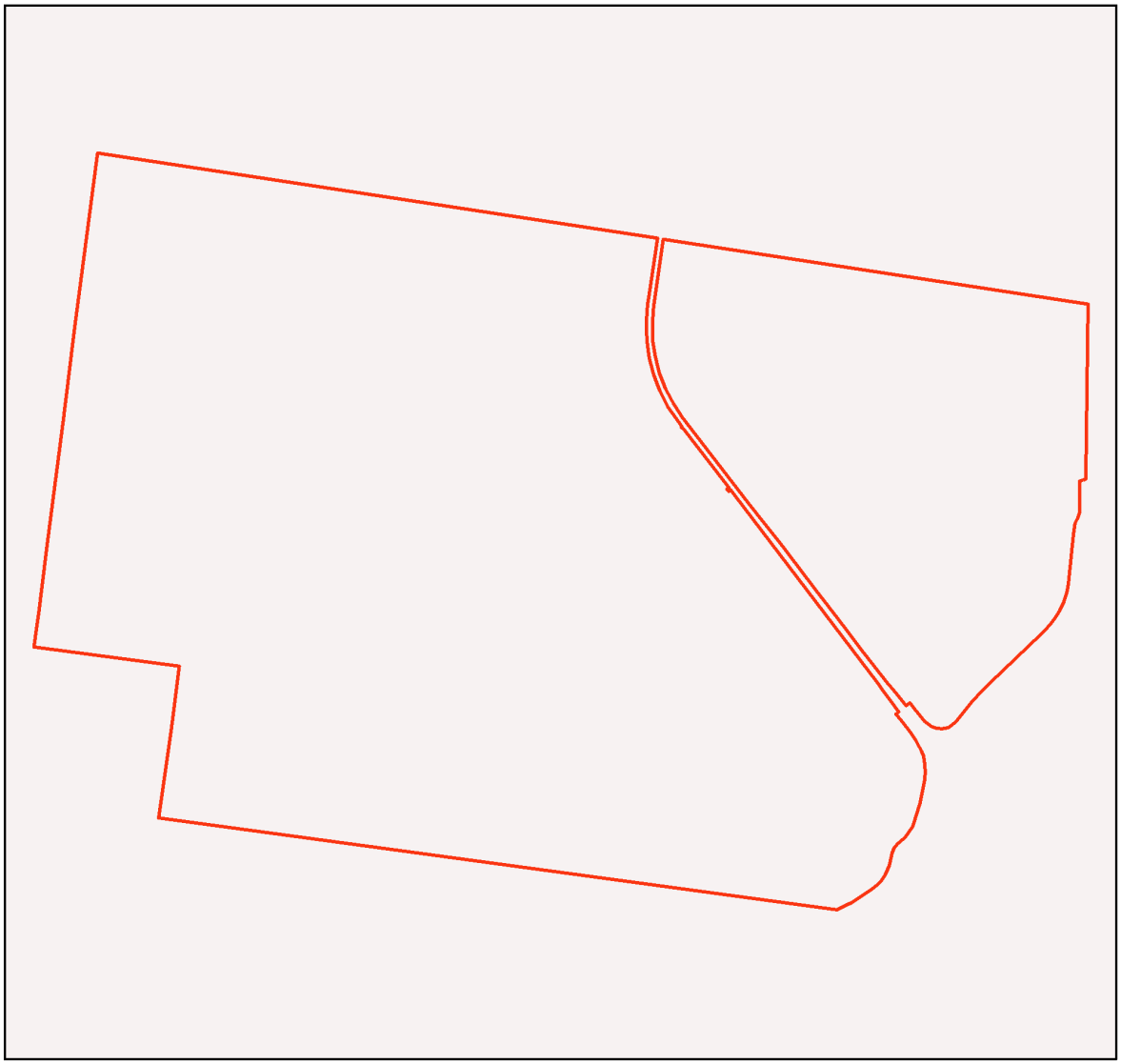
Map 2 - MSES - Wetlands and Waterways

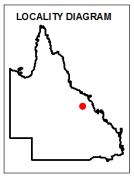


MSES - Wetlands and Waterways

Area of Interest

- Selected Lot and Plan
- 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

LOCALITY DIAGRAM



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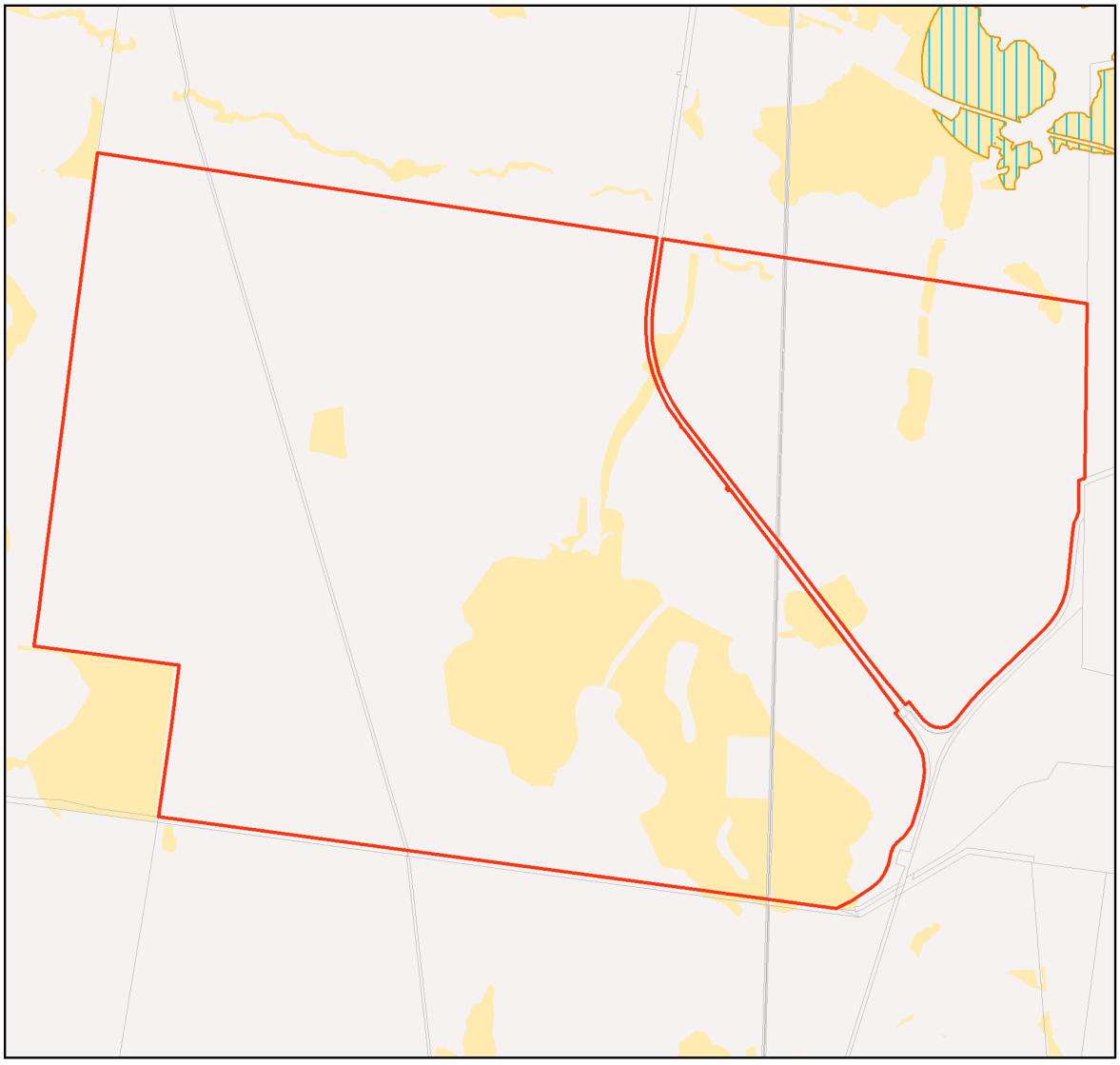
0 610 1220 1830 2440 3050 m

This product is projected into GDA 1994 Queensland Albers

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

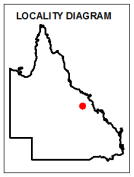


MSES - Species
Threatened (endangered or vulnerable) wildlife and special least concern animals

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)

LOCALITY DIAGRAM



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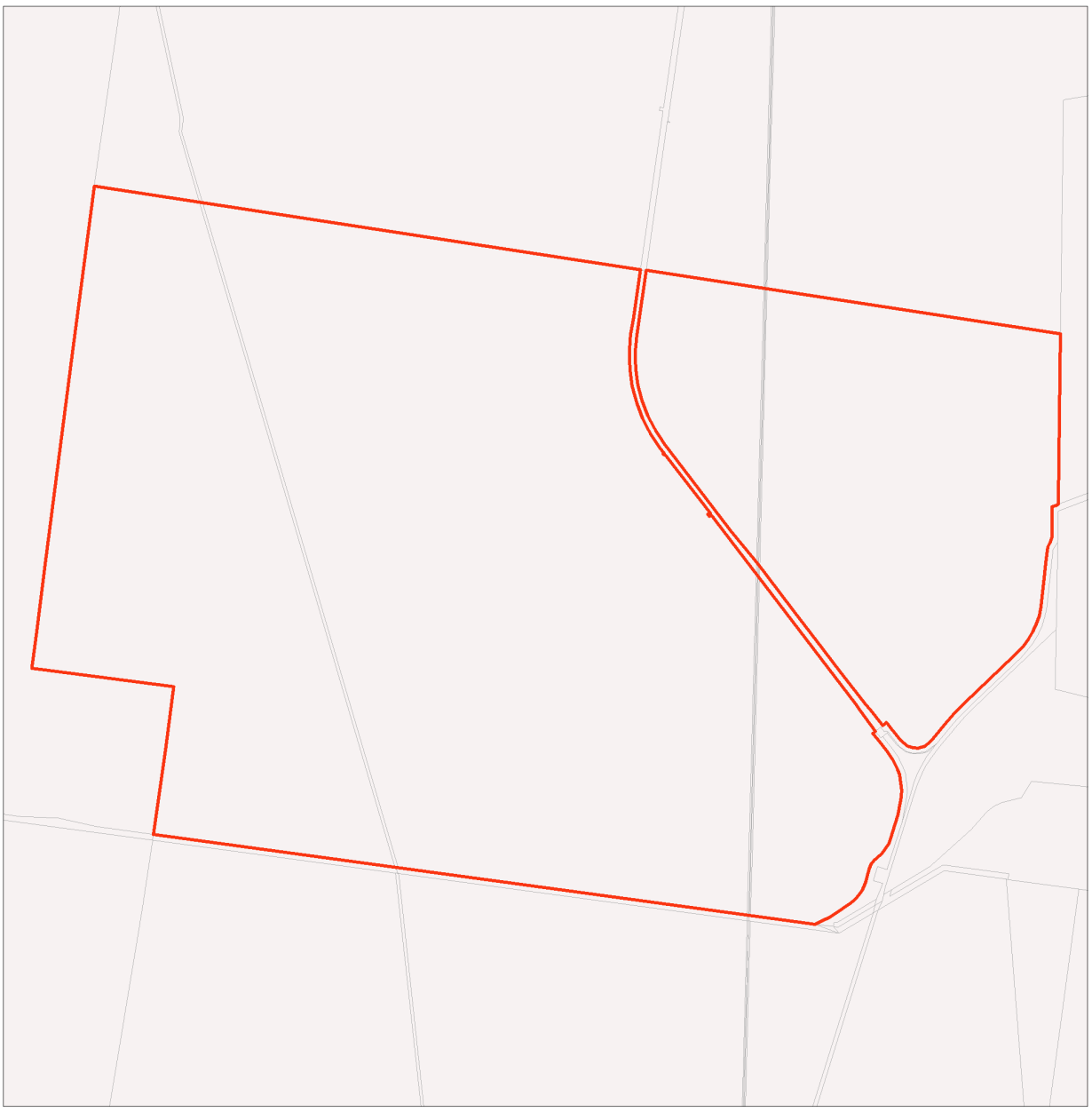
0 610 1220 1830 2440 3050 m

This product is projected into GDA 1994 Queensland Albers

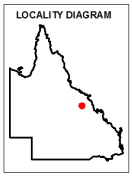
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)

LOCALITY DIAGRAM



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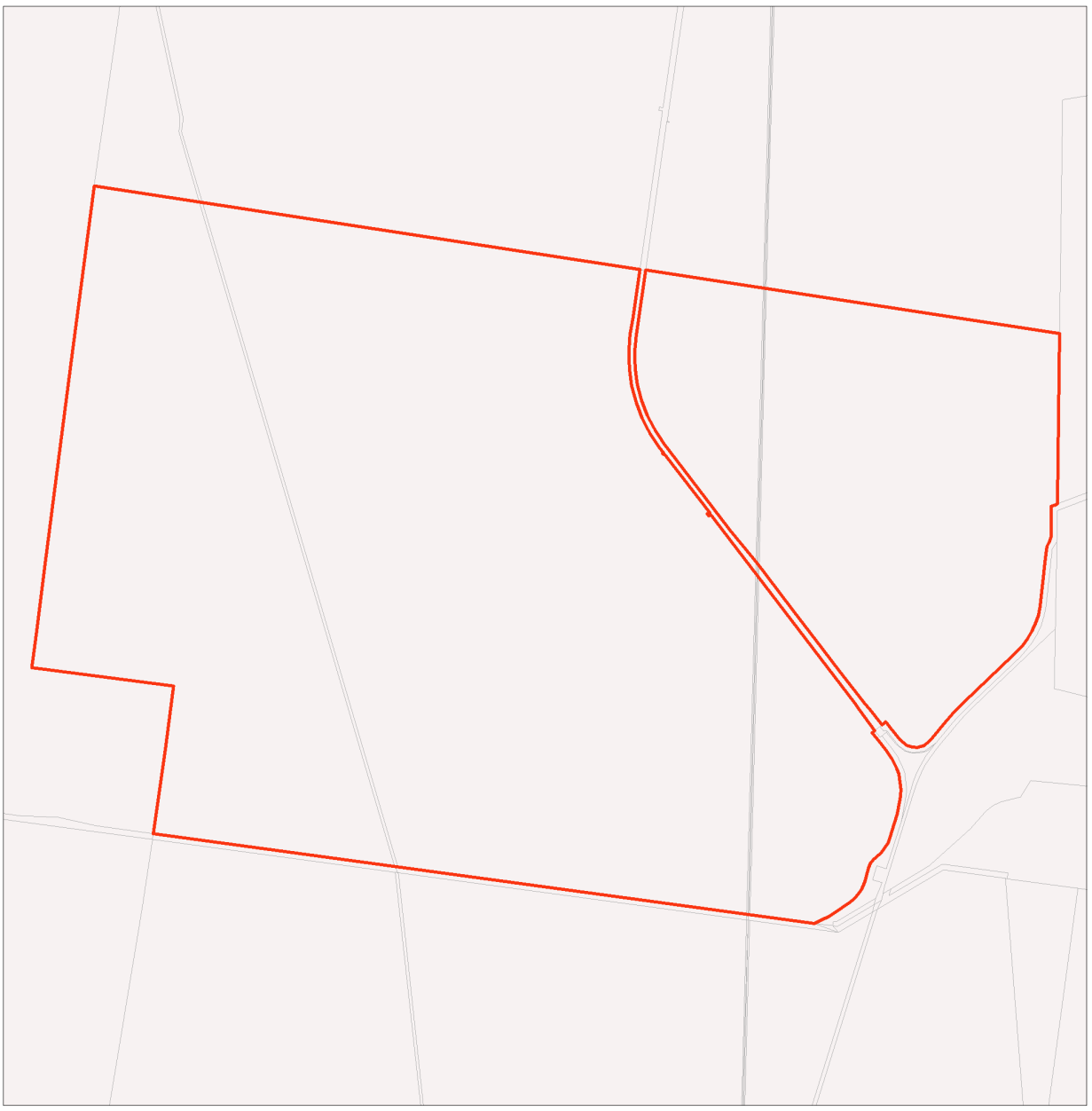
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be 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.

0 575 1,150 1,725 2,300 2,875 m

This product is projected into GDA 1994 Queensland Albers

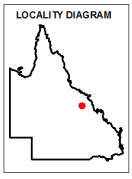
Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)

LOCALITY DIAGRAM



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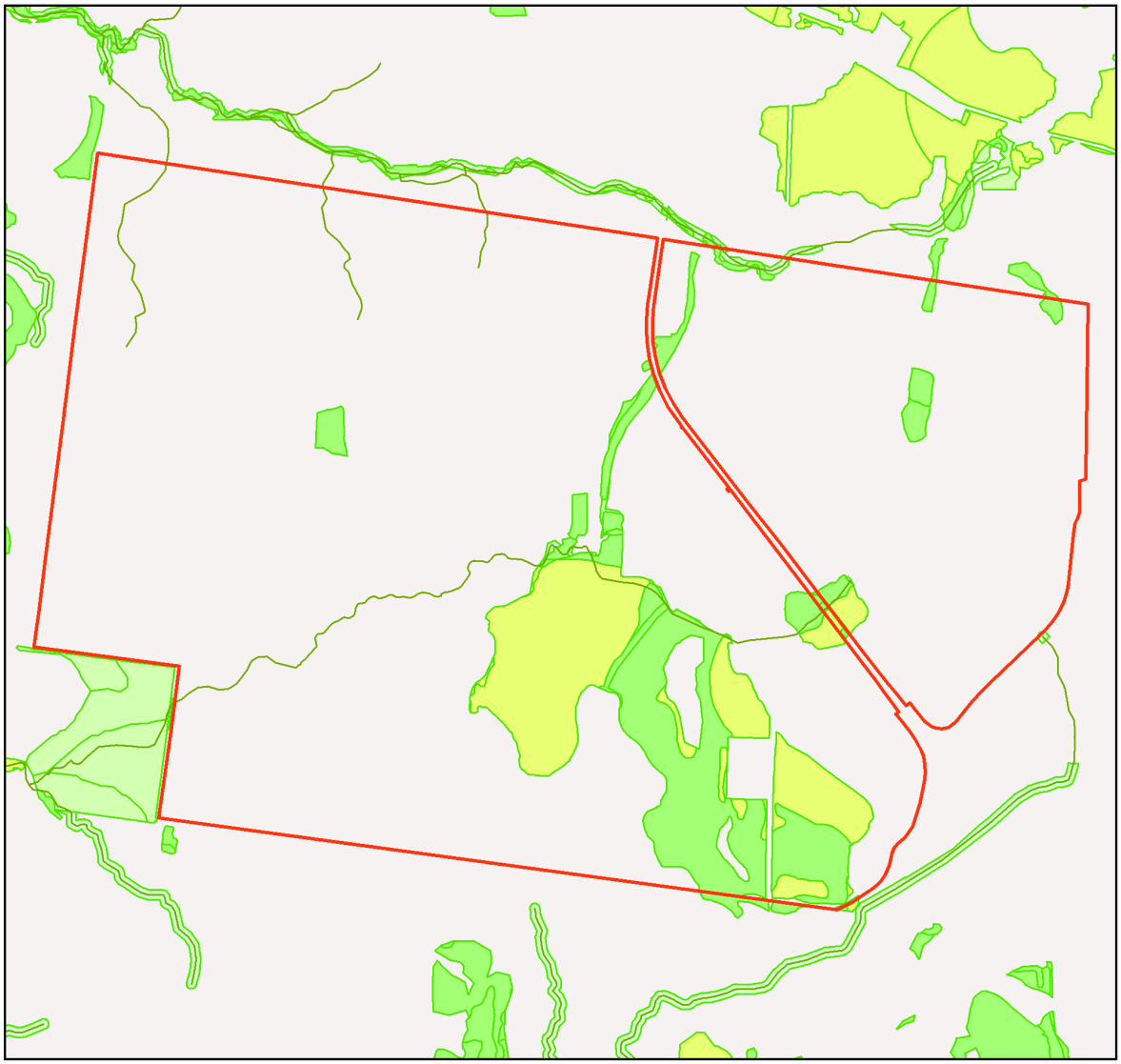
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.

0 575 1,150 1,725 2,300 2,875 m

This product is projected into GDA 1994 Queensland Albers

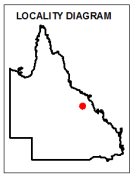
Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)

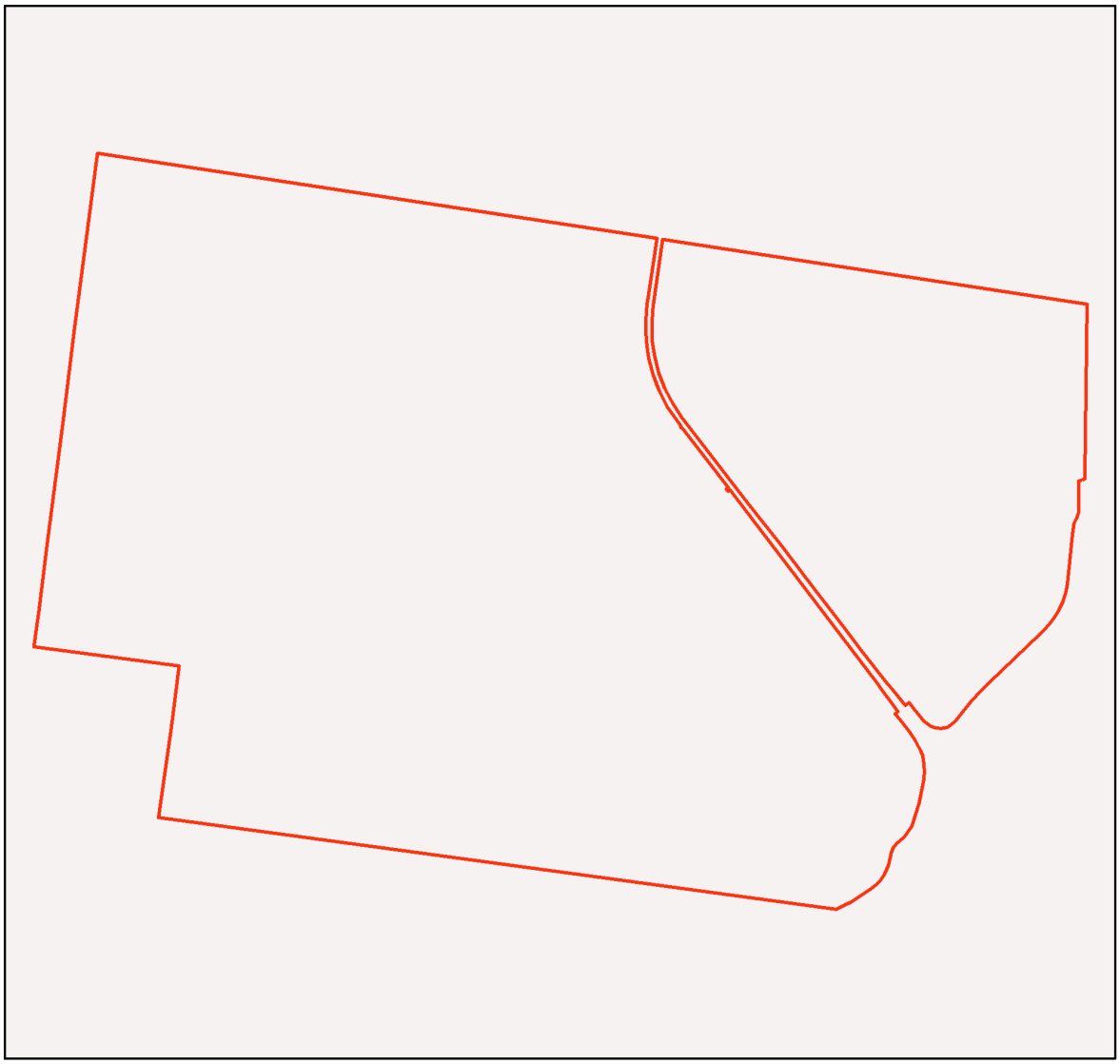


N

0 610 1220 1830 2440 3050 m

This product is projected into GDA 1994 Queensland Albers

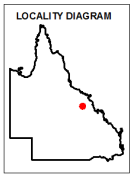
Map 5 - MSES - Offset Areas



MSES - Offsets

Area of Interest

- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)



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0 610 1220 1830 2440 3050 m

This product is projected into GDA 1994 Queensland Albers

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). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support 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. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" 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 - Sea Turtle Nesting Areas records
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
DES	- Department of Environment and Science
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 and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
Lot: 23 Plan: SP262530

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 input coordinates.

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 matters of interest 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.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.resources.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@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.

Table of Contents

Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details: Lot: 23 Plan: SP262530

Size (ha)	5,998.66
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	53.17	0.89
Of concern	245.28	4.09
No concern at present	453.72	7.56
Total remnant vegetation	752.17	12.54

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

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.resources.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
11.3.4	Eucalyptus tereticornis and/or Eucalyptus spp. woodland on alluvial plains	Of concern	33.01	0.55
11.4.11	Dichanthium sericeum and Astrebla spp. grassland with patchy Acacia harpophylla or Eucalyptus coolabah on Cainozoic clay plains	Of concern	6.43	0.11
11.4.8	Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains	Endangered	15.98	0.27
11.4.9	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains	Endangered	31.82	0.53
11.5.3	Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces	No concern at present	338.44	5.64
11.7.2	Acacia spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	No concern at present	115.28	1.92
11.9.1	Acacia harpophylla-Eucalyptus cambageana woodland to open forest on fine-grained sedimentary rocks	Endangered	5.38	0.09
11.9.7a	Eucalyptus populnea, Eremophila mitchellii shrubby woodland on fine-grained sedimentary rocks	Of concern	205.83	3.43
non-remnant	None	None	5,246.45	87.46

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
11.3.4	Pre-clearing 684000 ha; Remnant 2019 179000 ha	16c	Not a Wetland	Low

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
11.4.11	Pre-clearing 74000 ha; Remnant 2019 24000 ha	30b	Not a Wetland	Low
11.4.8	Pre-clearing 726000 ha; Remnant 2019 67000 ha	25a	Contains Palustrine	Low
11.4.9	Pre-clearing 998000 ha; Remnant 2019 90000 ha	25a	Contains Palustrine	Low
11.5.3	Pre-clearing 976000 ha; Remnant 2019 369000 ha	17a	Not a Wetland	Low
11.7.2	Pre-clearing 549000 ha; Remnant 2019 359000 ha	24a	Not a Wetland	Low
11.9.1	Pre-clearing 564000 ha; Remnant 2019 53000 ha	25a	Not a Wetland	Low
11.9.7a	Pre-clearing 505000 ha; Remnant 2019 103000 ha	17a	Not a Wetland	Low
non-remnant	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
11.3.4	Potential habitat for NCA listed species: Acacia pedleyi, Callicarpa thozetii, Cycas megacarpa, Cycas ophiolitica, Digitaria porrecta, Eriocaulon carsonii subsp. orientale, Livistona nitida, Rhaponticum australe, Samadera bidwillii, Sannantha brachypoda. This ecosystem is also known to provide suitable habitat for koalas (Phascolarctos cinereus).
11.4.11	None
11.4.8	Larger gilgai provides ephemeral wetland habitat.
11.4.9	Potential habitat for NCA listed species: Cadellia pentastylis, Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea
11.5.3	Potential habitat for NCA listed species: Sannantha brachypoda
11.7.2	Habitat for threatened plant species including Acacia wardellii.
11.9.1	Potential habitat for NCA listed species: Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea
11.9.7a	None
non-remnant	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate

scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	5,246.45	87.46
16c	Woodlands and open woodlands dominated by Eucalyptus coolabah (coolabah) or E. microtheca (coolabah) or E. largiflorens (black box) or E. tereticornis (blue gum) or E. chlorophylla on floodplains. Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (All bioregions except WET, principally GUP, BRB, MUL).	33.01	0.55
17a	Woodlands dominated by Eucalyptus populnea (poplar box) (or E. brownii (Reid River box)) on alluvium, sand plains and footslopes of hills and ranges. (land zones 3, 5, 10, 9, 4, 11, 12, [8]) (BRB, MUL, DEU, MUL, EIU)	544.28	9.07
24a	Low woodlands to tall shrublands dominated by Acacia spp. on residuals. Species include A. shirleyi (lancewood), A. catenulata (bendee), A. microsperma (bowyakka), A. clivicola, A. sibirica, A. rhodoxylon (rosewood) and A. leptostachya (Townsville wattle). (land zones 7, 10, 5, 12, 11, [9, 3]) (MUL, CHC, BRB, GUP, EIU, MGD, DEU, NWH, [CYP])	115.28	1.92
25a	Open forests to woodlands dominated by Acacia harpophylla (brigalow) sometimes with Casuarina cristata (belah) on heavy clay soils. Includes areas co-dominated with A. cambagei (gidgee) and/or emergent eucalypts (land zones 4, 9, 3, 11, 7, 12, [5, 8]) (BRB, MUL, MGD, DEU, [SEQ])	53.17	0.89
30b	Tussock grasslands dominated by Astrebla spp. (mitchell grass) or Dichanthium spp. (bluegrass) often with Iseilema spp. on undulating downs or clay plains. (land zones 9, 3, 4, 8, [5]) (MGD, CHC, GUP, BRB, [EIU, DEU, NWH])	6.43	0.11

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

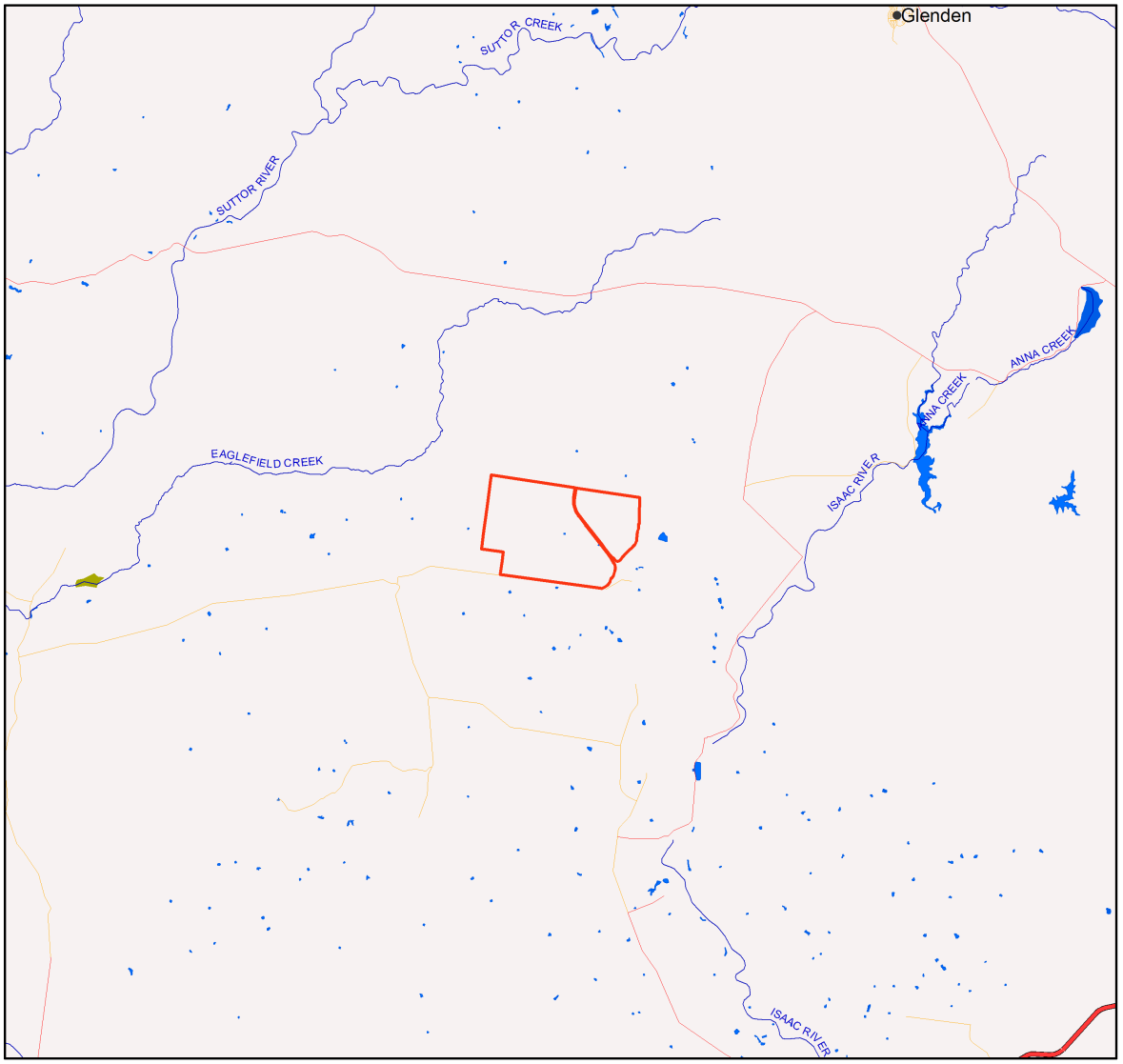
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
11.3.4	Available	Available
11.4.11	Available	Not currently available
11.4.8	Available	Available
11.4.9	Available	Not currently available
11.5.3	Available	Available
11.7.2	Available	Available
11.9.1	Available	Available
11.9.7a	Available	Not currently available
non-remnant	Not currently available	Not currently available

Maps

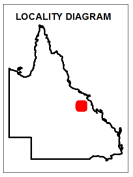
Map 1 - Location



Locality Map

Legend

- Selected Lot and Plan
- Towns
- Highway
- 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



N

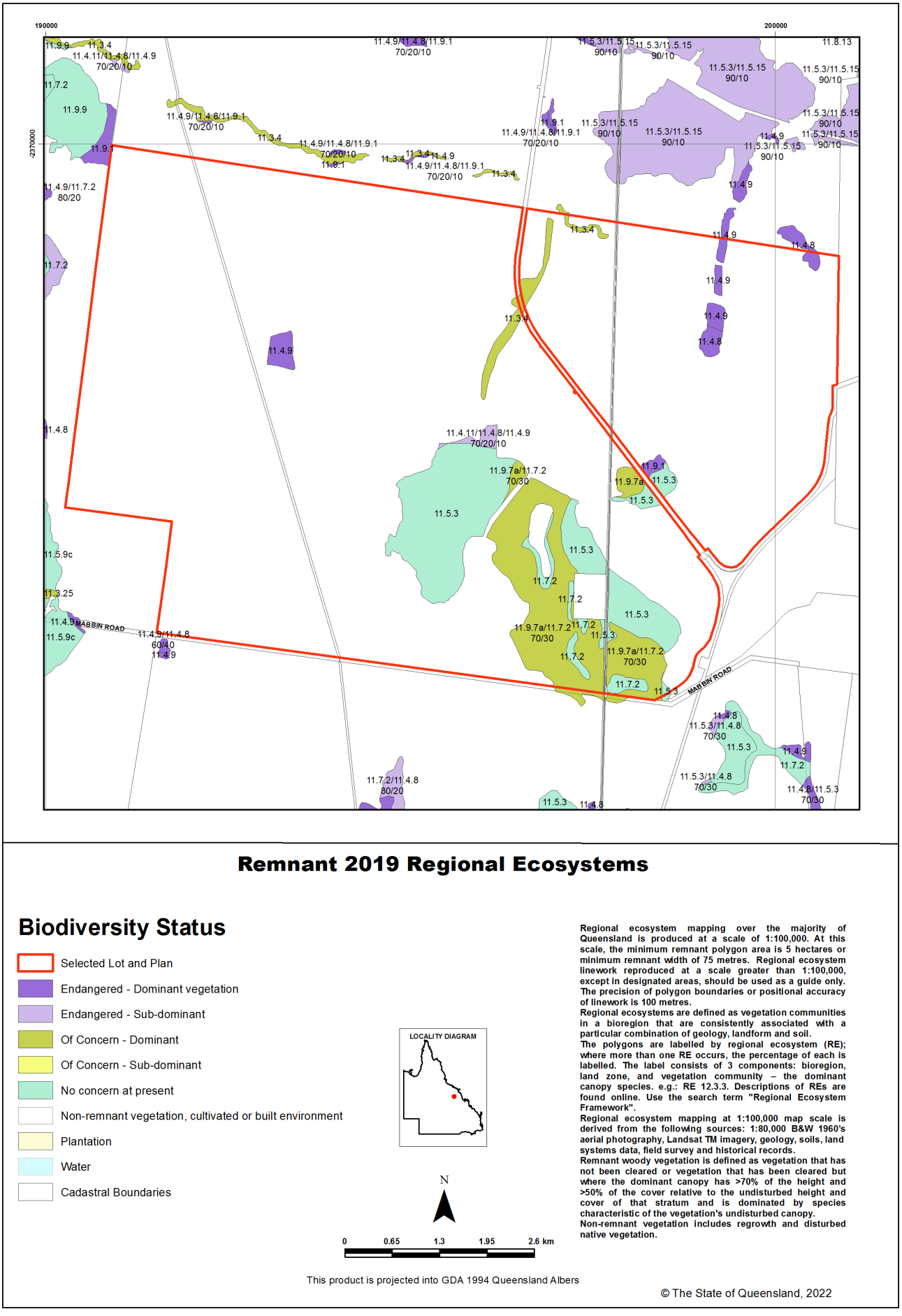
0 4000 8000 12000 16000 20000 m

This product is projected into GDA 1994 Queensland Albers

DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Map 2 - Remnant 2019 regional ecosystems



Remnant 2019 Regional Ecosystems

Biodiversity Status

- Selected Lot and Plan
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant vegetation, cultivated or built environment
- Plantation
- Water
- Cadastral Boundaries

This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

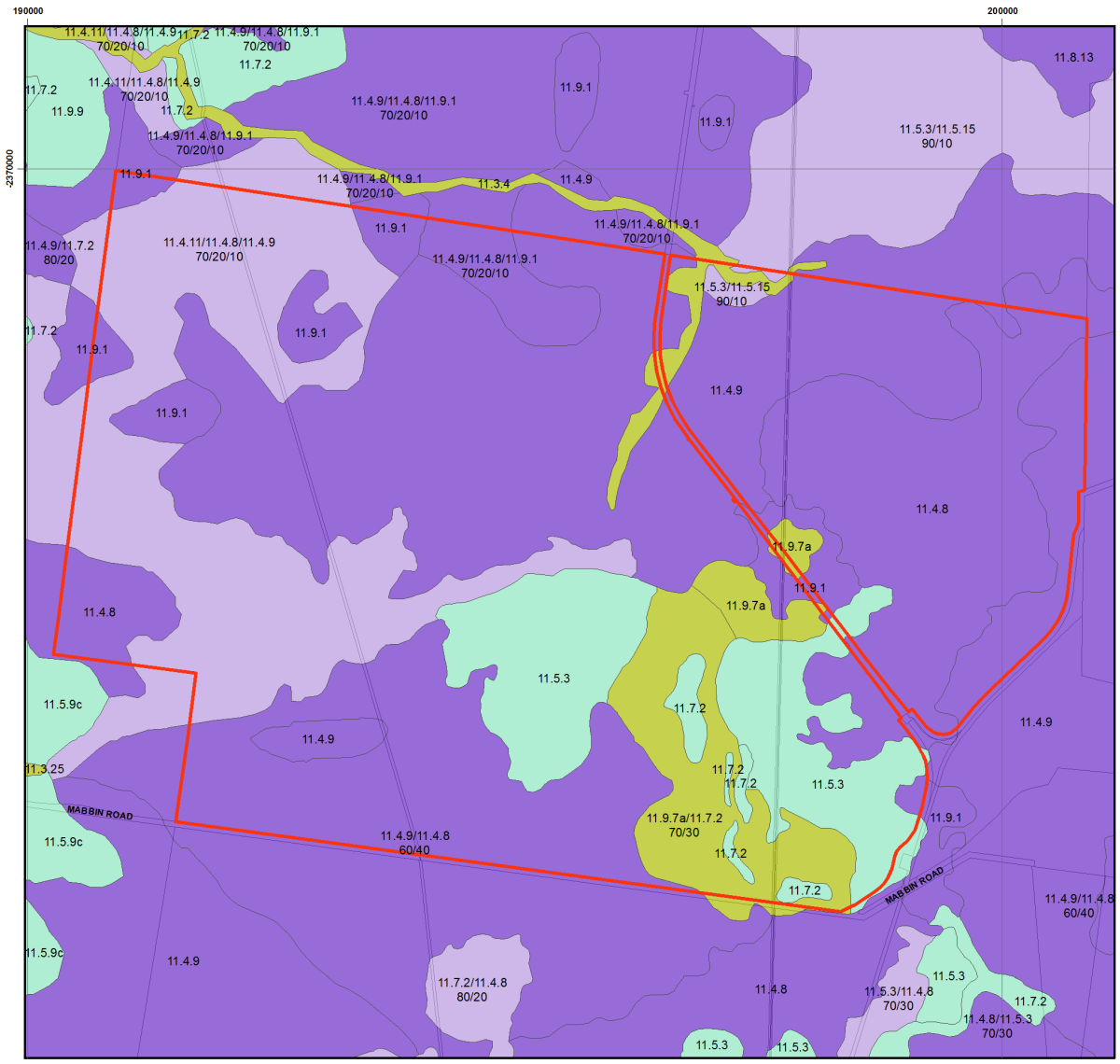
The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

Non-remnant vegetation includes regrowth and disturbed native vegetation.

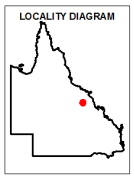
Map 3 - Pre-clearing regional ecosystems

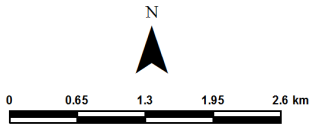


Pre-clearing Regional Ecosystems

Biodiversity Status

- Selected Lot and Plan
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries





This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
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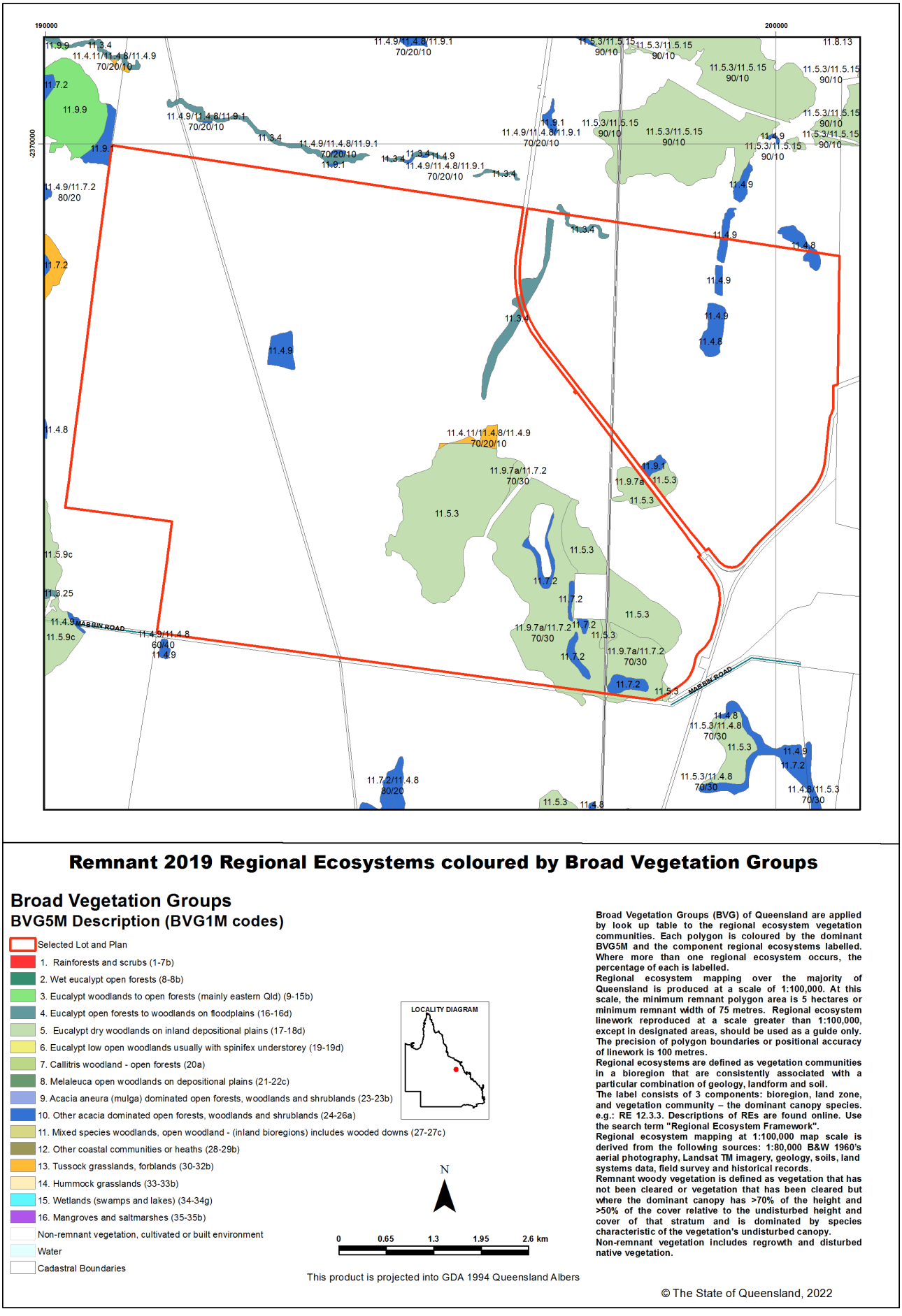
The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Remnant 2019 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- Selected Lot and Plan
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries

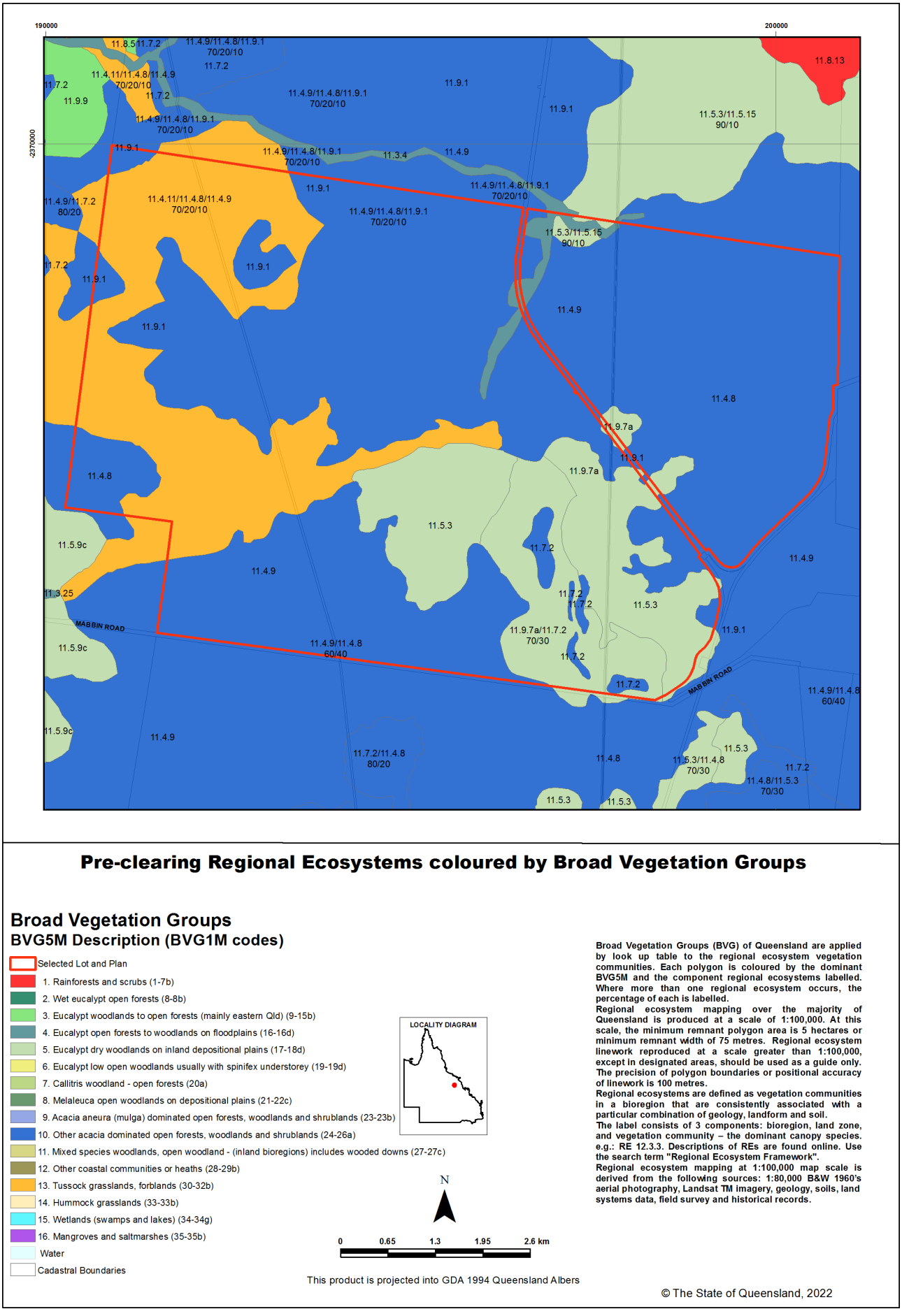
N

0 0.65 1.3 1.95 2.6 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.
Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
Non-remnant vegetation includes regrowth and disturbed native vegetation.

Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- Selected Lot and Plan
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
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- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries

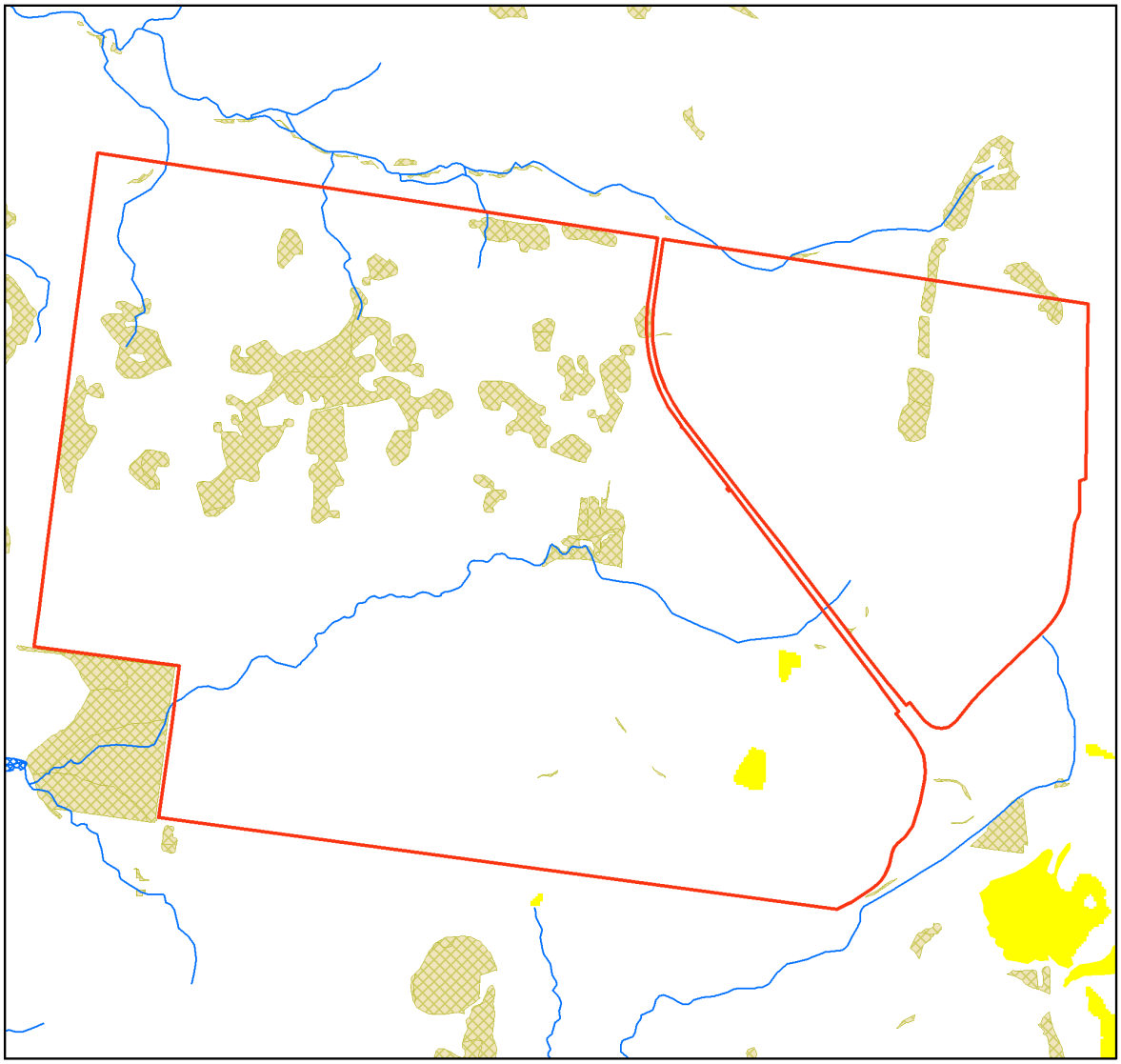
N

0 0.65 1.3 1.95 2.6 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 6 - Wetlands and waterways



Queensland Wetland Data

Legend

- Selected Lot and Plan
- Towns

Queensland Wetland Data

- Riverine Drainage Lines
- Springs

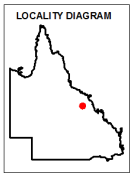
Wetland System - Water Bodies

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies

Wetland System - Regional Ecosystems

- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)

LOCALITY DIAGRAM



N

0 610 1220 1830 2440 3050 m

This product is projected into GDA 1994 Queensland Albers

Accuracy information: The positional accuracy of wetland data mapped at a scale of 1:100,000 is +/-100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coa st which are mapped at the 1:50,000 scale with a positional accuracy of +/-50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data. Consideration of the effects of mapped scale is necessary when interpret ing data at a larger scale, e.g. 1:25,000. For property assessment, digital linework should be used as a guide only. The extent of wetlands depicted on this map is based on rectified 2013 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Environment and Science. The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2013 imagery.

Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

https://qldglobe.information.qld.gov.au/

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

(https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

(https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4)

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

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

WildNet Records
Conservation Significant Species List

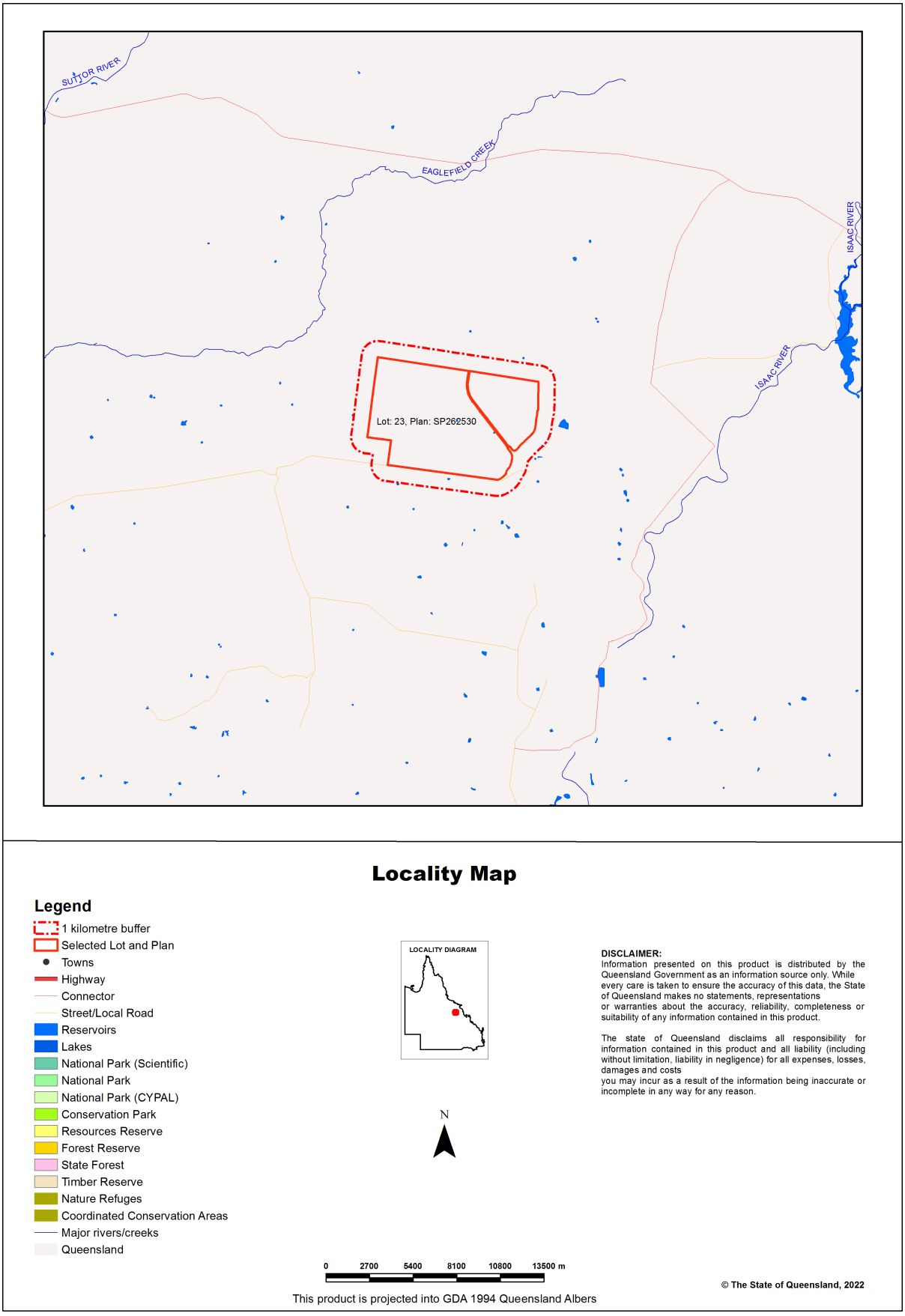
For the selected area of interest 5998.66ha Lot: 23 Plan: SP262530

Current as at 04/10/2022

WildNetCSSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 23 Plan: SP262530.

Table 1. Area of interest details

Size (ha)	5,998.66
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Conservation Significant Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

Conservation significant species are species listed:

- as threatened or near threatened under the Nature Conservation Act 1992;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
  - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
  - China-Australia Migratory Bird Agreement
  - Japan-Australia Migratory Bird Agreement
  - Republic of Korea-Australia Migratory Bird Agreement

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the species recorded within the area of interest and its one kilometre buffer.

Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
483	Animalia	Reptilia	Elapidae	*Denisonia maculata*	ornamental snake	V	V	0	53	24/10/2006

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Pest List

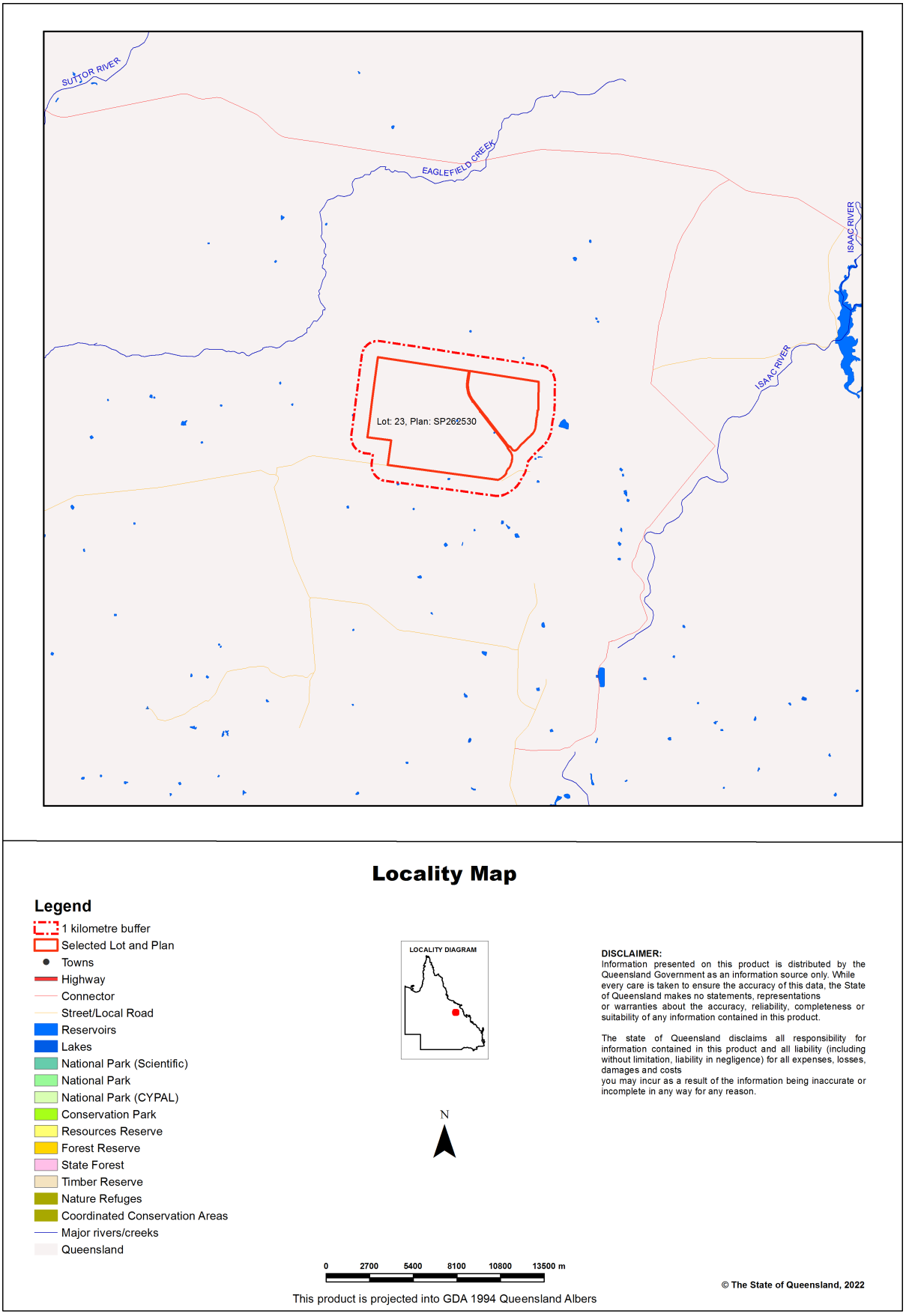
For the selected area of interest 5998.66ha Lot: 23 Plan: SP262530

Current as at 04/10/2022

WildNetPestList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 23 Plan: SP262530.

Table 1. Area of interest details

Size (ha)	5,998.66
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Catchment(s)	Fitzroy, Burdekin

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No estates or reserves are located within the area of interest.

World Heritage Area(s)

No World Heritage Areas are located within the area of interest.

Ramsar Area(s)

No Ramsar Areas are located within the area of interest.

Pest List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Species Data

Contextual location information is presented in Map 1.

A summary of the pests recorded within the area of interest and its one kilometre buffer is presented in Table 2.

Table 2. Pests recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	Specimens	Records	Last record	Endemicity
764	Animalia	Mammalia	Muridae	*Mus musculus*	house mouse	0	2	19/10/2006	II
14999	Plantae	Equisetopsida	Poaceae	*Urochloa mosambicensis*	sabi grass	1	1	05/03/2008	IU

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Endemicity: The endemicity code for the taxon (Introduced (Intranational) (IA), Introduced (International) (II), Introduced (Unknown), Exotic (Intranational) (XA), Exotic (International) (XI) and Exotic (Unknown) (XU)).

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
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- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
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- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Species List

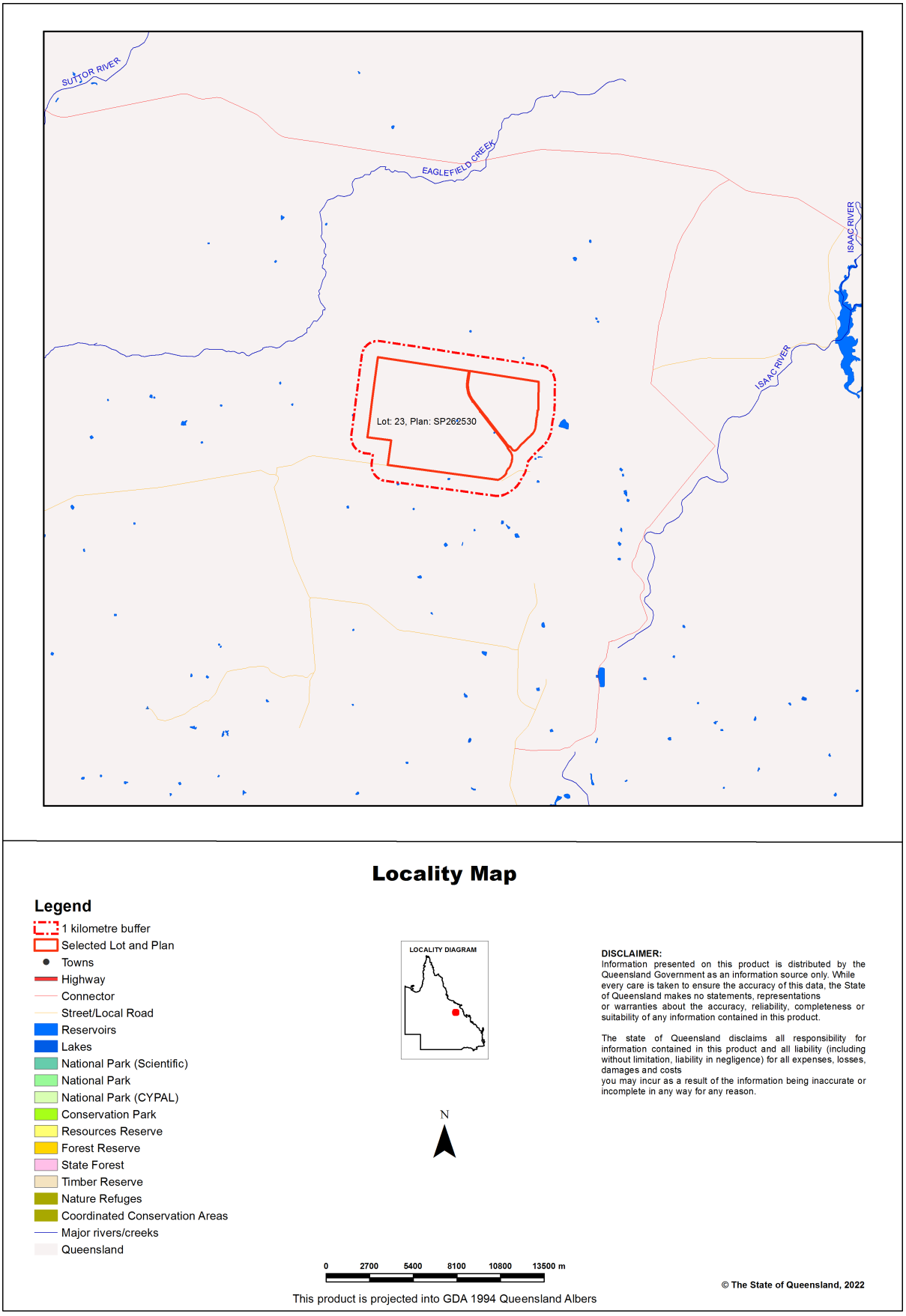
For the selected area of interest 5998.66ha Lot: 23 Plan: SP262530

Current as at 04/10/2022

WildNetSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 23 Plan: SP262530.

Table 1. Area of interest details

Size (ha)	5,998.66
Local Government(s)	Isaac Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Northern Bowen Basin
Catchment(s)	Fitzroy, Burdekin

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

Table 2. Animals recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
624	Amphibia	Hylidae	*Cyclorana alboguttata*	greenstripe frog	C	None	0	14	02/05/2004
620	Amphibia	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog	C	None	0	15	28/04/2004
627	Amphibia	Hylidae	*Litoria caerulea*	common green treefrog	C	None	0	29	02/05/2004
684	Amphibia	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog	C	None	0	2	22/10/2006
1437	Aves	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	C	None	1	1	31/12/1979
810	Mammalia	Dasyuridae	*Planigale ingrami*	long-tailed planigale	C	None	0	3	23/10/2006

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
792	Mammalia	Dasyuridae	*Sminthopsis macroura*	stripe-faced dunnart	C	None	0	12	24/10/2006
901	Mammalia	Macropodidae	*Macropus giganteus*	eastern grey kangaroo	C	None	0	1	19/10/2006
764	Mammalia	Muridae	*Mus musculus*	house mouse	None	None	0	2	19/10/2006
747	Mammalia	Muridae	*Pseudomys delicatulus*	delicate mouse	C	None	0	2	20/10/2006
739	Mammalia	Muridae	*Pseudomys sp.*	None	C	None	0	1	30/04/2004
734	Mammalia	Muridae	*Rattus tunneyi*	pale field-rat	C	None	0	5	20/10/2006
862	Mammalia	Potoroidae	*Aepyprymnus rufescens*	rufous bettong	C	None	0	1	17/10/2006
18847	Reptilia	Agamidae	*Amphibolurus burnsi*	Burns's dragon	C	None	0	1	18/04/2004
556	Reptilia	Agamidae	*Pogona barbata*	bearded dragon	C	None	0	2	18/10/2006
537	Reptilia	Boidae	*Antaresia maculosa*	spotted python	C	None	0	11	21/10/2006
35618	Reptilia	Diplodactylidae	*Diplodactylus platyurus*	eastern fat-tailed gecko	C	None	0	2	24/10/2006
426	Reptilia	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko	C	None	0	3	24/10/2006
369	Reptilia	Diplodactylidae	*Strophurus williamsi*	soft-spined gecko	C	None	0	12	23/10/2006
460	Reptilia	Elapidae	*Brachyurophis australis*	coral snake	C	None	0	4	20/10/2006
455	Reptilia	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake	C	None	0	5	20/10/2006
493	Reptilia	Elapidae	*Demansia psammophis*	yellow-faced whipsnake	C	None	0	3	20/10/2006
483	Reptilia	Elapidae	*Denisonia maculata*	ornamental snake	V	V	0	53	24/10/2006
454	Reptilia	Elapidae	*Pseudonaja textilis*	eastern brown snake	C	None	0	7	19/10/2006
441	Reptilia	Elapidae	*Suta suta*	myall snake	C	None	0	6	23/10/2006
444	Reptilia	Elapidae	*Vermicella annulata*	bandy-bandy	C	None	0	1	18/10/2006
413	Reptilia	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko	C	None	0	1	18/10/2006
325	Reptilia	Pygopodidae	*Lialis burtonis*	Burton's legless lizard	C	None	0	13	24/10/2006
327	Reptilia	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot	C	None	0	4	23/10/2006
26886	Reptilia	Pygopodidae	*Pygopus schraderi*	eastern hooded scaly-foot	C	None	0	1	23/10/2006
240	Reptilia	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus	C	None	0	3	18/10/2006
167	Reptilia	Scincidae	*Lerista fragilis*	eastern mulch slider	C	None	0	2	02/11/2006
138	Reptilia	Scincidae	*Morethia taeniopleura*	fire-tailed skink	C	None	0	1	18/10/2006

Table 3. Plants recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
34500	Equisetopsida	Poaceae	*Dinebra ligulata*	None	C	None	2	2	28/04/2010
10817	Equisetopsida	Poaceae	*Paspalidium globoideum*	sago grass	C	None	1	1	28/04/2010
14999	Equisetopsida	Poaceae	*Urochloa mosambicensis*	sabi grass	None	None	1	1	05/03/2008
27672	Equisetopsida	Poaceae	*Walwhalleya subxerophila*	None	C	None	1	1	28/04/2010

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
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- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
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Please direct queries about this report to the WildNet Team.

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- Useful wildlife resources
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Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government, to the maximum extent permitted by law, 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.

WildNet Records
Weed List

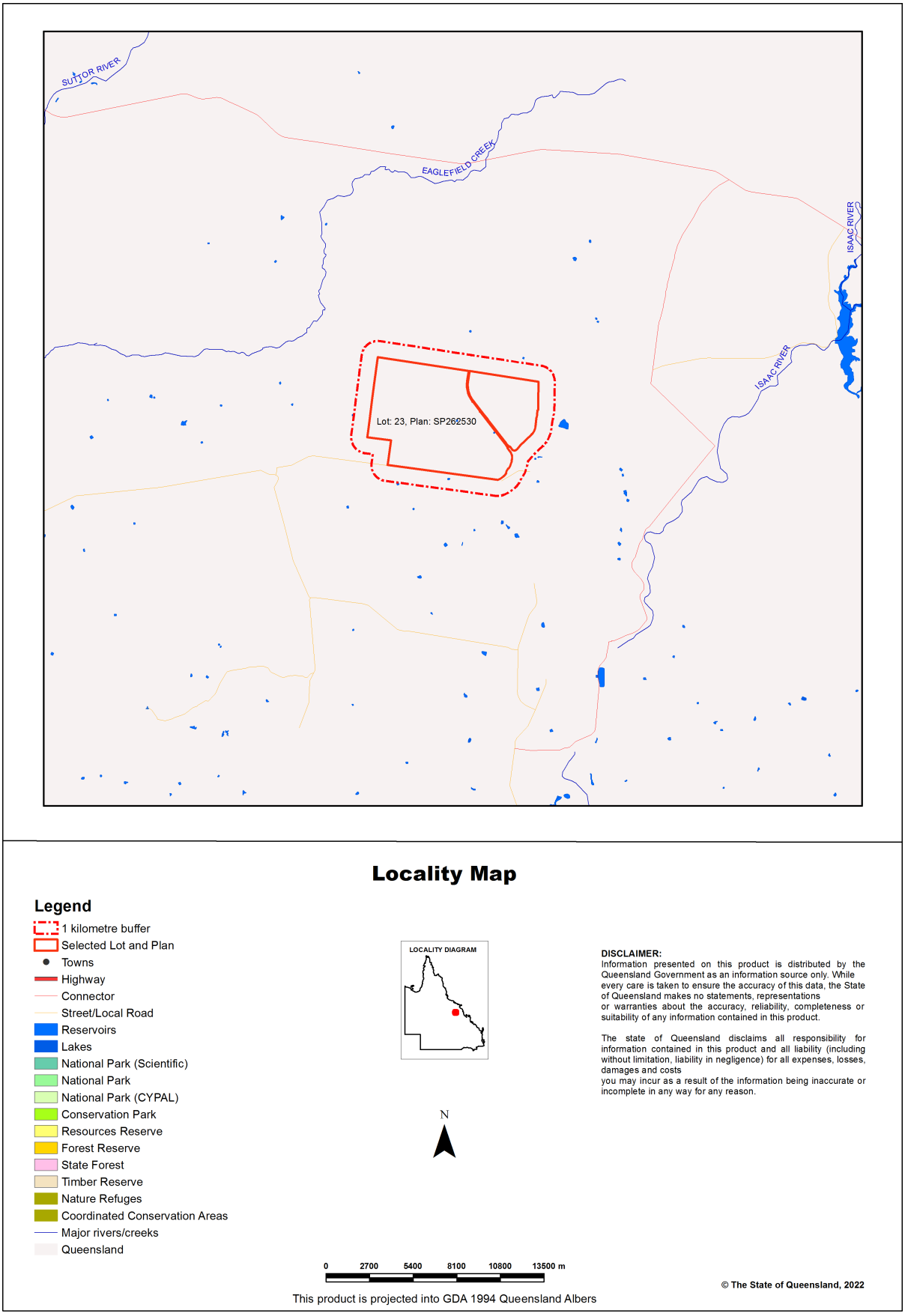
For the selected area of interest 5998.66ha Lot: 23 Plan: SP262530

Current as at 04/10/2022

WildNetWeedList

Queensland Government

Map 1. Locality Map



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Species Data

Contextual location information is presented in Map 1.

A summary of the weeds recorded within the area of interest and its one kilometre buffer is presented in Table 2.

Table 2. Weeds recorded within the area of interest and its one kilometre buffer

Taxon Id	Family	Scientific Name	Common Name	Specimens	Records	Last record	Endemicity
14999	Poaceae	*Urochloa mosambicensis*	sabi grass	1	1	05/03/2008	IU

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Endemicity: The endemicity code for the taxon (Introduced (Intranational) (IA), Introduced (International) (II), Introduced (Unknown), Exotic (Intranational) (XA), Exotic (International) (XI) and Exotic (Unknown) (XU)).

Links and Support

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- Protected Matters Search Tool

Disclaimer

Annexure B
Curricula vitae

EMM
creating opportunities

Andrew Jensen

Associate Ecologist | Team Leader - Ecology
EMM Consulting Pty Limited

Professional Overview

Andrew has 15 years' consulting experience across a range of environmental disciplines and industries including mining, renewables, and oil and gas.

Key aspects of his work have included ecological reporting and leading field surveys, preparation of environmental impact statements, preparation of management plans, environmental offset plans, management of subcontractors and health and safety processes. Andy has also led preparation of a number of EPBC Act referrals including recently for two large wind farms.

Andrew routinely reviews environmental technical studies and has developed environmental management plans and negotiated environmental approval conditions for clients. Andrew has also been responsible for conducting a number of species impact significance assessments at both Commonwealth and state level.

Qualifications and licences

Bachelor of Science (Hons), University of St Andrews, 2003

Specialisation

Ecological assessment and reporting

Representative experience

- Specimen Hill windfarm, Ecological Surveys and EPBC referral, Biloela (Epuron)
- Boulder Creek windfarm, EPBC referral and ecological surveys, Mount Morgan (Epuron)
- Cooloola Great Walk, Review of EPBC referral, Brisbane (Queensland Parks and Wildlife Service)
- Blackwater Tailings Project, Blackwater (BHP)
- ARTC Inland Rail Project, Supplementary Fauna Surveys, Brisbane and SEQ (ARTC)
- Olive Downs Coal Mine Project, MNES surveys and monitoring, Moranbah (Pembroke Resources)
- Townsville Energy and Chemicals Hub Project, EPBC referral, Townsville (QPM)
- Queensland Coal Assets, Secondment to BHP, Brisbane (BHP)
- ARTC Inland Rail Project, Preclearance surveys for Geotechnical Program, Brisbane and SEQ (ARTC)
- Blackwater Mine Seismic Surveys, MNES Significant Impact Assessments, Brisbane (BHP)
- Mole River Dam, Ecological Constraints Report and Scoping Report, Brisbane (Water NSW)
- Carmichael Coal Mine, Secondment to Adani Mining, Brisbane (Adani Mining)
- Queensland Oil Refinery, Ecological Surveys, Gladstone (Queensland Oil Refinery)
- Mount Fox Windfarm, Ecological Constraints Report, Brisbane (Windlab)
- Blackwater Mine, Ecological Surveys, Blackwater (BHP)
- McPhillamys Gold Mine, Ecological Surveys and Biodiversity Assessment Report, Blayney NSW (Regis Resources)
- Tipton West Dalby Pipeline, Ecological Surveys, Dalby (APA Group)
- Rugby Run Solar Farm, Secondment to Adani Renewables, Brisbane/Moranbah (Adani Renewables)
- Reedy Creek Wallumbilla Pipeline, Ecological Surveys, Reedy Creek (APA Group)
- Styx Coal Mine, Supplementary Ecological Surveys, Marlborough (Waratah Coal)
- Bauxite Hills Mine, Ecological Surveys, north of Weipa (Metro Mining)
- Williamtown Airport – expansions, Newcastle (Defence Australia)
- Elk Antelope gas field, Preparation of ESIA, Papua New Guinea (Total E&P PNG Limited)
- Cape River Substation, Vegetation clearing permit, Pentland (Windlab)
- Frieda River Project, Aquatic Ecology Impact Assessment, Papua New Guinea (PanAust)
- Kennedy Energy Park, Ecological assessment and EPBC referral, Hughenden (Windlab)
- Chifley Road upgrade, Review of Environmental Factors, Chifley NSW (Roads and Maritime
- Granville Platform Upgrade, Review of Environmental Factors, Granville NSW (Sydney Trains)
- Erskineville platform upgrade, Review of Environmental Factors, Erskinville NSW (Sydney Trains)
- Menangle Park gas pipeline, Review of Environmental Factors, Menangle Park NSW (Jemena)
- Riverwood Bridge upgrade, Review of Environmental Factors, Riverwood NSW (Sydney Trains)
- P'nyang Project appraisal well, Preparation of ESIA, Papua New Guinea (Oil Search)
- P'nyang Project, Preparation of EIS, Papua New Guinea (Esso PNG P'nyang Ltd)
- Former Mary Kathleen uranium mine, Environmental Condition and Rehabilitation Assessment, near Mount Isa (Queensland Government)
- Sarsfield Gold Mine Expansion Project Supplementary Report to the EIS, Ravenswood (Carpentaria Gold)
- PNG LNG Pipeline Project, Preconstruction Environmental Surveys, Papua New Guinea (Spiecapag)

- PNG LNG Project, Secondment to ExxonMobil, Papua New Guinea (ExxonMobil)
- Moura Pipeline, Ecological Assessment and EPBC Referral, Moura (Queensland Nitrates)
- Hillalong Project, Ecological Surveys for reassignment of vegetation mapping, Glenden (Shandong Energy)
- Surat Gas Project, Supplementary Report to the EIS, Brisbane/Surat Basin (Arrow Energy)
- Arrow LNG Plant, Supplementary Report to the EIS, Brisbane/Gladstone (Arrow Energy)
- Moranbah Gas Project, Threatened Species Management Plan, Brisbane (Arrow Energy)
- Arrow LNG Plant, Preparation of EIS, Brisbane/Gladstone (Arrow Energy)
- Pagham Harbour Coastal Defence Scheme, Preparation of EIS, Pagham UK (Environment Agency)
- QE2 Teesport Berth Development, Preparation of EIS, Teesport UK (PD Teesport)
- Round 3 Offshore Windfarms, Review of Ecological Constraints, Edinburgh UK (Airtricity)
- Onshore Windfarm bird survey methodology design, Edinburgh UK (Enertrag)
- Dover Harbour Terminal 2 Development, Preparation of EIS, Dover UK (Dover Harbour Board)
- Dudgeon Offshore Windfarm, Preparation of EIS, Edinburgh UK (Dudgeon Offshore Wind)
- Elgin Flood Alleviation Scheme, Ecological Surveys, Elgin UK (Moray Council)
- Seaham Harbour Redevelopment, Preparation of EIS, Seaham UK (Durham Council)
- Titchwell Managed Realignment, Preparation of EIS, Norfolk UK (Royal Society for the Protection of Birds)
- Forres (River Findhorn) Flood Alleviation Scheme, Ecological Surveys and Preparation of EIS, Elgin UK (Moray Council)
- Helix Project Phase II, Ecological Surveys, Grangemouth UK (British Waterways)
- Forres (River Findhorn) Flood Alleviation Scheme, Ecological Surveys, Elgin UK (Moray Council)
- Proposed Firth of Forth Windfarm, Review of Constraints, Edinburgh UK (Airtricity)
- Seahouses seawall upgrade, Ecological Surveys, Seahouses UK (Northumbria Council)
- Thames Estuary Maintenance Dredging, Review of Ecological Data, London UK (Port of London Authority)
- BERR Offshore Energy Strategic Assessment, Review of Survey Method, Edinburgh UK (BERR)
- Bo'ness Harbour Development, Wintering Bird Management Plan, Bo'ness UK (ING Estate)
- Brent Decommissioning, Sensitivity Assessment and Environmental Risk, Edinburgh UK (Shell)
- Canvey Biodiesel Plant, Preparation of EIS Addendum, Canvey UK (Sure Green Fuels)
- Barrow Waterfront Harbour Revision Order, Preparation of EIS, Barrow UK (West Lakes Renaissance)
- Trow Quarry Remediation Project, Ecological Surveys and Preparation of EIS, Trow UK (South Tyneside Council)
- Isle of Grain Windfarm, Review of Ecological Data, Isle of Grain UK (British Petroleum)
- Newhaven Desalination Plant, Preparation of EIS, Newhaven UK (Clarity Ltd)
- Strangford Lough Marine Current Turbine, Preparation of EIS, Strangford UK (SeaGen Ltd)
- Thanet Offshore Windfarm, Preparation of EIS Addendum, Thanet UK (Warwick Energy)
- River Carron Forth Gateway Project, Ecological Surveys, Grangemouth UK (British Waterways)

Sandra Walters

Associate Ecologist
EMM Consulting Pty Limited

Professional Overview

Sandra has 22 years' experience in terrestrial ecology, having worked for the past 10 years in environmental consultancy, following ecology roles in state government and private not-for-profit conservation. She has extensive experience in fauna and flora survey, natural resource management, fire management systems, pest animal management, and Indigenous cultural heritage management.

Sandra has applied her technical skills in Terrestrial Ecology, Environmental Impact Assessment, Fire Management, Mine Rehabilitation and Contaminated Land Assessment across a range of sectors including Defence, Mining and Gas, Energy, Rail, Construction, and State and Local Governments. Sandra has worked on projects in varied landscapes and legislative jurisdictions, including QLD, NSW, the ACT, Northern Territory and South Australia.

Qualifications and licences

Bachelor of Environmental Science, Charles Sturt University, 2010

Rainforest Plant Identification Certificate, JCU/ATH, 2013

QLD Department of Transport and Main Roads SOA E1 Technical Specialist, Ecology and Bushfire

'Suitably qualified person' QLD Protected Plants framework

Bushfire Attack Level Assessor, FPAA

Certified Environmental Practitioner (CEnVP), Environment Institute of Australia and New Zealand

Member, Environment Institute of Australia and New Zealand

Member Birdlife Australia, Australasian Bat Society, Queensland Wader Study Group, Native Plants Queensland

Baseline Security Clearance, Australian Government Security Vetting Agency

Certificate III Fire Communication Operations

Certificate II Public Safety (Firefighting Operations)

Specialisation

Terrestrial ecology

Environmental impact assessment

Fire management

Mine rehabilitation

Contaminated land assessment

Representative experience

Advisory Flora and Fauna Ecology

- Mackay Port access road, detailed environmental assessments, project manager / lead ecologist (Department of Transport and Main Roads)
- Mackay Kirkup Bridge Design, lead ecologist (Department of Transport and Main Roads)
- Port of Mackay and Port of Hay Point, environmental constraints analysis, project manager / lead ecologist (North Queensland Bulk Ports)
- Eton Range Realignment Denison and Stockyard Creek, fauna exclusion fence monitoring, lead ecologist (Department of Transport and Main Roads)
- Dalrymple Bay Coal Terminal 8X expansion EIS, lead ecologist (Dalrymple Bay Coal Terminal)
- Lake Lindsay Environmental Impact Assessment, senior ecologist (AngloAmerican)
- High Risk Species Management Plans for Port of Mackay, Port of Abbot Point, Port of Hay Point, and Port of Weipa, project manager / lead ecologist (North Queensland Bulk Ports)
- Kennedy Highway environmental assessment, lead ecologist (Department of Transport and Main Roads)
- Peak Downs Highway Hazard Reduction, lead ecologist (Department of Transport and Main Roads)
- Mackay Ring Road Fursden Creek, Platypus survey management plan, lead ecologist (Department of Transport and Main Roads)
- West Funnel Creek Bridge Replacement survey management plans, lead ecologist (Mackay Regional Council)
- Bee Creek Bridge Replacement, lead ecologist (Mackay Regional Council)
- Sandy Gully Bridge Replacement, lead ecologist (Department of Transport and Main Roads)
- Wide Centreline environmental scoping report, Innisfail to Ingham, QLD, lead ecologist (Department of Transport and Main Roads)
- Cape Gloucester Subdivision, senior ecologist (Aldabra Pty Ltd)
- Warnervale Link Road Review of Environmental Factors, lead ecologist (Central Coast Council)
- Wiggins Island Coal Export Terminal ecological assessments, senior ecologist (Wiggins Island Coal Export Terminal)
- Dysart Road Realignment, Peak Downs Coal Mine, senior ecologist (BHP Billiton Mitsubishi Alliance)
- Goyder River Crossing and Road Realignment, senior ecologist (Department of Construction and Infrastructure)
- Roma and Fairview Gas Fields, senior ecologist (Santos)

Spotter catcher services

- Roma and Fairview Gas Fields: Spotter catcher services for 14 separate construction projects (new roads and well lease constructions) (Santos)
- Hutton and Christmas Creek, Fairview Gas Fields: Platypus surveys and preparation of Platypus SMP for the pipeline transmission project. Preparation of SMP for Roma and Fairview Gas Fields (Santos)
- Bedford Rd, Mackay: Spotter catcher services for vegetation clearing for new housing development (Shadforth Civil Construction)

- Hay Point Coal Export Terminal: Spotter catcher services for linear vegetation clearing for new high voltage powerline for HPX3 expansion at Hay Point Coal Export Terminal (Thiess)
- Hay Point Coal Export Terminal: Spotter catcher services for vegetation clearing and land reclamation operations – tidal and marine environments (BMD Constructions)
- Sheep station Creek Rail Level Crossing: Spotter catcher services during vegetation clearing to improve the line of sight (Coal Stream Alliance)
- Blackmans Gap Rd cutting upgrade: Spotter catcher services for widening and upgrade of steep cutting (Gladstone City Council)
- Yakapari-Habana Rd: Spotter catcher services for vegetation clearing associated with the installation of new power transmission line and pole (Ergon Energy)

Weed and pest animal management

- Central Queensland Region Pest and Weed Survey: Part of a team that surveyed over 30,000 km of DTMR road network for declared weeds and pest animals over four weeks (Department of Transport and Main Roads)
- Ecological Field Assessments, QLD: Pre-clearance and Baseline Weed Surveys - Newlands system at Havilah and Jilalan Rail Yards (Aurizon)
- Prepared Pest Animal Management Plan for Gas Transmission Pipeline from Roma and Fairview Gas Fields to Gladstone (Santos)

Biodiversity offsets

- Preparation of Biodiversity Offset Plan for Heathcote Railway Station upgrade (Novorail)
- Offline storage area Biodiversity Offsets Assessment. Field surveys to verify mapped areas of suitable offset vegetation using Ecological Equivalence Methodology (Gladstone Area Water Board)

Land contamination

- Glenpark St Overpass Duplication, Mackay, QLD: Contaminated Site Investigation within rail corridor involving intrusive sampling, laboratory results analysis and site characterisation under NEPM guidelines. Preparation of Acid Sulphate Soil Management Plan for the project (Mackay Regional Council)
- Preliminary Site Investigation Reports to facilitate the upgrade of infrastructure at Granville, Gordon, Strathfield, Hornsby and Undercliffe Railway Stations (Novorail)
- Preliminary Site Investigation Reports to facilitate the upgrade of infrastructure at Mulgrave, Meeks and Canterbury Railway Stations (Transport for NSW)

Mine rehabilitation

- Meandu Mine environmental approval amendment, senior environmental scientist (Stanwell Corporation)

Department of Defence Projects

Ecology

- Tully Training Area ecological assessment, lead ecologist
- Bradshaw Bush Blitz, expert mammal and bird ecologist
- Biodiversity monitoring strategy, NT, project leader / lead ecologist
- Cultana Training Area Expansion environmental report, lead ecologist / report author /reviewer
- Woomera Test Range ecological assessment, lead fauna ecologist / report author
- RAAF Tindal Mahogany Replacement Program, senior ecologist
- PDS Northern Australia Regional Environmental Lead, lead environmental advisor to Defence PDS Projects

Bushfire Management

- Bushfire Management Plans, Expert Technical Panel Member
- Review and Reissue of Existing Bushfire Management Plans, Project Design Manager / author
- Revision of Bushfire Management Plans with integration into GEMS, design manager / expert technical review panel member

Land Contamination

- Kangaroo Flats Training Area, Mount Bundey Training Area, Robertson Barracks, Mount Stuart Training Area, and Townsville Field Training Area, National Lead Contamination Audit / field sampling and report author
- RAAF Base Darwin, asbestos stockpile sampling, field sampling and report author
- Halifax Bay Training Area, marine water and benthic environment surveys, field ecologist and reporting support

Publications and conference presentations

- Walters, S & Goedegebuure, M, 2021 Effectiveness of fauna-sensitive infrastructure in reducing roadkill of koala in Central Queensland (in prep)
- Farrell, C & Walters, S, 2016 Combining multiple bushfire behaviour models for improved hazard assessment. Presentation at Fire Australia 2015 Conference, Fire Protection Association of Australia.

Annexure C

EVNT species likelihood of occurrence

EMM
creating opportunities

C.1 Fauna species

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Calidris ferruginea	Curlew Sandpiper	✓	×	CE, Mi	E	This migratory shorebird species spends its non-breeding season in coastal parts of Australia. The species has been recorded in various inland regions as it migrates to southern parts of the Australian coastline (Pizzey et al. 2012). Near the coast, it typically inhabits intertidal mudflats in sheltered areas. When inland, they utilise ephemeral and permanent lakes, lagoons, ponds, or dams with bare edges of mud. The species does not breed in Australia (DAWE 2022j).	Unlikely	Preferred habitats of coastal mudflats and shallow wetlands are not known to occur within the study area. The desktop reviews confirmed no records of this species within the Project area and optimal habitats do not occur.
Denisonia maculata	Ornamental Snake	✓	✓	V	V	The Ornamental Snake is a nocturnal species known only from the Brigalow Belt North and the Brigalow Belt South biogeographical regions. Its preferred habitat includes woodlands (Acacia and Eucalypt) and open forests associated with moist areas and cracking clays. It has been recorded from multiple regional ecosystems including RE11.4.3, 11.4.6, 11.4.8, 11.4.9, 11.3.3, 11.5.16, most regularly from those associated with clay soils (Land zone 4). It shelters within deep soil cracks, under coarse woody debris and amongst deep leaf litter. It feeds almost exclusively on frog species and therefore is most active during wet conditions (DAWE 2022a).	Known	Suitable habitat occurs throughout the Project area and multiple desktop records exist (66 records in the study area). This species was recorded by EMM during March 2022 survey.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Egernia rugosa	Yakka Skink	✓	×	V	V	The Yakka Skink occurs in a variety of habitats including eucalypt and acacia woodland, as well as Callitris and Casuarina dominated communities. Within these communities it requires specific refuge microhabitats including partially buried timber and large rocks, disused animal burrows, and hollow logs (DAWE 2022k).	Unlikely	No records of this species exist within the region. This large skink utilises Brigalow habitats and in particular, hollow ground logs for denning. Ground timber throughout the Project area is predominantly recently felled trees with a paucity of hollows. The presence of this species is often detected via its conspicuous latrine sites. None were observed within the Project area, and this species is considered unlikely to occur.
Elysea albagula	White-throated Snapping Turtle	✓	×	CE	CE	The White-throated Snapping Turtle is the largest short-necked freshwater turtle in Australia. The species is only found in Queensland in the Fitzroy, Mary and Burnett Rivers and associated drainages. It is typically found in clear, flowing, well-oxygenated waters (DES 2022a). Most records of the species are from larger river systems.	Unlikely	This species utilises riverine habitats within the Fitzroy, Mary, and Burnett River catchment. This habitat is not present within the Project area.
Erythrotriorchis radiatus	Red Goshawk	✓	×	V	E	The Red Goshawk is a large bird of prey that primarily feeds on other bird species. Its preferred habitat consists of a mosaic of vegetation types including forest and woodland communities with ample prey populations and permanent water. Regular prey species include Corvids, Kingfishers and Parrots. Nesting locations are highly specific and usually restricted to trees taller than 20 m and within 1 km of a permanent watercourse or wetland (DAWE 2022l).	Unlikely	This species has undergone a well-documented and severe northerly range retraction in recent decades. Currently, its breeding population is restricted to Cape York peninsula and parts of the Northern Territory (DAWE 2022l). The species utilises coastal and sub-coastal tall open forests and woodlands, tropical savannas traversed by wooded or forested rivers, and the edges of rainforest. This habitat is not present within the Project area.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Falco hypoleucos	Grey Falcon	✓	×	V	V	The Grey Falcon inhabits woodland, shrubland and grasslands in the arid and semi-arid zones (Menkhorst et al. 2017).	Unlikely	There are no regional records of Grey Falcon, and it is mostly restricted to arid habitats. Therefore, the species is considered unlikely to occur.
Furina dunmalli	Dunmall's Snake	✓	×	V	V	Dunmall's Snake is a small elapid that primarily occurs in the Brigalow Belt region and is considered very rare with limited records. It has been recorded in forests and woodland dominated by Brigalow and other Acacia, native Cypress, or Bull-oak. It shelters under woody debris and leaf litter and may use cracks in alluvial clay soils. Suitable soils occur on LZ 4 and 10 (DAWE 2022m).	Unlikely	Suitable habitat occurring within the Project area is severely limited and no confirmed records are available. Therefore, the species is considered unlikely to occur.
Geophaps scripta scripta	Squatter Pigeon (southern)	✓	✓	V	V	The Squatter Pigeon is a medium-sized, terrestrial pigeon that occurs from Cape York to southern Queensland (formerly to northern New South Wales). Habitat for the species is generally open-forests to sparse open-woodlands and scrub, dominated by Eucalyptus, Corymbia, Acacia or Callitris species, within 3 km of surface water. Squatter Pigeons prefer areas in these habitats with low ground cover, typically below 33%. Soils in these areas consist of sandy substrates dissected with low gravely ridges (DAWE 2022b).	Known	Multiple records of this species exist within the study area (12 records). Field surveys identified this species as being present in the Project area and as such the species is considered known to occur.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Grantiella picta	Painted Honeyeater	✓	×	V	V	The Painted Honeyeater is a nomadic species that occurs in inland areas spanning from central Victoria, through NSW into central QLD and eastern NT. It occupies dry, open forests and woodlands including box, ironbark, yellow gum, Melaleuca, Casuarina, Callitris, and Acacia communities. It feeds primarily on Mistletoe (Loranthaceae) fruits and its movements are highly dependent on fruit availability (DAWE 2022n).	Unlikely	Areas of potential habitat (which consist of remnant Acacia woodlands and riparian eucalypt vegetation with mistletoe species such as Amyema quandang) do not occur.
Hirundapus caudacutus	White-throated Needletail	✓	×	V	V	A regular summer non-breeding migrant to eastern Australia, the White-throated Needletail is a highly aerial species that forages in the airspace over most habitats. However, the shows some preference for forested hilly areas and coastal ranges. Its roosting habits are poorly known but it has been recorded roosting in woodlands, high amongst the foliage of large Eucalypt species (Pizzey et al. 2012).	Known	Recorded by EMM in December 2021 and adjacent to the Project area in March 2022. The species habitat preferences indicate that it could occur in any airspace over the entire Project area.
Lerista allanae	Retro Slider	✓	×	E	E	This species occurs in a small distribution near Clermont, on black soil. Recent records of the skink were from leaf litter and friable soils beneath trees and shrubs (Borsboom et al. in prep).	Unlikely	The Project area is outside the known distribution of the species and habitat is unsuitable. Known only from a small area near Clermont/Capella, south of the Project area, in open grasslands and grassy woodland, on black and red soil.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Macroderma gigas	Ghost Bat	✓	×	V	E	This species requires specific breeding habitat throughout its range. Breeding sites are typically large, deep natural caves or abandoned mineshafts, which provide stable environmental conditions. During the non-breeding season, roosting habits are more variable, and the species will utilise rock crevices and overhangs. The species forages in close proximity to roosting sites, in woodland, monsoonal rainforest, and dry vine thickets (Hourigan 2011).	Unlikely	Roosts in large sandstone and limestone caves. This habitat is not present in the Project area, and the nearest known population is at Cape Hillsborough, north of Mackay.
Neochmia ruficauda ruficauda	Star Finch (Eastern)	✓	×	E	E	This species prefers natural grasslands and grassy woodlands and is often associated with permanent or ephemeral wetlands. Preferred woodlands consist primarily of eucalypts, as well as Melaleuca and Casuarina species (DAWE 2022o). In recent decades, the distribution of the species has largely contracted to eastern Cape York and the Gulf of Carpentaria (Pizzey et al. 2012).	Unlikely	No records of this species exist within the study area. This species has recently undergone an extreme range reduction and as such these records are likely to be historical. Therefore, the species is considered unlikely to occur.
Nyctophilus corbeni	Corben's Long-eared Bat	✓	×	V	V	Corben's Long-eared Bat is a dark grey-brown bat with long ears and a shallow muzzle ridge groove. Its preferred habitat is eucalypt woodland including box/ironbark/cypress pine woodlands, Bull-oak woodlands, Brigalow woodlands, and Belah woodland. It roosts under loose bark or in the crevices and hollows of trees. Overall it is considered a relatively rare species (TSSC 2015b).	Unlikely	The desktop review did not identify any record of the species within the study area. The Project area appears to be beyond the known northern limit of the species distribution and the closest record is to the south in Expedition National Park.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Petauroides volans volans	Greater Glider	✓	✓	E	E	This folivore prefers eucalypt woodlands with a high diversity of mature myrtaceous tree species and abundant hollows. Populations of this species are sensitive to habitat disturbance and particularly the removal of large mature trees (van der Ree et al. 2004)	Unlikely	Records of Greater Glider exist within the study area (seven records) associated with riparian vegetation to the east. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The Greater Glider was not identified when undertaking nocturnal spotlighting surveys or through scat observations. It is unlikely the species is present due to the lack of large mature hollow bearing trees and scarcity of large hollows. The Project area is largely fragmented and has been previously cleared with non-remnant and regrowth vegetation being the dominant vegetation features. This limits large, mature hollow bearing trees for the Greater Glider to feed on or dwell in. Due to unsuitable habitat within the majority Project area, absence of records within the study area, lack of mature trees and a scarcity of large hollows it is unlikely this species is present.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
								There is a small section of the alignment on Lot 11 that contains RE 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces. This woodland is mapped correctly and contains *E. crebra* and *C. clarksoniana* trees around 14 m high. Some hollows are present, but they are relatively scarce (approximately five per hectare) and small in size, as the woodland appears to have been subject to selective clearing in the past. Due to the open nature of the canopy, small numbers of hollows and lack of connectivity to more optimal Greater Glider habitat, this area is conservatively considered marginal habitat for Greater Glider and should be confirmed through nocturnal spotlighting surveys at a later date. Areas of RE 11.5.3 on Lot 2 are unsuitable for Greater Glider, as they have been cleared in the past and have now regrown to achieve remnant status. However, hollows have not yet developed in the canopy trees, so no denning habitat for the glider is present. Additionally a patch of *Eucalyptus orgadophila* open grassy woodland in the eastern portion of the alignment on Lot 2 is mapped as potential foraging habitat.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Phascolarctos cinereus	Koala	✓	×	E	E	The Koala is an iconic arboreal mammal that inhabits a range of temperate, sub-tropical and tropical and semi-arid habitats throughout eastern Australia. It forages almost exclusively on myrtaceous tree species within the genera of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Melaleuca*. Preferred species within these genera vary according to range but are predominated by *Eucalyptus* species (DAWE 2022f).	Potential (low)	No records of Koala exist within the study area. The species is not considered likely to occur in the Project area and is scarce in the Moranbah region and has not been recorded to date. No individuals were recorded, and no scratches or scats associated with the species were recorded. If present in the region, the species is likely to be restricted to riparian areas of major watercourses. The Project area is largely cleared and dominated by dense weedy groundcover. Koala is considered to have a low potential to occur in the Project area.
Poephila cincta cincta	Southern Black-throated Finch	✓	×	E	E	The Southern Black-throated Finch has undergone an extensive northerly range retraction. Its preferred habitats consist of grassy woodland dominated by eucalypts (savannah communities), but it will also use *Melaleuca* or *Acacia* dominated communities with a diversity of grass species. Riparian habitats can also be utilised within highly fragmented and modified environments (DAWE 2022p).	Unlikely	Utilises savannah grasslands and riverine wetlands dominated by eucalypts, paperbarks or acacias and is known from localities close to Townsville. This habitat is not present in the Project area, and it is outside the species' range.
Rheodytes leukops	Fitzroy River Turtle	✓	×	V	V	The Fitzroy River turtle inhabits permanent freshwater riverine reaches and large, isolated permanent waterholes. It is only found in the Fitzroy River and its tributaries (DAWE 2022q).	Unlikely	The desktop review did not identify any records of this species within the study area. Only found in the Fitzroy River and its tributaries, in flowing rivers with deep pools. This habitat is not present in the Project area.

Scientific name	Common Name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Rostratula australis	Australian Painted Snipe	✓	×	E	E	The Australian Painted Snipe is a predominately crepuscular and nocturnal shorebird species. Its preferred habitats include shallow ephemeral freshwater wetlands such as swamps, gilgai and streams with ample vegetative cover. It is most common in south-eastern Australia but can exhibit dispersive characteristics and has been known to occur far from its usual range when conditions are suitable, usually following rain events (DAWE 2022c).	Potential	No records of this species exist within the study area although areas of potentially suitable habitat in the form gilgai occur within the Project area. Such habitats may be utilised on a sporadic basis if the species is present in the region. The Australian Painted Snipe is a predominately crepuscular and nocturnal shorebird species. It is most common in southeastern Australia but can exhibit dispersive characteristics and has been known to turn up far from its usual range when conditions are suitable post rain events. The species was not recorded during field surveys. However due to its nomadic nature this species is considered to have the low potential to occur during suitably wet conditions, although any occurrence is likely to be sporadic.
Tyto novaehollandiae kimberli	Masked Owl (northern)	✓	×	E	V	Roosting in tree hollows, dense foliage or caves, the northern Masked Owl occupies a wide variety of woodland and forest ecosystems (Menkhorst et al 2017), with some preference for tall open Eucalypt forests with suitable hollows for nesting (DAWE 2022r).	Unlikely	Utilises woodland habitats with well-developed tree hollows for roosting and hunting, as well as open grasslands and grassy woodlands. The southern limit of the species is not precisely known, but likely to be further north than the Project area. Suitable habitat is not present.

1. EPBC Act status: CE- critically endangered, E – endangered, V – vulnerable, M – migratory, Ma – marine
2. NC Act status: CE – critically endangered, E – endangered, V – vulnerable, NT – near threatened, SLC – special least concern

C.2 Flora species

Scientific name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Cerbera dumicola	O	P	-	NT	Occurs in the region primarily on lateritic 'jump-ups' (Land zone 7) in association with Lancewood (*Acacia shirleyi*) or vine thicket communities.	Unlikely	While some SEVT species are present in the understorey of the mapped RE 11.5.3, none of the known habitat descriptions for *C. dumicola* are present. Areas containing SEVT species were ground-truthed thoroughly and *C. dumicola* was not present.
Dichanthium queenslandicum	P	P	E	V	This grasses occurrence is confined to heavy black clay soils on undulating plain where it is typically found in natural grassland communities. It can however also occur in other communities on this soil type such as eucalypt and acacia woodlands (DES 2022b).	Unlikely	Due to a lack of suitable native grasslands and extensive areas of Buffel Grass along with cattle grazing, the species is considered unlikely to occur in much of the alignment. There are 26 records within the study area. Extensive field surveys failed to detect the species.
Digitaria porrecta	O	P	-	NT	Occurs widely in four disjunct areas extending over 1000 km. In Queensland, it occurs in the Nebo district and the Central Highlands between Springsure and Rolleston; and from Jandowae south to Warwick. It favours tussock grassland or open woodland of poplar box, on heavy, cracking clays.	Unlikely	There is potential habitat in black soil areas at the eastern end of the alignment and in the north-south section, however these areas were ground-truthed thoroughly and *D. porrecta* was not recorded. Digitaria brownii was present and flowering in June 2022, which is reported to flower in summer (https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Digitaria~brownii). Due to unseasonably wet conditions and the presence of fertile material on grasses, there is a high level of confidence in the detection of *D.porrecta* if present. Similar to the Dichanthium species, invasion by exotic species has degraded potential habitat for the species.

Scientific name	PMST search	Wildlife online	EPBC Act status[1]	NC Act status[2]	Habitat and ecology	Likelihood of occurrence	Rationale
Ptilotus uncinellus *Kelita uncinella A.R Bean sp nov*	O	P	-	E	Recently described from the vicinity of the Newlands coal mine c.130 km west of Mackay on south facing slopes of jump ups in Acacia woodland. Occurs where the ground layer is sparse on gravelly loams. A further record from near Moranbah, c.25 km southeast of the Project area (Bean 2010).	Unlikely	There is no suitable habitat for the species in the Project area. This species is unlikely to occur.
Samadera bidwillii	P	O	V	V	This species predominately grows in or adjacent to lowland rainforest but can also occur in other community types such as open eucalypt forests and woodlands. In these areas it is commonly found in association with ephemeral and permanent streams. The species also has broad soil preferences with individuals recorded loams, silts, sands, and clays (DES 2022c).	Unlikely	No records exist in the study area, and the habitat types are not present in the Project area. This species is unlikely to occur.

1. EPBC Act status: CE- critically endangered, E – endangered, V – vulnerable, M – migratory, Ma – marine
2. NC Act status: CE – critically endangered, E – endangered, V – vulnerable, NT – near threatened, SLC – special least concern

Annexure D

Historical aerial imagery

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D.1 1987

Figure D.1 1987 image, vegetation to north of Goonyella Rd intact, cleared to south

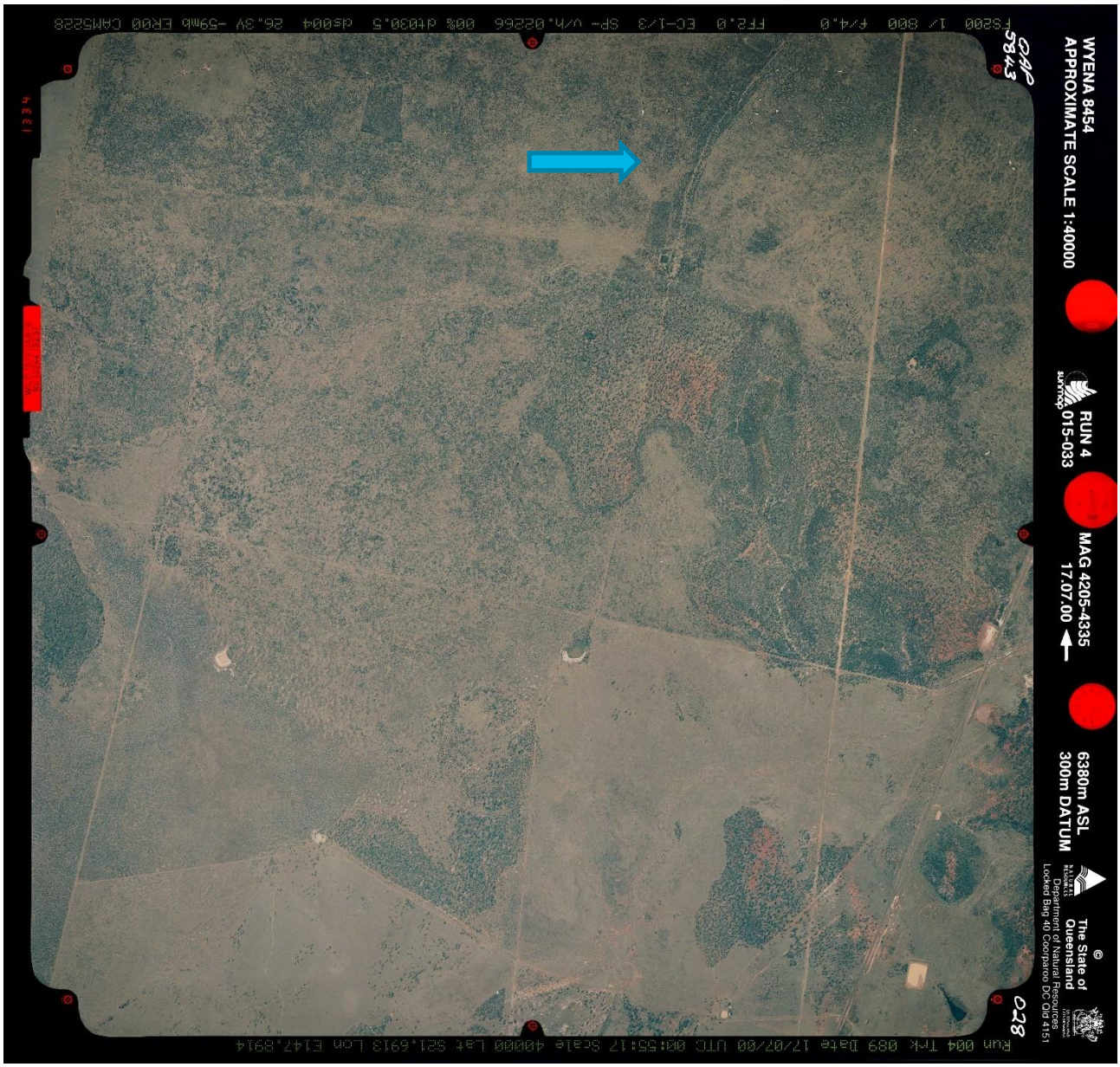
Source: Q Imagery https://qimagery.information.qld.gov.au/

D.2 2000

Figure D.2 2000 image, polygon 1 (arrow 1), polygon 2 (arrow 2) & polygon 6 (arrow 3) vegetation intact

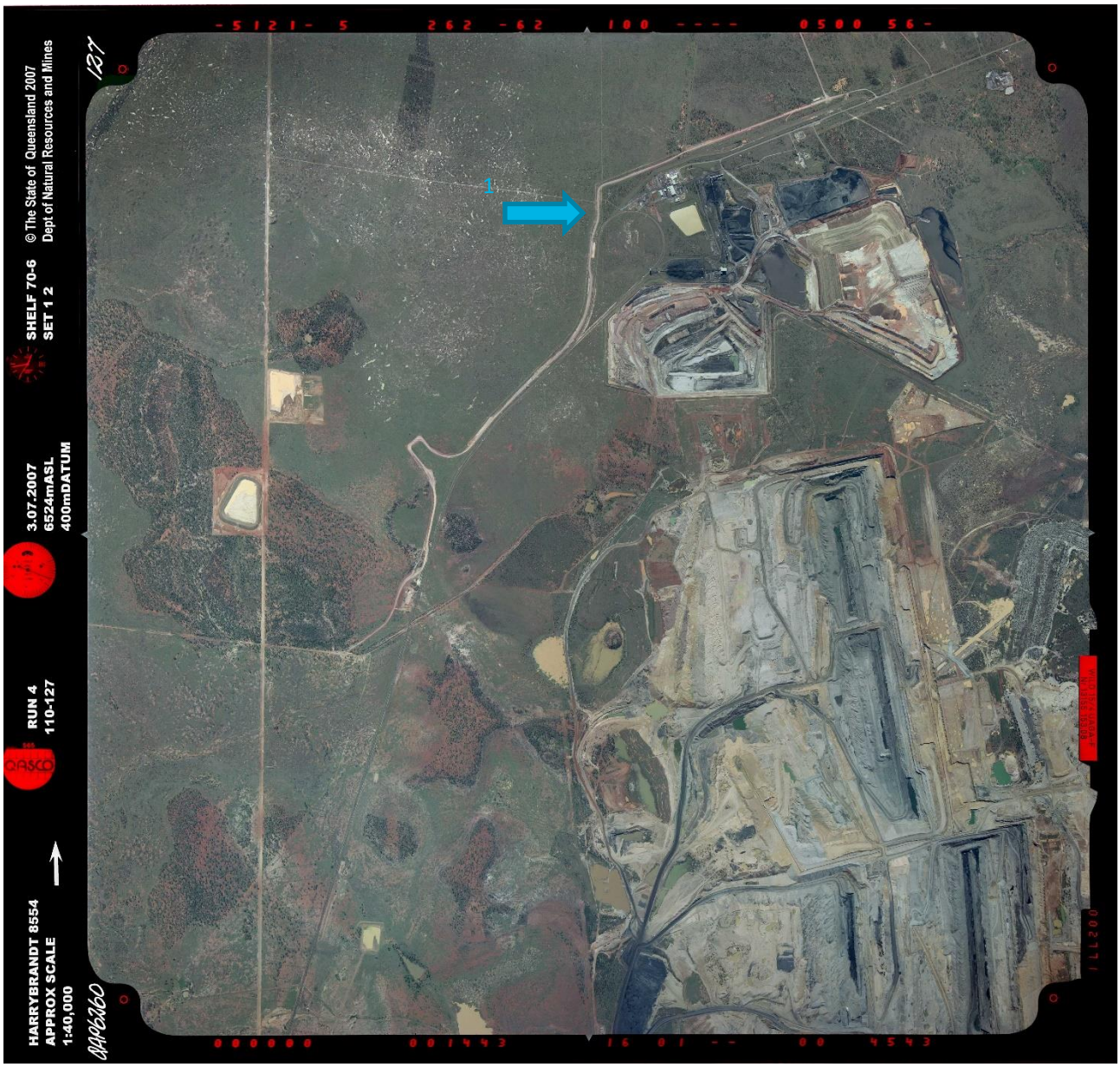
Source: Q Imagery https://qimagery.information.qld.gov.au/

Figure D.3 2000 image, western alignment on Lot 23 (approximate location marked with arrow)



D.3 2007, west. Unmapped Brigalow regrowth, intact

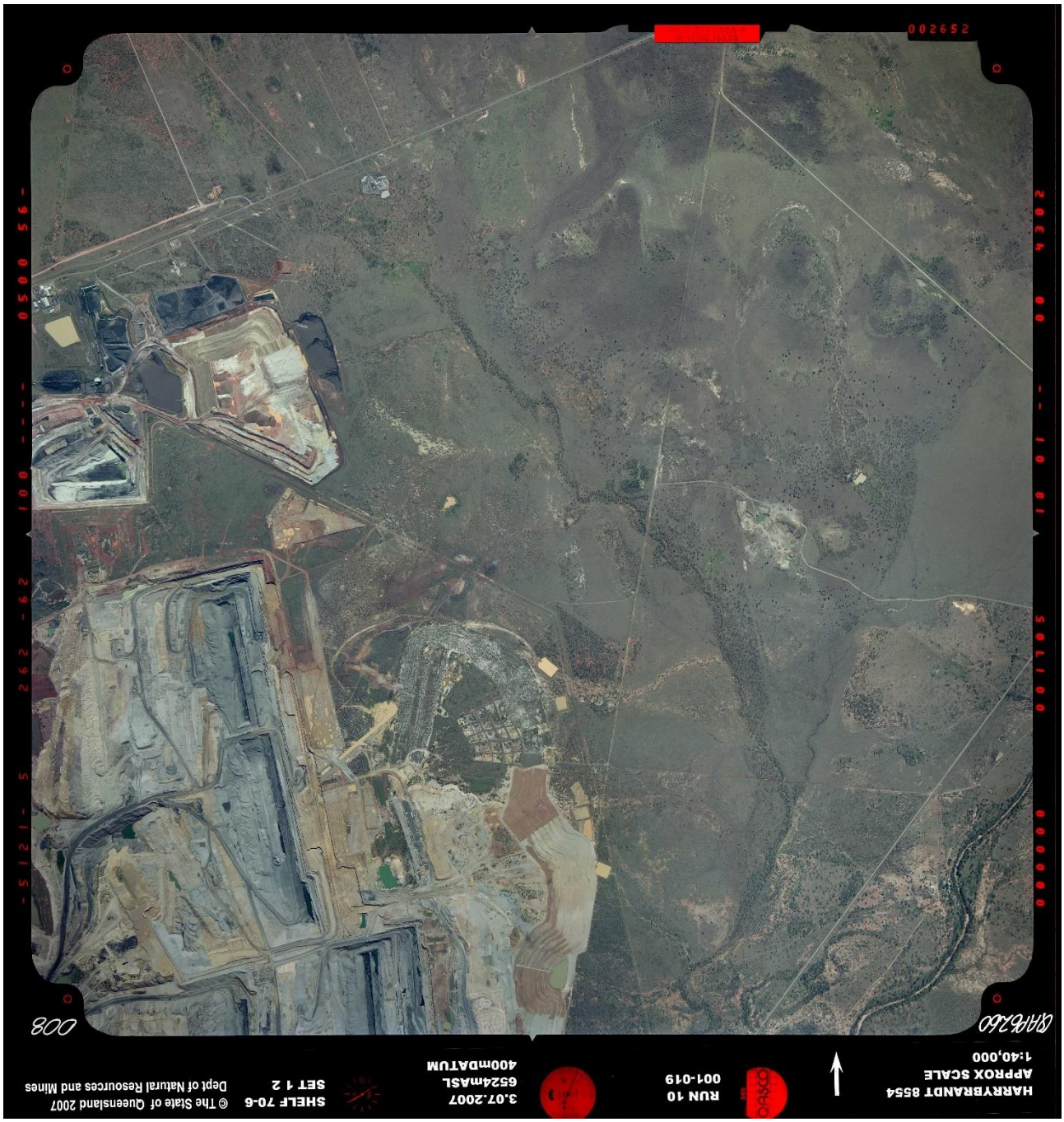
Figure D.4 2007 image, western end of alignment. Unmapped Brigalow regrowth is visible



Source: Q Imagery https://qimagery.information.qld.gov.au/

D.4 2007, east

Figure D.5 2007 image, eastern end of alignment



Source: Q Imagery https://qimagery.information.qld.gov.au/

D.5 2017, west

Figure D.6 2017 image, western end of alignment

Source: Q Imagery https://qimagery.information.qld.gov.au/

D.6 2017, east

Figure D.7 2017 image, eastern end of alignment

Source: Q Imagery https://qimagery.information.qld.gov.au/

Annexure E
Species list

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E.1 Fauna species list

Table E.1 Fauna species list

Class	Scientific name	Common name
Aves	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater
	*Acridotheres tristis**	Common Myna
	Anthus novaeseelandiae	Australasian Pipit
	Antigone rubicunda	Brolga
	Aprosmictus erythropterus	Red-winged Parrot
	Aquila audax	Wedge-tailed Eagle
	Ardea alba	Great Egret
	Ardea pacifica	White-necked Heron
	Ardeotis australis	Australian Bustard
	Artamus cinereus	Black-faced Woodswallow
	Cacomantis pallidus	Pallid Cuckoo
	Centropus phasianinus	Pheasant Coucal
	Chenonetta jubata	Maned Duck
	Chlamydera maculata	Spotted Bowerbird
	Cincloramphus cruralis	Brown Songlark
	Cincloramphus timoriensis	Tawny Grassbird
	Cisticola exilis	Golden-headed Cisticola
	Colluricincla harmonica	Grey Shrikethrush
	Coracina novaehollandiae	Black-faced Cuckooshrike
	Corvus orru	Torresian Crow
	Coturnix ypsilophora	Brown Quail
	Cracticus nigrogularis	Pied Butcherbird
	Cracticus tibicen	Australian Magpie
	Dacelo novaeguineae	Laughing Kookaburra
	Dendrocygna eytoni	Plumed Whistling Duck
	Dicaeum hirundinaceum	Mistletoebird
	Egretta novaehollandiae	White-faced Heron
	Elanus axillaris	Black-shouldered Kite
	Elseyornis melanops	Black-fronted Dotterel

Table E.1 Fauna species list

Class	Scientific name	Common name
	Entomyzon cyanotis	Blue-faced Honeyeater
	Eolophus rosiecapilla	Galah
	Falco berigora	Brown Falcon
	Falco cenchroides	Nankeen Kestrel
	Gavicalis virescens	Singing Honeyeater
	Geopelia placida	Peaceful Dove
	Geophaps scripta scripta	Squatter Pigeon
	Gerygone olivacea	White-throated Gerygone
	Grallina cyanoleuca	Magpie-lark
	Haliastur sphenurus	Whistling Kite
	Himantopus	Pied Stilt
	Hirundapus caudacutus	White-throated Needletail
	Lalage tricolor	White-winged Triller
	Malurus assimilis	Purple-backed Fairywren
	Malurus melanocephalus	Red-backed Fairywren
	Manorina melanocephala	Noisy Miner
	Merops ornatus	Rainbow Bee-eater
	Microeca fascinans	Jacky Winter
	Milvus migrans	Black Kite
	Myiagra inquieta	Restless Flycatcher
	Myiagra rubecula	Leaden Flycatcher
	Ninox novaeseelandiae	Australian Boobook
	Nymphicus hallandicus	Cockatiel
	Ocyphaps lophotes	Crested Pigeon
	Oriolus sagittatus	Olive-backed Oriole
	Pachycephala rufiventris	Rufous Whistler
	Pardalotus striatus	Striated Pardalote
	Petrochelidon ariel	Fairy Martin
	Philemon corniculatus	Noisy Friarbird
	Platycercus adscitus	Pale-headed Rosella
	Plectorhyncha lanceolata	Striped Honeyeater

Table E.1 Fauna species list

Class	Scientific name	Common name
	Podargus strigoides	Tawny Frogmouth
	Pomatostomus temporalis	Grey-crowned Babbler
	Rhipidura leucophrys	Willie Wagtail
	Smicornis brevirostris	Weebill
	Struthidea cinerea	Apostlebird
	Synoicus ypsilophorus	Brown Quail
	Taeniopygia bichenovii	Double-barred Finch
	Taeniopygia guttata	Zebra Finch
	Turnix pyrrhothorax	Red-chested Buttonquail
	Turnix velox	Little Buttonquail
	Tyto javanica	Eastern Barn Owl
	Vanellus miles	Masked Lapwing
Mammalia	*Aepyprymnus rufescens*	Rufous Bettong
	Hydromys chrysogaster	Water Rat aka Rakali
	Leggadina forresti	Forrest's Mouse
	Lepus europaeus	Brown Hare
	Macropus agilis	Agile Wallaby
	Macropus giganteus	Eastern Grey Kangaroo
	Oryctolagus cuniculus	Rabbit
	Planigale tenuirostris	Narrow-nosed Planigale
	Chalinolobus gouldii	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Chalinolobus nigrogriseus	Hoary Wattled Bat
	Chalinolobus picatus	Little Pied Bat
	Nyctophilus sp (*N. geoffroyi* or *N. gouldi*)	Lesser Long-eared Bat/Gould's Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Scotorepens greyii	Little Broad-nosed Bat
	Scotorepens sanborni	Northern Broad-nosed Bat
	Vespadelus troughtoni	Eastern Cave Bat
	Miniopterus australis	Little Bent-wing Bat
	Miniopterus orianae oceanensis	Southern Bent-wing Bat

Table E.1 Fauna species list

Class	Scientific name	Common name
	Chaerephon jobensis	Northern Freetail Bat
	Ozimops lumsdenae	Northern Free-tailed Bat
	Ozimops ridei	Eastern Free-tailed Bat
	Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat
	Taphozous troughtoni	Troughton's Sheathtail Bat
Reptilia	*Amphibolurus burnsi*	Burns' Dragon
	Antaresia maculosa	Spotted Python
	Boiga irregularis	Brown Tree Snake
	Carlia vivax	Lively Rainbow Skink
	Cryptophis boschmai	Carpentaria Snake
	Denisonia maculata	Ornamental Snake
	Heteronotia binoei	Bynoe's Gecko
	Pseudonaja textilis	Eastern Brown Snake
	Suta suta	Curl Snake
	Tropidonophis mairii	Keelback
Amphibia	*Cyclorana alboguttata*	Green-striped Burrowing Frog
	Cyclorana novaehollandiae	Eastern Snapping Frog
	Limnodynastes tasmaniensis	Spotted Marsh Frog
	Litoria caerulea	Green Tree Frog
	Litoria latopalmata	Broad-palmed Rocket Frog
	Litoria rubella	Ruddy Tree Frog
	Notaden bennettii	Holy Cross Frog
	*Rhinella marina**	Cane Toad

Note: CEEVNT or migratory species in bold

Note: * = introduced.

Annexure F
Anabat results

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Microbat Call Identification Report

Prepared for ("Client"):	EMM Consulting
Survey location/project name:	Moranbah, Qld
Survey dates:	7-11 March 2022
Client project reference:	
Job no.:	EMM-2203
Report date:	3 June 2022

Methods

Data received

Balance! Environmental received 15 raw ZCA data files, recorded on three Anabat Express detectors, over five consecutive nights (7th – 11th March 2022) in the Moranbah area of central Queensland. Seven separate sites were surveyed (see **Figure 1**), with one site sampled for five nights (detector EMMBRIS2), four sites for two nights and two sites for 1 night (see **Table 1**).

Call analysis and identification

The data were processed in *Anabat Insight* (Version 2.0.2; Titley Scientific, Brisbane). The ZCA data files were converted to bat-call sequence files (ZC files) and then all ZC files were scanned with a generic noise filter to separate files containing only non-bat background noise from those with potentially identifiable bat calls.

All files that passed the noise filter (*i.e.,* contained bat calls) were processed through a Decision Tree analysis to group calls with similar pulse characteristics (*e.g.*, characteristic frequency, slope, duration) and apply tentative species labels. Each "species" group was then reviewed manually by comparing call spectrograms and derived metrics with those of regionally relevant reference calls and published call descriptions (*e.g.,* Reinhold *et al.* 2001; Milne 2002). Due to the large size of the dataset, once all potential species in each group were identified and representative calls labelled for each site, the remaining calls in the group retained only the group label.

The likelihood of species' occurrence in the study area was confirmed by referring to the Australasian Bat Society's *BatMap* application (ABS 2021) and other published distribution information (*e.g.,* Churchill 2008; van Dyck *et al.* 2013).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at http://www.ausbats.org.au/.

Species nomenclature follows Armstrong *et al.* (2020).

Table 1 Bat detector deployment schedule for the QPM Moranbah survey.
GPS coordinates derived from detector metadata.

Detector	Serial Number	Dates	Latitude	Longitude
EMMBRIS1	SN628202	7-8 March	-21.66145	147.9531
		9-10 March	-21.6623	147.9403
		11-Mar	-21.6457	148.0009
EMMBRIS2	SN628201	7-11 March	-21.6472	147.99684
EMMBRIS3	SN628205	7-8 March	-21.6471	147.9938
		9-10 March	-21.66865	147.9027
		11-Mar	-21.6636	147.9501

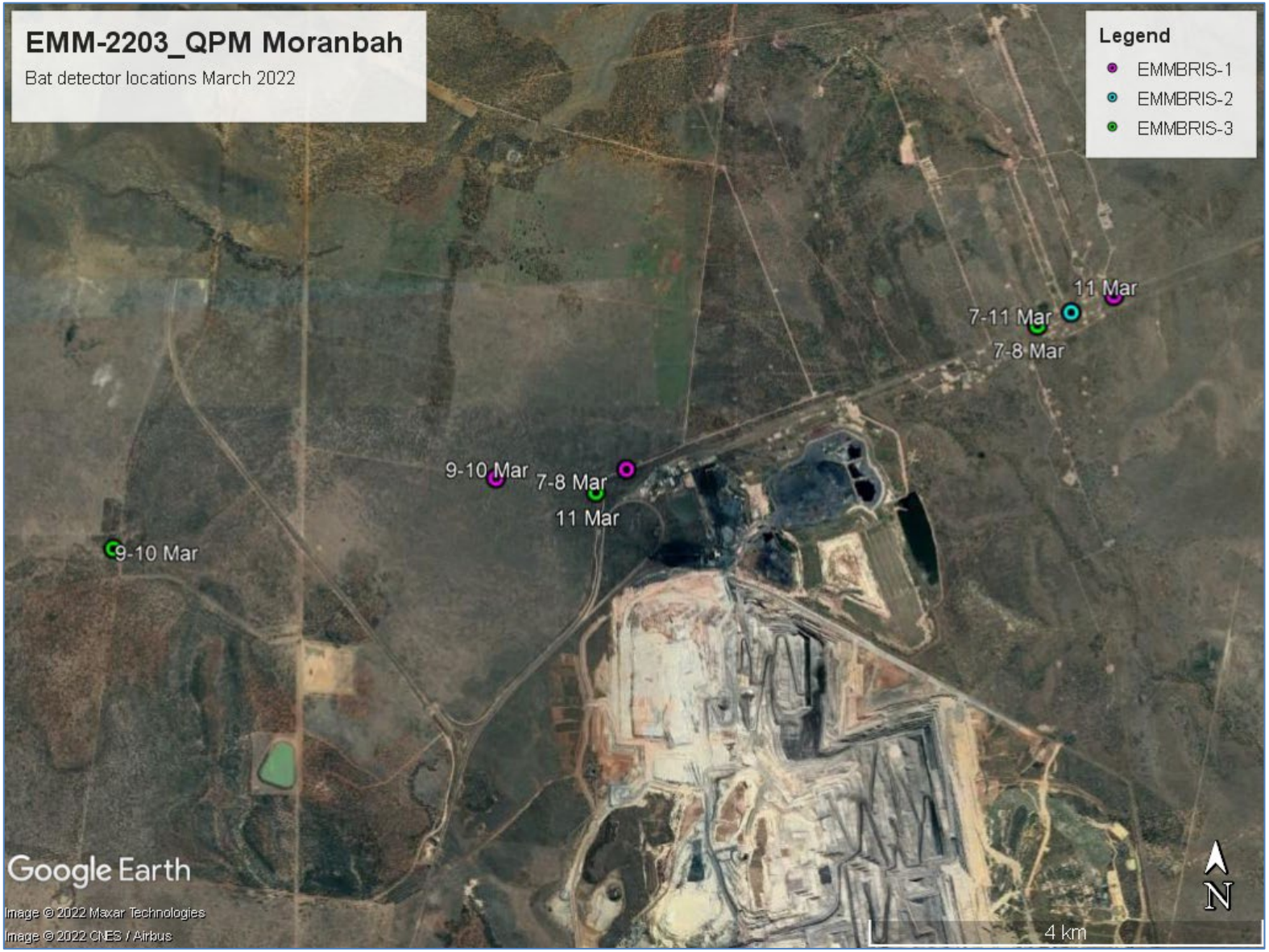

Figure 1 Bat detector deployment sites, QPM Moranbah, 7-11 March 2022.

Table 2 Bats detected during the QPM Moranbah acoustic survey, 7-11 2022.

♦ = Definite at least one call from the site was unequivocally attributed to the species

□ = Possible calls like those from the species were recorded but could not be reliably identified

Detector:	EMMBRIS-1			EMMBRIS-2	EMMBRIS-3		
Nights:	7-8 Mar	9-10 Mar	11 Mar	7-11 Mar	7-8 Mar	9-10 Mar	11 Mar
Chalinolobus gouldii	♦	♦	♦	♦	♦	♦	♦
Chalinolobus morio	♦			□	♦	♦	
Chalinolobus nigrogriseus	□			♦	♦	♦	
Chalinolobus picatus	♦	♦	♦	♦	♦	♦	♦
Nyctophilus sp.	♦			♦			♦
Scotorepens balstoni	♦	□	♦	♦	♦	□	♦
Scotorepens greyii	♦			♦	♦	♦	□
Scotorepens sanborni	♦	♦	□	♦	♦	♦	□
Vespadelus finlaysoni				□			
Vespadelus troughtoni	♦		♦	♦	♦	♦	
Vespadelus vulturnus / V. baverstocki				□	□		
Miniopterus australis				♦			
Miniopterus orianae oceanensis	□			♦			
Chaerephon jobensis	♦	♦	♦	♦	♦	♦	♦
Ozimops lumsdenae	♦	♦	♦	♦	♦	♦	♦
Ozimops ridei	♦	♦	♦	♦	♦	♦	♦
Saccolaimus flaviventris	♦	♦	♦	♦	♦	♦	♦
Taphozous troughtoni	♦			□		□	

Results

The ZCA conversion and noise filtration process yielded a dataset of 17,605 ZC files containing identifiable bat calls. Within that data, a total of 4344 calls were identified, either to distinct species (3598 calls) or to undifferentiated species pairs where call characteristics precluded reliable species attribution (745 "unresolved calls").

Most (>3000) of the calls selected for analysis were recorded at just two sites: the western-most site beside a dam (EMMBRIS-3, 9-10 March); and adjacent to a bridge/large-culvert under the North Goonyella Mine Access Road (EMMBRIS-2, 7-11 March). In both cases, a significant portion of the calls were typical of bats flying in highly cluttered airspace, often with multiple individuals recorded in the same file. In the case of the bridge/culvert site, many of these calls appear to be from "cave-dependent" bats (*e.g.*, *Vespadelus troughtoni, Miniopterus* spp.) that may be roosting in the structure. The abundant clutter-adapted calls at the dam site are characteristic of numerous individuals of multiple species drinking at and/or foraging over the dam.

Table 2 provides an overview of the species detected at each site and example spectrograms for each identified species appear in **Appendix 1**. **Appendix 2** gives a full breakdown of the numbers of calls recorded per site for each species or unresolved species group.

At least 16 and up to 19 species were detected during the survey. Fifteen call types were positively attributed to individual species, while one additional type was reliably allocated to the *Nyctophilus* genus, two species of which potentially occur in the study area: *N. geoffroyi* and *N. gouldi*.

Most of the unresolved calls were assigned to eight undifferentiated pairs of species that were otherwise positively identified from more definitive calls (see lower section of table in **Appendix 2**). Where such unresolved calls were identified, but one or more pair members were not also positively identified, those species are shown as "possible" in **Table 2**.

Four unresolved call types (261 calls) potentially represent two additional species records for the survey. All but one of these calls was recorded at the bridge/culvert site, the exception being a call detected near a dam (EMMBRIS-3, 7-8 March), approximately 300m west of the bridge/culvert site.

Most (239) of the bridge/culvert site calls were probably made by *V. troughtoni* flying in proximity to the apparent roost site, but it is possible some calls in this group belonged to *Vespadelus finlaysoni*, another cave-dependent species, which is usually associated with more westerly regions. Similarly, another 17 calls were thought to potentially be from either *V. finlaysoni* or *Miniopterus australis*.

Four calls from the bridge/culvert site showed characteristics intermediate between the calls of *Miniopterus orianae oceanensis* and two other *Vespadelus* species (*V. vulturnus / V. baverstocki*). It is probable that these were roost exit/approach call variants of *M. o. oceanensis*, from which several calls were positively identified; however, some pulse sequences were remarkably similar to *Vespadelus* spp.

The single call from the dam west of the bridge/culvert was almost certainly a *Vespadelus* sp. call, but with lower frequency (~47 kHz) than typically recorded from *V. troughtoni*. Calls of this type are generally made by *V. vulturnus* in southern inland Queensland or by *V. baverstocki* in the southern Northern Territory. The latter species is shown as occurring within 50km of the study site (ABS 2021), so it is possible this call belongs to *V. baverstocki*.

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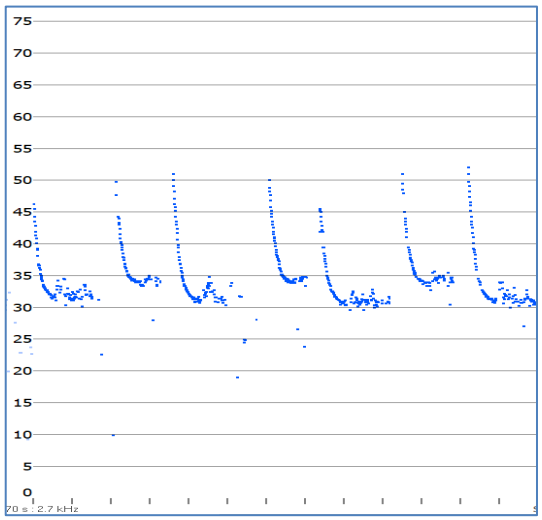
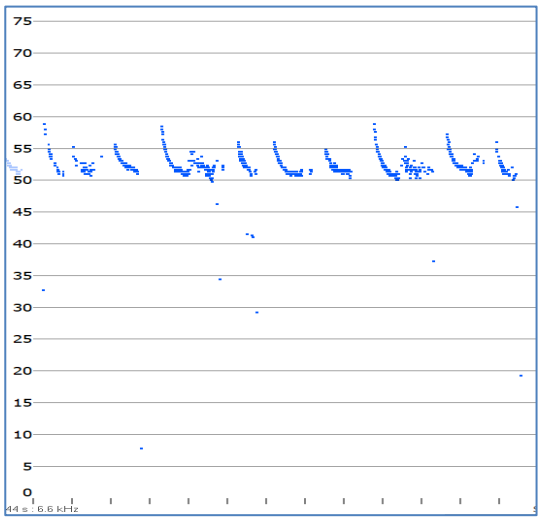
Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

van Dyck, S., Gynther, I. and Baker, A. (ed.) (2013). Field Companion to the Mammals of Australia. New Holland; Sydney.

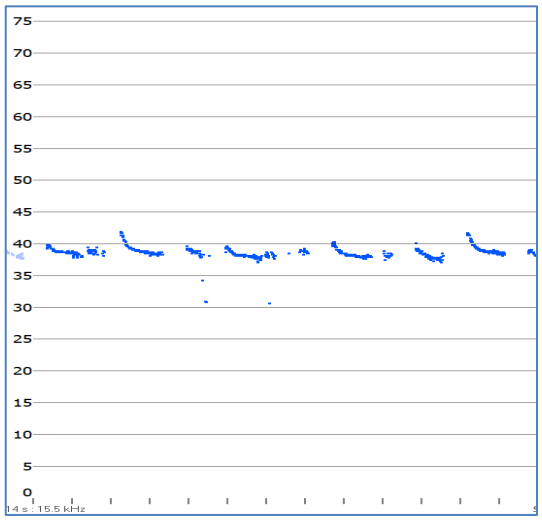
Appendix 1 Representative bat-calls recorded during the Moranbah survey, 7-11 March 2022. Time between pulses removed; time-scale (*x*-axis) 10ms per tick



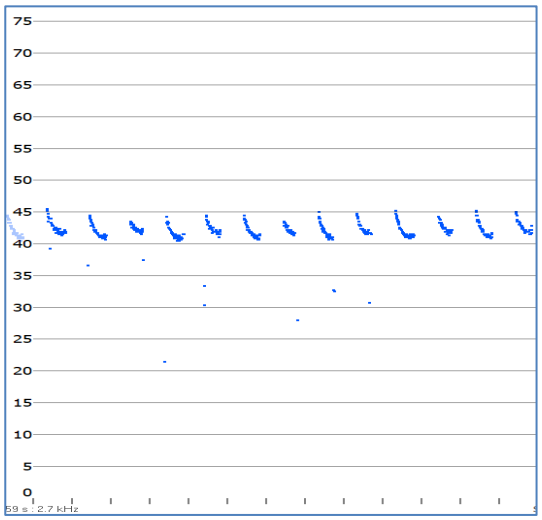
Chalinolobus gouldii



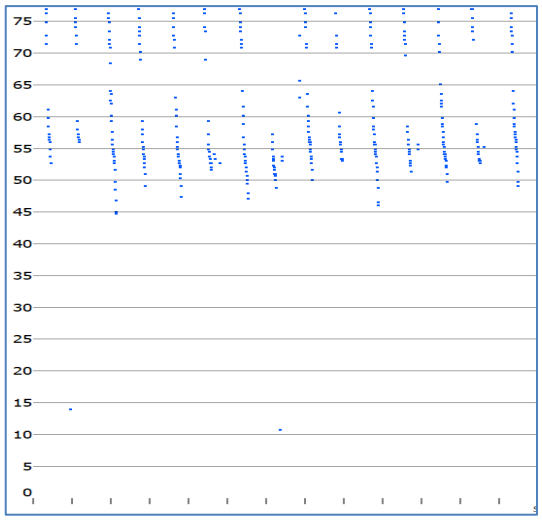
Chalinolobus morio



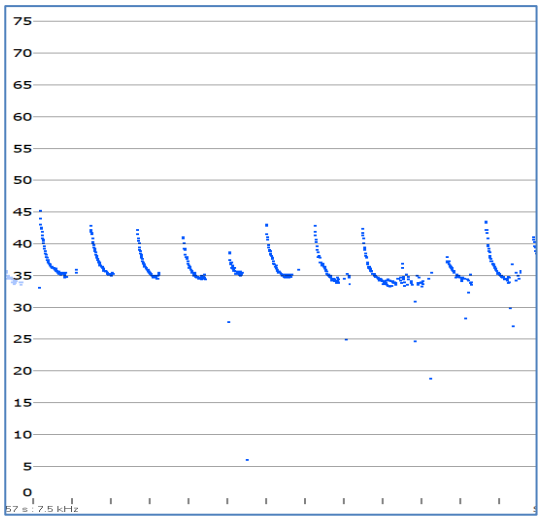
Chalinolobus nigrogriseus



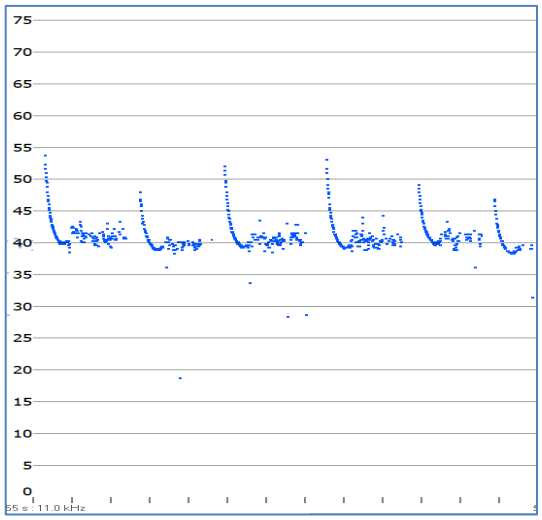
Chalinolobus picatus



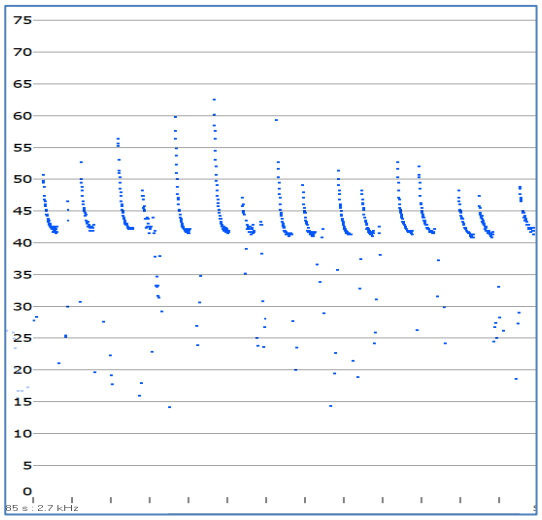
Nyctophilus sp.



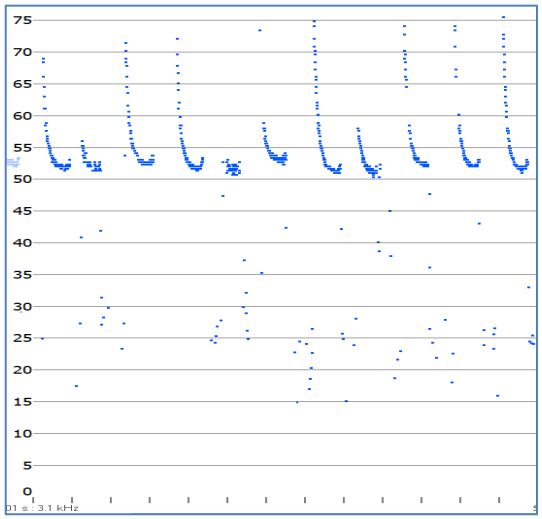
Scotorepens balstoni



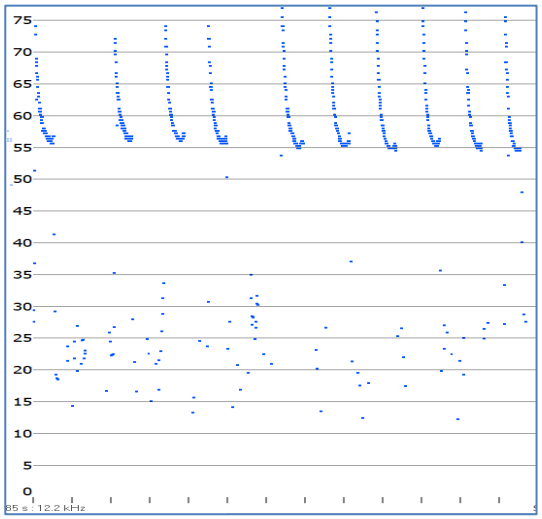
Scotorepens greyii



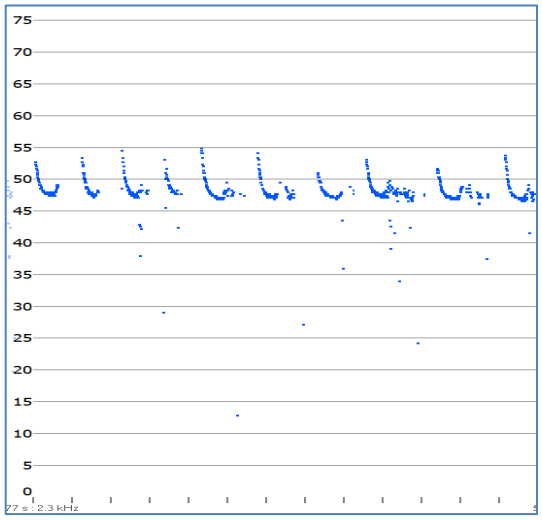
Scotorepens sanborni



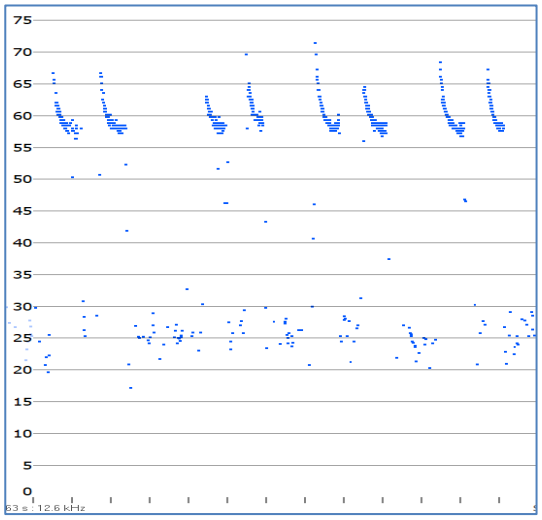
Vespadelus troughtoni



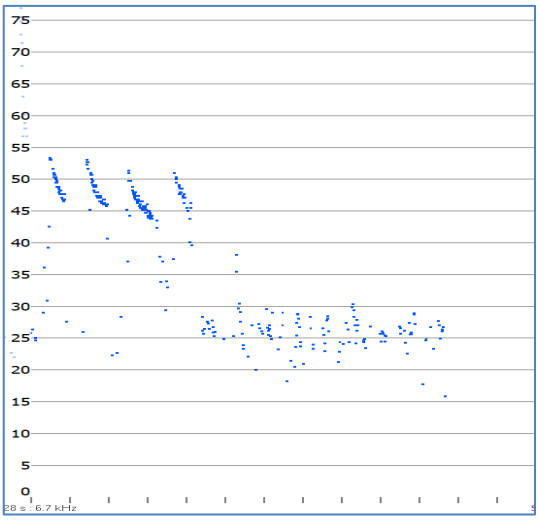
V. troughtoni or *V. finlaysoni*



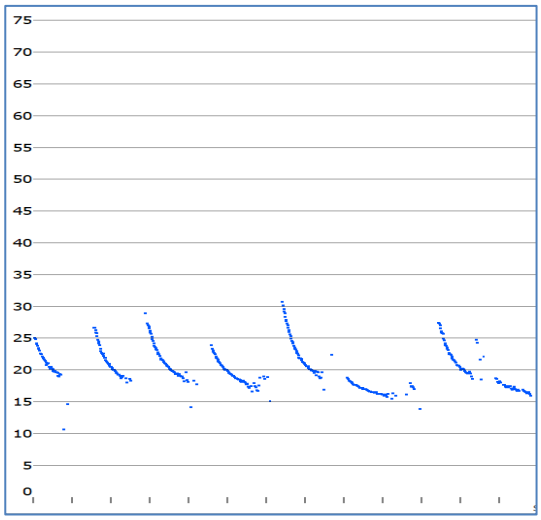
V. troughtoni or *V. vulturnus* or *V. baverstocki*



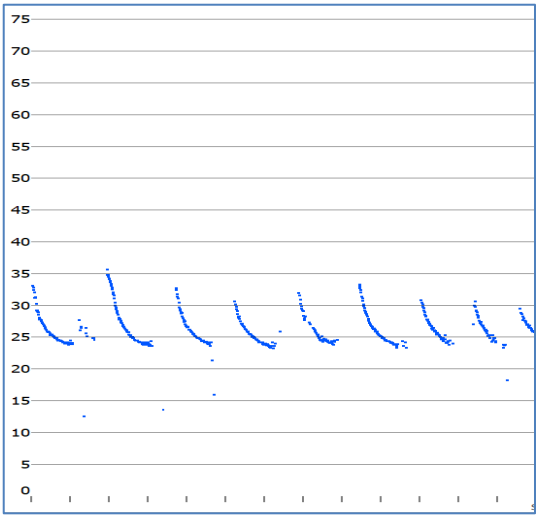
Miniopterus australis



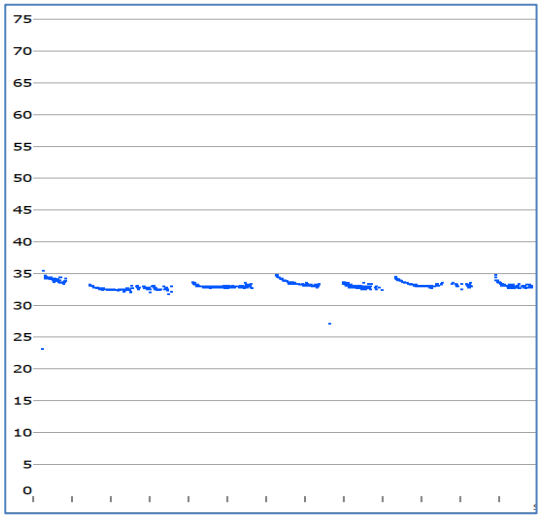
Miniopterus orianae oceanensis



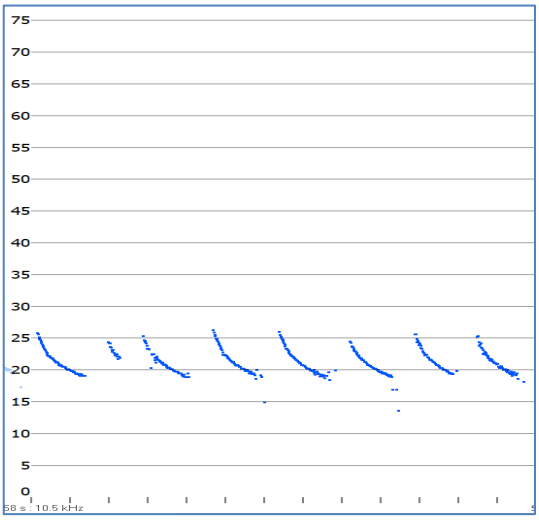
Chaerephon jobensis



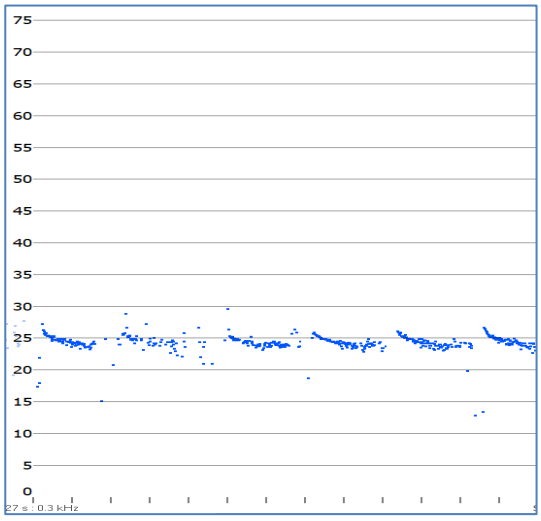
Ozimops lumsdenae



Ozimops ridei



Saccolaimus flaviventris



Taphozous troughtoni

Appendix 2 Bats recorded during the QPM Moranbah acoustic surveys, 7-11 March 2022
Count of calls allocated per species or unresolved group per site.

Detector:	EMMBRIS1			EMMBRIS2	EMMBRIS3			Species Total
Nights:	7-8 Mar	9-10 Mar	11 Mar	7-11 Mar	7-8 Mar	9-10 Mar	11 Mar	
Positively identified calls								
Chalinolobus gouldii	45	9	8	75	192	221	11	561
Chalinolobus morio	1				3	4		8
Chalinolobus nigrogriseus				1	17	2		20
Chalinolobus picatus	9	1	1	9	21	31	2	74
Nyctophilus sp.	1			18			1	20
Scotorepens balstoni	3		1	2	33		1	40
Scotorepens greyii	1			6	17	2		26
Scotorepens sanborni	14	1		41	40	118		214
Vespadelus troughtoni	31		2	926	191	201		1349
Miniopterus australis				5				5
Miniopterus orianae oceanensis				11				11
Chaerephon jobensis	32	6	3	13	26	490	4	574
Ozimops lumsdenae	10	1	1	11	37	116	1	177
Ozimops ridei	3	2	7	1	29	34	4	80
Saccolaimus flaviventris	143	10	7	64	86	123	2	435
Taphozous troughtoni	4							4
Unresolved calls								
C. gouldii / O. ridei	7		3		17	27	2	56
C. gouldii / S. balstoni	4	2			1	6	2	15
C. morio / V. troughtoni	1			23	20	8		52
C. nigrogriseus / S. greyii	1			1	16	14		32
C. picatus / S. sanborni	23		1	53	42	55	1	175
S. greyii / S. sanborni	2			2	27	5	1	37
V. troughtoni / V. finlaysoni				239				240
V. troughtoni / V. vulturnus / V. baverstocki					1			1
M. australis / Vespadelus sp.				17				17
M. o. oceanensis / Vespadelus sp.	1			4				5
O. lumsdenae / T. troughtoni	1			2		5		8
S. flaviventris / C. jobensis	11	5		5	13	64	9	107
Site Total	348	37	34	1529	829	1526	41	4344

Annexure G

Significant Residual Impact Assessment against Environment Protection Act 1994 guidelines

EMM
creating opportunities

G.1 SRI Assessment – Endangered REs

The MSES SRI assessment for Endangered RE 11.4.9 using the SRI Guideline is summarised below in Table G.1. RE 11.4.9 has a sparse structure category and is therefore assessed using criteria for a sparse RE.

Table G.1 MSES significant impact assessment for Endangered RE 11.4.9

Criteria	Discussion
For clearing for linear infrastructure: • greater than 25m wide in a grassland (structural category) regional ecosystem; or • greater than 20m wide in a sparse (structural category) regional ecosystem; or • greater than 10m wide in a dense to mid-dense (structural category) regional ecosystem. For clearing other than clearing for linear infrastructure: • area greater than 5 ha where in a grassland (structural category) regional ecosystem; or • area greater than 2 ha where in a sparse (structural category) regional ecosystem; or • area greater than 0.5 ha where in a dense to mid-dense (structural category) regional ecosystem.	RE 11.4.9 was ground-truthed along the pipeline on Lot 2 and Lot 23 totalling 3.04 ha of remnant vegetation. The Project will have a SRI under this criterion as the clearing of RE 11.4.9 is greater than 20 m wide in a number of patches. The clearing will be greater than 20 m wide in all three patches intersected by the alignment.
Conclusion	Clearing widths vary, between The Project will have a SRI under this criterion as the clearing of RE 11.4.9 is greater than 20m wide in a number of patches. The clearing will be greater than 20 m wide in all three patches intersected by the alignment.

G.2 SRI Assessment – watercourse vegetation

The MSES SRI assessment for REs within a defined distance of a watercourse using the SRI Guideline is summarised below in Table G.2. RE 11.8.5 has a very sparse structure category and is therefore assessed using criteria for a sparse RE.

Table G.2 MSES significant impact assessment for watercourse vegetation

Criteria	Discussion
For clearing for linear infrastructure: • greater than 25m wide in a grassland (structural category) regional ecosystem; or • greater than 20m wide in a sparse (structural category) regional ecosystem; or • greater than 10m wide in a dense to mid-dense (structural category) regional ecosystem. For clearing other than clearing for linear infrastructure: • area greater than 5 ha where in a grassland (structural category) regional ecosystem; or • area greater than 2 ha where in a sparse (structural category) regional ecosystem; or • area greater than 0.5 ha where in a dense to mid-dense (structural category) regional ecosystem.	RE 11.8.5 was ground-truthed along the pipeline in the vicinity of Goonyella Creek. Based on the alignment, the project footprint will avoid this patch of vegetation within the defined bank of the watercourse. Therefore this Project will not have a SRI on watercourse vegetation.
Clearing within 5 m of the defining bank.	RE 11.8.5 was ground-truthed along the pipeline in the vicinity of Goonyella Creek. Based on the alignment, the project footprint will avoid this patch of vegetation within the defined bank of the watercourse. Therefore this Project will not have a SRI on watercourse vegetation. It is acknowledged the clearing at these watercourses crossings is temporary and rehabilitation will occur post construction to the pre-disturbance land use and species to be planted will be consistent with those species confirmed in ground truthed Regional Ecosystem mapping.
Conclusion	No significant impact will result.

G.3 SRI Assessment – protected wildlife habitat

The MSES SRI assessment for MSES listed fauna and flora using the SRI Guideline are summarised below in tables G.3 to G.10.

Table G.3 MSES significant impact assessment for Ornamental Snake (*Denisonia maculata*)

Species profile	**Ornamental Snake** **Vulnerable (NC Act)** **Vulnerable (EPBC Act)**
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
lead to a long-term decrease in the size of a local population; or	The occurrence of the Ornamental Snake in the Project area constitutes an important population. The Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPC 2011) go on to specify gilgai depressions and mounds (including connectivity between gilgai and other suitable habitat) as being known important habitat. There are extensive areas of gilgai in the Project footprint – the majority of the alignment on Lot 23 is located in areas of landzone 4 on heavy clay soils with well-formed gilgai. Toward the western end of the alignment, gilgai are dominated by Buffel Grass with little fallen timber, but these areas nonetheless are likely to contain the species. After heavy rain on 10 March, a total of nine individuals were recorded on Lot 23 and on the following night, a total of 30 individuals were recorded in the same area. All individuals were in the gilgai on the eastern part of the property, although it is likely individuals would have been recorded in the western part of the alignment too if this area had been accessed (was not possible due to flooding). Additionally, the species is considered very likely to occur in the north-south alignment on Lot 11, where gilgai habitat is virtually identical to the areas surveyed and found to contain high numbers of Ornamental Snake on Lot 23. Targeted surveys (eg spotlighting) are not considered necessary to demonstrate this. Parts of Lot 2 where Brigalow communities on clay soils are present adjacent to extensive areas of gilgai, but there are very limited areas with soil cracks or gilgais in the Project area itself. These areas are mapped as potential dispersal habitat. This dispersal habitat is present at the eastern end of the pipeline alignment on Lot 2, and within the proposed compressor facility location. Within the Project footprint, there is 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat between areas of preferred habitat) mapped in the Project footprint. Additionally essential habitat for the species is present in the Project footprint. The Project will result in a narrow clearance footprint through the species habitat. Impacts are likely to the species during construction through earthworks resulting in mortality of individuals. Mitigation measures around preclearance surveys will be implemented namely: • Spotlighting pre-clearance surveys will occur in mapped areas of Ornamental Snake habitat. If any individuals are caught they will then be released in adjacent suitable habitats which are being retained outside of the Project area. • For areas where Ornamental Snake were recorded during spotlighting pre-clearance surveys, a fauna spotter catcher will also supervise any earthworks due to the likelihood they could be residing in soil cracks. If any individuals are caught they will then be released that night to adjacent suitable habitats which are being retained outside of the Project area. There is potential for individuals to be trapped in the trench during trenching activities, but fauna spotter catchers will check the open trench daily and remove trapped individuals. During operation the pipeline easement will be rehabilitated so will be available for utilisation again by the species. However, it is anticipated that rehabilitation will involve construction of an access track, and the structure of gilgai (melon holes and mounds) will not be reinstated. That said the area of clearance will be minimal in the surrounding landscape of extensive gilgai habitat. Given the evidently high density of Ornamental Snake in the Project area, and limited loss of preferred and connectivity habitat, it is unlikely the action will result in a long-term decrease in the size of the local population.

Table G.3 MSES significant impact assessment for Ornamental Snake (*Denisonia maculata*)

Species profile	Ornamental Snake Vulnerable (NC Act) Vulnerable (EPBC Act)
	As stated above the majority of habitat is located outside the Project footprint which is a narrow linear corridor through the extensive areas of gilgai habitat on Lot 23 and as such there is not expected to be a long-term decrease in the size of a local population.
reduce the extent of occurrence of the species; or	The occurrence of Ornamental Snake in the Project area constitutes an important population as per the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPC 2011). The clearance of 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat will likely lead to a localised decrease in the area of occupancy of the local population, but due to the amount of available habitat surrounding the Project footprint and in the region and the extensive number of individuals recorded both by EMM during surveys for this Project and other database records in the vicinity, it is unlikely that this decrease would be significant at a regional scale.
fragment an existing population; or	The Project is unlikely to fragment an important population of Ornamental Snake. Although the occurrence of the species in the Project area constitutes an important population, the Project footprint is largely avoiding areas of preferred habitat and is a minimal clearance footprint (30 m wide construction right of way reduced to a 15 m operational rehabilitated footprint. The alignment on Lot 23 will involve the clearing of 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat. Extensive areas of habitat are retained surrounding this area. The habitat is already extensively fragmented to some degree by constructed farm access tracks, existing easements, and fence lines and as such the additional QPM pipeline easement is not anticipated to significantly further fragment the habitat. Additionally on Lot 2, the construction of the easement through mapped dispersal/connectivity habitat will not negate the ability of the species to traverse this area between more suitable areas of gilgai habitat, except through the compressor facility where the disturbance will be at a scale unlikely to be overcome by dispersing snakes.
result in genetically distinct populations forming as a result of habitat isolation; or	The Project footprint will result in the loss of 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat, which acts as connectivity habitat between areas of preferred habitat. Although gilgai habitat is not present in these areas, the species could move the vegetation in these areas between gilgai patches. This is consistent with the Draft Referral Guidelines for nationally listed Brigalow Belt reptiles. Large areas of preferred habitat are retained surrounding the Project area. Additional to the direct impacts described above and under earlier criteria, there is potential for indirect impacts to retained Ornamental Snake habitat may occur through abiotic factors such as surface water, groundwater, or soil. Although areas of retained habitat in gilgai are away from any clearing the potential for indirect impacts to occur is present. These are described under Criteria 4 above. Preferred habitat for this species is mapped within areas of grazing land already subject to existing threats to the species including weed infestation, grazing, presence of introduced fauna species (such as Cane Toads) and habitat fragmentation. While the Project will result in a small loss of preferred or connectivity/dispersal Ornamental Snake habitat it is not expected to an extent that will cause the species population to decline, due to the large areas of available retained habitat. The Project is unlikely to result in genetically distinct populations forming as a result of habitat isolation as the Project disturbance footprint is largely avoiding areas of preferred habitat. Connectivity between other preferred patches in retained areas of habitat will be maintained.

Table G.3 MSES significant impact assessment for Ornamental Snake (*Denisonia maculata*)

Species profile	Ornamental Snake Vulnerable (NC Act) Vulnerable (EPBC Act)
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or	The presence of the Cane Toad is known to adversely impact populations and individuals of the Ornamental Snake. It is unlikely that the Project will lead to an increase in the number of Cane Toads present on the site. This species is well established in the area and weed, and pest hygiene protocols will be followed. The potential for weeds to further impact on the quality of foraging habitat is low. The Project area is already subject to weed invasion and impacts from grazing practices. Gilgai are often infested with Buffel Grass. Weed and pest control measures as outlined in Section 8 will be in place to minimise the risk of Project activities further facilitating the spread of weeds and pests across the landscape.
introduce disease that may cause the population to decline, or	Disease is not recognised as a threat to the Ornamental Snake. Given this, it is unlikely that the Project will introduce diseases that cause the species to decline.
interfere with the recovery of the species; or	No adopted or made Recovery Plans are available for this species. The Project activities do not interfere with the overall objectives of the Draft Recovery Plan for the Queensland Brigalow Belt Reptiles (Richardson 2006). With mitigation of potential project impacts, and retention of areas of higher quality habitat where the species was observed in Project surveys, any impacts, are unlikely to interfere with the recovery of the species. The Action Plan for Australian Reptiles (Cogger et al. 1993) lists the following recovery actions: • identify suitable habitat for conservation of the ornamental snake; • identify key threats and develop management guidelines to protect key habitat; • ensure ornamental snake conservation is incorporated into appropriate land management decisions; • maximise the establishment of appropriate reserves to protect ornamental snake habitat and landscape connectivity over the long term; eg on stock route networks, road reserves and private lands; • implement recommended fire management guidelines in property and reserve designs; • work with landholders and key stakeholders to undertake monitoring programs on selected sites; • maximise ornamental snake habitat and landscape connectivity; and • ensure ornamental snake conservation is incorporated into appropriate land management decisions. The Project will not significantly interfere with these objectives.

Table G.3 MSES significant impact assessment for Ornamental Snake (*Denisonia maculata*)

Species profile	Ornamental Snake Vulnerable (NC Act) Vulnerable (EPBC Act)
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	The Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPC 2011) defines important habitat as being gilgai depressions and mounds, with habitat connectivity between gilgai noted as important also. The species is widespread in the region, and not at the limit of the species range. Regardless, large areas of important habitat (as demonstrated by numerous Ornamental Snake records) are located in the wider locality. Additional to the direct impacts described above and under earlier criteria, there is potential for indirect impacts to retained Ornamental Snake habitat may occur through abiotic factors such as surface water, groundwater, or soil. Based on mitigation measures described in Section 8, impacts from sediment runoff or alteration to flows from the Project are unlikely to have a significant impact on areas of gilgai that may support this species. It is anticipated that based on implementation of management strategies (eg erosion and sediment controls and management of hazardous materials) that impacts on habitat quality of retained areas will be controlled. This will include management of uncontrolled spills, and management of discharges related to the project. Additional to this, progressive rehabilitation of landforms will assist in potential for sediment transport. Increased dust from excavation, vehicle movement and construction activities have the potential to adversely impact the health of retained vegetation in the Project area, including areas of gilgai habitat. Any degradation in quality of vegetation in these areas may compromise the availability of refugia for this species. The Ornamental Snake is a viviparous species which usually births 6 or 7 live young (DAWE, 2020). It is unlikely that the Project will disrupt the breeding cycle of an important population of this species. The majority of habitat for this species in the study area is avoided, with only 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat cleared. As such the Project has the potential to cause disruption to ecologically significant locations.
Conclusion	Due to the large number of Ornamental Snakes recorded, and the presence of areas of mapped important habitat, the clearing of 36.05 ha of preferred habitat and 19.62 ha of connectivity/dispersal habitat therefore is likely to constitute a significant residual impact to the species.

Table G.4 MSES significant impact assessment for Squatter Pigeon (*Geophaps scripta scripta*)

Species profile	Squatter Pigeon Vulnerable (NC Act) Vulnerable (EPBC Act)
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
lead to a long-term decrease in the size of a local population; or	North of the Carnarvon Ranges the species is relatively common and is considered to be distributed as a single, continuous sub-population (Squatter Pigeon Workshop, 2011). Squatter Pigeons were observed on four different occasions while traversing the Project area in March 2022, and once in June 2022. This comprised groups of one, two, five and eight individuals all in the same vicinity around a farm dam surrounded by open grassy woodland on Lot 23 during March 2022. A group of four birds were seen in the same area in June 2022. It is expected that individuals disturbed by construction activities will temporarily move away from the area of disturbance into areas of retained habitat bordering the Project area in the vicinity of this dam, which is bordered by grassy woodland to the south. Connectivity to this area will be maintained. The majority of the Project area on Lot 23 and the southern portion of Lot 11 is unsuitable for the species, being dominated by dense Buffel Grass. Additionally, the Project area on Lot 23 and the southern part of Lot 11 is dominated by clay soils, and sandy substrates are not extensive. The habitat is typically unsuitable for the species due to a combination of factors, namely: • Terrain and soils – most of the Project area on Lot 23 and the southern part of Lot 11 occurs on clay dominated soils, which differs from the flat alluvial plains and sandy substrates favoured by the species (Squatter Pigeon Workshop, 2011). • Groundcover – much of the Project footprint is dominated by areas of dense grassy groundcover, which differs from the patchy tussock grassy understories of open woodland favoured by the species. Feeding opportunities are restricted in such dense grassy understoreys, and the potential for predation is increased. • Vegetation communities – the species favours open grassy woodlands and disturbed area. The Project area on Lot 23 and the southern part of Lot 11 is dominated by extensive Buffel Grass and communities along creek lines are dense with clay soils. Although the species was initially considered to have potential to occur in the Project area on Lot 23 and the southern part of Lot 11 (especially near water sources) the likelihood is significantly reduced by the dominance of Buffel Grass (*Cenchrus ciliaris*) and clay soils (this species favours sandy soils and a mosaic of open woodland and native grasses). The majority of the Project area on Lot 23 and the southern part of Lot 11 comprises extensive areas of dense Buffel Grass cover and clay soils. This species generally requires open forest or scrub on sandy soils, dominated by native grasses, in close association with permanent water (DoE 2019a). Where non-alluvial clay soils (land zone 4) occur, the species is less likely to be present unless the ground cover has been thinned to suitable levels (Squatter Pigeon Workshop 2011; DoE 2019a. On the northern part of Lot 11 and Lot 2, open woodlands on sandy soils provide habitat for the species although it was not observed during the June-July 2022 surveys in that area. The Project is unlikely to lead to a long-term decrease in a local population.
reduce the extent of occurrence of the species; or	Database records indicate the species occurs widely across the local and wider region. Clearing for the Project is expected to remove up to 31.68 ha of habitat for the species (see Section 8.2). The Project will reduce the area of occupancy in the local area to a very minor extent. Preferred habitats are located within wooded portions of the Project area which support more suitable foraging conditions. It is expected that individuals disturbed by construction activities will temporarily move away from the area of disturbance into areas of retained habitat bordering the Project area in the vicinity of this dam, which is bordered by grassy woodland to the south. Connectivity to this area will be maintained.

Table G.4 MSES significant impact assessment for Squatter Pigeon (*Geophaps scripta scripta*)

Species profile	Squatter Pigeon Vulnerable (NC Act) Vulnerable (EPBC Act)
fragment an existing population; or	The species is sparsely distributed across a wide range. Clearing for the Project is expected to remove up to 31.68 ha of habitat for the species. Roads, access tracks and the pipeline are unlikely to cause fragmentation of the local population. The species regularly forages alongside and on access tracks, and in other disturbed habitats. Access tracks throughout the site will have strict speed limits in place. The impact on movement across the Project area will be negligible. The Project area is already heavily fragmented as a result of historical and contemporary clearing for agriculture, predominantly in form of cattle grazing. The Project design will maintain linkages to surrounding retained habitat. Vegetation clearance will not impede the movement of any Squatter Pigeon present in the Project area. The Project is unlikely to fragment an existing population.
result in genetically distinct populations forming as a result of habitat isolation; or	The species occurs in grassy woodlands which remain abundant across much of its range including the Project area. Squatter Pigeon also occur in disturbed areas cleared for cattle grazing and along access tracks. Preferred habitats are located within wooded portions of the Project area which support more suitable foraging conditions. Large parts of the Project area in which the majority of Project infrastructure is located is dominated by dense Buffel Grass cover and is unsuitable habitat for the species. Significant areas of habitat will be retained within the Project area. It is unlikely that the Project will modify the species habitat dramatically.
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or	Degradation of habitat from invasive weeds and predation by feral predators such as cats and foxes are threats to the species. The Project has the potential to facilitate the spread of weeds and pest fauna through machinery, vehicles and materials being bought in from outside the Project area although the Project area is already subject to extensive weed and pest impacts. Weed and pest control measures as outlined in Section 8.9 will be in place to minimise the risk of Project activities further facilitating the spread of weeds and pests across the landscape.
introduce disease that may cause the population to decline, or	Disease is not a known threat to the species, and it is unlikely that the Project will introduce disease that may cause the species to decline.
interfere with the recovery of the species; or	There is no State or Commonwealth recovery plan for this species. The Approved Conservation Advice for Squatter Pigeon (TSSC 2015a) outlines the main threats to species as relating to the loss and fragmentation of habitat due to clearing for agricultural purposes (including degradation of habitat through overgrazing). Degradation of habitat from invasive weeds, such as Buffel Grass (*Cenchrus ciliaris*) which has been widely introduced as an improved pasture species, is also a key threat. Weed and pest control measures as outlined in Section 8.9 will be in place to minimise the risk of Project activities further facilitating the spread of weeds and pests across the landscape. The long-term survival and recovery of the species depends on (Squatter Pigeon Workshop, 2011): • the protection of habitat critical to the survival of the subspecies throughout its range; • the restoration of habitat which is potentially critical to the survival of the subspecies, especially in northern NSW and southern Queensland where there is a greater threat of a further contraction in the subspecies' range; • the alleviation of mortality caused by predators, particularly cats and foxes; and • the development of a greater understanding of the subspecies' ecology and use of modified landscapes for foraging, breeding, and dispersal. The Project will not conflict with any of these objectives.

Table G.4 MSES significant impact assessment for Squatter Pigeon (*Geophaps scripta scripta*)

Species profile	**Squatter Pigeon** **Vulnerable (NC Act)** **Vulnerable (EPBC Act)**
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	The species occurs in grassy woodlands which remain abundant across much of its range including the Project area. Squatter Pigeon also occur in disturbed areas cleared for cattle grazing and along access tracks. It is not considered that the Project area supports habitat critical to the survival of the species. Significant areas of habitat will be retained surrounding the Project area. The ability of the Project area to support this species will be maintained. Large areas of potential breeding habitat will be retained throughout the Project area. Pre-clearance surveys will identify breeding places for this species, and should breeding sites be encountered, an exclusion zone will be placed around the nest until young have fledged consistent with the requirements of an approved Species Management Program under which the fauna spotter catcher(s) will be working.
Conclusion	Based on an evaluation of all criteria, the Project is not expected to have a significant residual impact on Squatter Pigeon. The Project will result in the loss of up to 9.55 ha of breeding habitat, 19.98 ha of foraging habitat and 2.15 ha of dispersal habitat (totalling 31.68 ha of habitat).

Table G.5 MSES significant impact assessment for Koala (*Phascolarctos cinereus*)

Species profile	Koala Endangered (NC Act) Endangered (EPBC Act)
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
lead to a long-term decrease in the size of a local population; or	No individual Koala have been recorded in the Project area or within the surrounding study area. Indirect evidence (scat and scratches) was not recorded. The Project footprint will result in the loss of 5 ha of low-quality potential habitat as defined in Section 6.6.6. The majority of higher quality habitat associated with preferred foraging resources such as *E. orgadophila* or *E. cambageana* woodland is avoided. If it occurs, it is likely to be restricted to areas where sparse *Eucalyptus cambageana* are present, or the patch of RE 11.5.3/11.5.15 on Lot 11 or a patch of *Eucalyptus orgadophila* open grassy woodland on Lot 2. However, this habitat is marginal. The remainder of the Project area is largely cleared and dominated by regrowth Acacia. The planned sequential clearing of habitat in any mapped remnant woodland to be cleared will provide any Koalas present the opportunity to safely move into adjacent habitats. A sequential clearing protocol where fauna spotter-catchers are present during clearing will ensure Koalas are not harmed during clearing and there are safe movement opportunities. This sequential clearing protocol is summarised below: • Any clearing would take place in a way to allow Koalas (if present) to move into adjacent areas of retained vegetation. This will include setting clearing limits per day and allowing escape paths to retained vegetation to be maintained. If Koalas are encountered, they are to be left in-situ, works stop in the area, and wait for the animal to move to retained habitat. This will entail: – Leaving a 30 m buffer of vegetation around the tree in which the Koala is located and a corridor of vegetation to retained habitat. – Monitoring the Koala location and if the animal appears stressed. – Allowing the Koala to relocate without assistance unless the animal is in immediate danger or is injured. Indirect impacts may occur to Koalas from the Project as a result of noise and lighting associated with construction activities. Additionally, by opening up further areas of habitat there is the potential for an increase in weeds and pest animals to infiltrate adjacent bushland although the Project area is already subject to extensive weed infestation and pest fauna presence. Due to the low likelihood of Koala being present, and as a result of the large areas of potential Koala habitat to be retained, mitigation measures to be put in place (including staging of clearing), the Project is not expected to result in a long-term decrease in the size of a local population.
reduce the extent of occurrence of the species; or	There being no records of the species on the Project area, or the study area and no signs of the species recorded in field surveys, conservatively an assessment on this species is carried out. No Koalas have been recorded in the Project area or within the surrounding study area. Indirect evidence (scat and scratches) which provide characteristic evidence of presence, was not recorded during field survey. The species has the potential to utilise eucalypt woodlands within the Project area although any presence is likely to be sporadic and infrequent. The Project footprint will result in the loss of 5 ha of potential habitat as defined in Section 6.6.6. Due to the low likelihood of the species being present, avoidance of areas of habitat which offer a higher potential of Koala being present) and through mitigation measures to be put in place, including staging of clearing, the Project is not expected to reduce the area of occupancy of the species.

Table G.5 MSES significant impact assessment for Koala (*Phascolarctos cinereus*)

Species profile	Koala Endangered (NC Act) Endangered (EPBC Act)
fragment an existing population; or	It is recognised that roads and development are fragmenting Koala habitats and increasing threats to Koala populations. Threats are coming from habitat loss and fragmentation, vehicle strike, dog attack, and increased stress on populations which then increases chance of disease. The Project area is already heavily fragmented as a result of historical and more contemporary clearing for agriculture, predominantly grazing. Vegetation clearance will not impede the movement of any Koalas present in the study area. The Project area is largely cleared with a dense ground layer of Buffel Grass which would impede existing movements of the species. The ability of the Project area and immediate surrounding area to offer breeding opportunities dispersal function and genetic diversity will be maintained.
result in genetically distinct populations forming as a result of habitat isolation; or	The Project footprint will result in the loss of 5 ha of potential habitat as defined in Section 6.6.6. If it occurs, it is likely to be restricted to areas where sparse *Eucalyptus cambageana* are present, or the patch of RE 11.5.3/11.5.15 on Lot 11 or a patch of *Eucalyptus orgadophila* open grassy woodland on Lot 2. However, this habitat is marginal. The remainder of the Project area is largely cleared and dominated by regrowth Acacia. Indirect impacts may occur to Koalas from the Project as a result of noise associated with construction activities, and by opening up further areas an increase in weeds and pest animals to adjacent bushland. While the Project will result in a minor loss of low-quality Koala habitat it is not expected to an extent that will cause the species population to decline, due to the apparent low utilisation of the study area and large areas of available retained habitat. The Project is unlikely to result in genetically distinct populations forming as a result of habitat isolation as the Project disturbance footprint is largely avoiding areas of preferred habitat. Retained riparian areas act as corridors of movement for the species, therefore avoiding isolation of habitat.
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or	The Project through clearing of vegetation, has the potential to increase light and open up areas which may then increase weed invasion and numbers of pest animals to adjacent retained areas of potential habitat. Feral animals such as Wild Dog prey on Koalas. This may increase in cleared areas as the hunting of Wild Dogs may become more efficient in these areas. However, the Project area is already subject to extensive weed infestation and pest fauna presence. Hygiene protocols in the operational areas will be implemented to reduce any weeds or disease being introduced to the site or spread from the site. Active pest management will also reduce the risk from Wild Dogs. Based on implementing the proposed mitigation measures it is not expected the Project will result in an increase of invasive species in the species habitat.
introduce disease that may cause the population to decline, or	The most well-known disease present in the Koala population is associated with particular strains of Chlamydia. Koala Retrovirus was recently identified and is thought to be responsible for a range of conditions, including leukaemia and an immunodeficiency syndrome (DoE 2014). The Project is not likely to directly result in an increase in Chlamydia in Koalas. This is a broader issue for the population. But through a cumulative loss of Koala habitat and increase in stress on animals from dog attacks and fragmentation of habitat etc the number of Koalas contracting Chlamydia are increasing. Fauna spotter-catchers will be present during clearing to identify Koalas and ensure they are not harmed during clearing process or as works progress (eg movement of machinery). If a Koala is observed the tree in which it is located, and adjacent trees will not be cleared to ensure the animal is not harmed and permitted to move from the area of its own accord. Clearing will be in accordance with an approved sequential clearing protocol to be detailed in a Species Management Plan. Additionally, animals showing signs of stress or disease will be transported to a vet for treatment. The Project is unlikely to introduce a disease that may cause the species to decline.

Table G.5 MSES significant impact assessment for Koala (*Phascolarctos cinereus*)

Species profile	Koala Endangered (NC Act) Endangered (EPBC Act)
interfere with the recovery of the species; or	DoE (2014) identifies a number of recovery and conservation objectives through Commonwealth Conservation Advice. These are listed below: • develop and implement a development planning protocol to be used in areas of Koala subpopulations or subpopulation fragments to prevent loss of Koala subpopulations, habitat critical to the survival of the species and vital habitat connectivity; • development plans should explicitly address ways to mitigate risk of vehicle strike when development occurs adjacent to, or within, Koala habitat; • develop and implement a management plan to control the adverse impacts of predation on Koalas by dogs in urban, peri-urban, and rural environments; • monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them, if necessary; • identify populations of high conservation priority; • develop and implement options of vegetation recovery and re-connection in regions containing fragmented Koala populations, including inland regions in which Koala populations were diminished by drought and coastal regions where development pressures have isolated Koala populations; • investigate formal conservation arrangements, management agreements and covenants on private land, and, for both Crown and private land, investigate and/or secure inclusion of habitat critical to the survival of the Koala in reserve tenure, if possible; • engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions; and • manage any other known, potential, or emerging threats such a Bell Miner (*Manorina melanophrys*) associated Dieback or Eucalyptus rust. The Project will not interfere substantially with any of these objectives. Significant areas of potential habitat for this species will be retained in the Project area. Connectivity to the broader landscape will be maintained (including retention of riparian corridors associated with Goonyella Creek).

Table G.5 MSES significant impact assessment for Koala (*Phascolarctos cinereus*)

Species profile	Koala Endangered (NC Act) Endangered (EPBC Act)
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	Large areas of eucalypt woodlands are being retained on the boundaries of the Project area adjacent to higher quality habitat present in the riparian corridors. These retained areas will be managed to maintain habitat quality and reduce threats including weed management, pest animal control (including Wild Dogs) and fire management. The majority of habitat in the Project area has low potential to be utilised by Koalas being dominated by Acacia regrowth. The Project footprint will result in the loss of 5 ha of potential habitat as defined in Section 6.6.6. If it occurs, it is likely to be restricted to areas where sparse *Eucalyptus cambageana* are present, or the patch of RE 11.5.3/11.5.15 on Lot 11 or a patch of *Eucalyptus orgadophila* open grassy woodland on Lot 2. However, this habitat is marginal. The remainder of the Project area is largely cleared and dominated by regrowth Acacia. Female Koalas can potentially produce one offspring each year, with births occurring between October and May. Project activities are not expected to disrupt the breeding cycle of an important population. Areas of habitat will be retained in the Project area and immediate surrounds, including areas of higher quality potential habitat in riparian areas, and movement corridors will be retained. Fauna spotter-catchers will be present to identify if Koalas are present during the clearing process and ensure they are not harmed during as works progress (eg through felling of trees or movement of machinery). If a Koala is observed, the tree in which it is located, and adjacent trees will not be cleared to ensure the animal is not harmed and permitted to move from the area of its own accord, before clearing in that area can recommence. Clearing will be in accordance with an approved sequential clearing protocol to be detailed in a Species Management Plan and summarised under Criteria 1 above. It is unlikely that the Project will further impact on connectivity for the species and disrupt the breeding cycle of the population.
Conclusion	The Project footprint will result in the loss of 5 ha of potential habitat as defined in Section 6.6.6. The majority of higher quality habitat associated with preferred foraging resources such as *E. orgadophila* or *E. cambageana* woodland is avoided. If it occurs, it is likely to be restricted to areas where sparse *Eucalyptus cambageana* are present, or the patch of RE 11.5.3/11.5.15 on Lot 11 or a patch of *Eucalyptus orgadophila* open grassy woodland on Lot 2. However, this habitat is marginal. The remainder of the Project area is largely cleared and dominated by regrowth Acacia. This species has not been recorded within the Project area or within the study area. Conservatively it is considered as having potential to occur on the Project area despite there being no evidence of scratches or scats during field surveys. Through the identified mitigation measures such as staged clearing, the Project will ensure impacts on any local Koala population are minimised.

Table G.6 MSES significant impact assessment for Greater Glider (*Petauroides volans*)

Species profile	**Greater Glider** **Endangered (NC Act)** **Endangered (EPBC Act)**
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
Lead to a long-term decrease in the size of a local population; or	It is unlikely the species is present due to the lack of large mature hollow bearing trees and scarcity of large hollows. The Project area is largely fragmented and has been previously cleared with non-remnant and regrowth vegetation being the dominant vegetation features. This limits large, mature hollow bearing trees for the Greater Glider to feed on or dwell in. Due to unsuitable habitat within the Project area, absence of records within the study area, lack of mature trees and a scarcity of large hollows there is a low potential this species is present. Greater Glider habitat is mapped based on field observations and the presence of hollow bearing trees, and connectivity to suitable habitat consistent with available literature, as well as observations from spotlighting effort. This species utilises eucalypt forest and woodland with mature trees containing abundant hollows, which it uses for shelter. There are some isolated mature trees (*E. cambageana*) with hollows within the pipeline and buffer areas of the Project area however these do not form part of a contiguous woodland and habitat is not suitable for this species. There is no potential for Greater Glider habitat in large parts of the Project area that have been subject to field survey. There is a small section of the alignment on Lot 11 that contains RE 11.5.3 – *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces. This woodland is mapped correctly and contains *E. crebra* and *C. clarksoniana* trees around 14 m high. Some hollows are present, but they are relatively scarce (approximately five per hectare) and small in size, as the woodland appears to have been subject to selective clearing in the past. Due to the open nature of the canopy, small numbers of hollows and lack of connectivity to more optimal Greater Glider habitat, this area is conservatively considered marginal habitat for Greater Glider and should be confirmed through nocturnal spotlighting surveys at a later date. Areas of RE 11.5.3 on Lot 2 are unsuitable for Greater Glider, as they have been cleared in the past and have now regrown to achieve remnant status. However, hollows have not yet developed in the canopy trees, so no denning habitat for the glider is present. Additionally a patch of *Eucalyptus orgadophila* open grassy woodland in the eastern portion of the alignment on Lot 2 is mapped as potential foraging habitat due to the lack of suitable hollows. Habitat is typically mapped as either denning habitat or foraging habitat. Denning habitat (as informed by the Draft Consultation on Species Listing Eligibility and Conservation Actions *Petauroides volans* (Greater Glider (southern)) (DAWE 2021) is present if suitable large hollow bearing trees containing hollows greater than 8 cm (Gibbons & Lindenmayer 2002) are present. Large parts of the Project area are considered unsuitable as denning habitat for Greater Glider due to the dominant vegetation communities of small statured woodlands with a lack of hollows, sparse canopy cover, low canopy height and small DBH. This small stature is likely due to previous large-scale clearing activities which have essentially reduced the age of the dominant vegetation species across the Project area below that necessary to produce the large hollows (typically >100 years required for this species). Based on the records and habitat mapping prepared a total of 3.16 ha of low potential denning habitat and 1.84 ha of low potential foraging habitat occurs within the Project footprint. Habitat mapping is conservative, and it is likely that the species does not occur in the Project area. Fauna spotter-catchers will be present prior to clearing to check for the presence of any hollow-bearing trees. When hollow-bearing trees are cleared, procedures are proposed to minimise impacts to fauna. Procedures will be developed regarding staged clearing to ensure impacts are minimised through retaining the hollow-bearing trees for another 24 hrs-48 hrs while adjacent trees are cleared to allow fauna to vacate the hollows overnight. These measures will be formalised in the EMP and in a SMP.
reduce the extent of occurrence of the species; or	The Project will result in a loss of 3.16 ha of low potential denning habitat and 1.84 ha of low potential foraging habitat for the species. These areas will be subject to spotlighting, and it is anticipated that the species will not occupy these areas. Coupled with the implementation of mitigation measures, the removal of approximately 5 ha of low potential denning or foraging habitat is not considered to reduce the area of occupancy for the species.

Table G.6 MSES significant impact assessment for Greater Glider (*Petauroides volans*)

Species profile	Greater Glider Endangered (NC Act) Endangered (EPBC Act)
fragment an existing population; or	Post-construction, the easement will shrink to a 15 m operating width which comprises the 11 m to the pipeline centreline. This section typically includes a farm track alongside a fence line plus 4 m to the other side of the pipeline to allow pipeline remediation, if required. This approach will maintain inspection traffic to an existing farm track which will enable the remaining are to largely rehabilitate. Terrestrial habitat connectivity may be disturbed as a result of the Project by obstructing movement of fauna across the corridor within the existing remnant vegetation patches that occur in the Project area. However, much of the proposed disturbance has been focused along existing cleared fence lines in these areas and is considered very unlikely to pose an ongoing issue to habitat connectivity following the construction disturbance and subsequent revegetation and maintenance of the corridor. Any impacts to remnant vegetation that are unavoidable have sought to clear areas adjacent to existing clearance, to avoid further fragmentation. There is one waterway passing through the alignment – Goonyella Creek. The crossing of this minor watercourse is unlikely to significantly impact in terms of fragmentation. The Project design will maintain linkages to surrounding retained habitat. The main mechanism for potential fragmentation is likely to relate to construction of access roads and pipeline linear infrastructure through the Project area. Although Greater Glider have been observed gliding for lengths between 75-100 m, Taylor and Goldingay (2009) state that a 55 m wide road can act as a barrier to movement for Greater Glider between forest patches. Conservatively 40 m is therefore taken as a distance at which achievable gliding distance may be compromised by Project design. The maximum width of the clearing footprint is a 30 m wide construction right of way – therefore this is not likely to result in impacts to glider movement if present. The Project is not expected to fragment an existing population into two or more populations.
result in genetically distinct populations forming as a result of habitat isolation; or	Hygiene protocols will be implemented to ensure weeds are not introduced or spread from trucks, vehicles, and machinery. The direct and indirect impacts from the Project are not expected to result in a decline of the species. The Project is unlikely to result in genetically distinct populations forming as a result of habitat isolation as the Project disturbance footprint is largely avoiding areas of preferred habitat. Retained riparian areas act as corridors of movement for the species, therefore avoiding isolation of habitat.
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or	The Project has the potential to result in the spread of weed species. Weeds have the potential to compete with native flora species recruitment, reduce the ability for fauna species to utilise the area and can increase fuel loads and potential for hot wildfires to occur. However, the site is already subject to extensive weed infestation and pest fauna presence. Weeds are likely only to have a minor impact on Greater Glider as they forage and breed in mature eucalypts which are not as susceptible to weeds. Hygiene protocols, such as wash-down facilities, will be present on site to ensure weeds are not brought in with vehicles or machinery. Based on implementing the proposed mitigation measures out lined in the EMP and elsewhere it is not expected the Project will result in an increase of invasive species that would significantly impact on the Greater Glider habitat.
introduce disease that may cause the population to decline, or	Eucalypt dieback is a known threat to the species and can occur as a result of a variety of pests, pathogens and parasites including soil pathogens. They can take advantages of trees stressed by environmental changes. Hygiene protocols, such as wash-down facilities, will be present on site to ensure pathogens are not brought in with vehicles or machinery. No specific disease is applicable to Greater Glider.
interfere with the recovery of the species; or	The Project is not expected to interfere substantially with the recovery of the species. Clearing of any potential habitat will be undertaken sequentially. Fire will also be managed on site to ensure hot wildfires are minimised. The Project operation is also not expected to impact on Greater Gliders as lighting will be minimal and retained habitats will be managed for weeds and inappropriate fire regimes.

Table G.6 MSES significant impact assessment for Greater Glider (*Petauroides volans*)

Species profile	Greater Glider Endangered (NC Act) Endangered (EPBC Act)
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	The Project will result in a loss of 3.16 ha of low potential denning habitat and 1.84 ha of low potential foraging habitat. Large parts of the Project area are considered unsuitable as denning habitat for Greater Glider due to the dominant vegetation communities of small statured woodlands with a lack of hollows, sparse canopy cover, low canopy height and small DBH. This small stature is likely due to previous large-scale clearing activities which have essentially reduced the age of the dominant vegetation species across the Project area below that necessary to produce the large hollows (typically >100 years required for this species). As such the habitat in the Project area is not considered to be habitat critical to the survival of the species, and there is low potential for the species to occur. Females give birth to single young from March to June (TSSC 2016). Their relatively low reproductive rate may render isolated populations in small remnants prone to extinction (TSSC 2016). To avoid and minimise impacts on Greater Glider breeding habitat and young, fauna spotter-catchers will be present prior to and during clearing to check for the presence of the species and suitable hollow bearing trees. If Greater Glider is identified in spotlighting, when suitable hollow bearing trees are cleared procedures will be put in place to minimise impacts to the species. Procedures will then be put in place to ensure impacts are minimised through retaining the hollow bearing trees for another 24 hrs to 48 hrs while adjacent trees are cleared to allow species to vacate the hollows overnight. These measures will be outlined in a SMP. Tree hollows that meet the requirements for Greater Glider will be specifically identified and mapped during pre-clearance. The Project is not expected to disrupt the breeding cycle of a population.
Conclusion	It is unlikely the species is present due to the lack of large mature hollow bearing trees and scarcity of large hollows. The Project area is largely fragmented and has been previously cleared with non-remnant and regrowth vegetation being the dominant vegetation features. This limits large, mature hollow bearing trees for the Greater Glider to feed on or dwell in. Due to unsuitable habitat within the Project area, absence of records within the study area, lack of mature trees and a scarcity of large hollows there is a low potential this species is present. This area is conservatively considered marginal habitat for Greater Glider and should be confirmed through nocturnal spotlighting surveys at a later date. It is unlikely that the Project will have a significant impact on this species.

Table G.7 MSES significant impact assessment for White-throated Needletail (*Hirundapus caudacutus*)

Species profile	**Greater Glider** **Endangered (NC Act)** **Endangered (EPBC Act)**
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
Lead to a long-term decrease in the size of a local population; or	White-throated Needletail are a non-breeding visitor to Australia arriving in October and departing by April. Numbers fluctuate on an annual basis and the species is widespread across the eastern coast, moving in response to foraging and weather conditions. The species migrates down the Great Dividing Range, and the Project area is a small component of this broader area and numbers will vary annually in response to weather and foraging conditions. It is an aerial insectivore that spend most of its time aloft, and could occur anywhere over the Project area, therefore the whole Project area is considered potential foraging habitat. As swifts are almost exclusively aerial, direct impacts to their habitat are not expected to occur as a result of vegetation clearance for the Project. There is limited potential the species could roost in an area of woodland across the Project area, although this use will be sporadic, temporary and across a broad area (ie not involving regular or repeated roost sites). The majority of suitable roost trees (larger more mature trees) are located within riparian corridors which are largely avoided by the project (see Section 8). Due to the large areas of retained suitable habitat within the Project area and in the surrounding region, the Project is unlikely to lead to a long-term decrease in the size of a population.
reduce the extent of occurrence of the species; or	The species is likely to occur on a sporadic basis over the summer months within the Project area. Within the core range of the species, numbers can vary from 0 on one day to over 1,000 the next day with seemingly little pattern, presumably driven by weather and foraging conditions. Large tracts of vegetation will be retained surrounding the Project area and loss of roosting habitat for such a widespread and mobile species will be negligible. Foraging habitat will be maintained above the Project area and the majority of the Project footprint comprises cleared grazing land of limited value.
fragment an existing population; or	The species is almost exclusively aerial in Australia across a wide range of habitats. It is not expected that the Project will fragment the habitat for this species. The species regularly forages up to 1,000 m ASL.
result in genetically distinct populations forming as a result of habitat isolation; or	It is unlikely that the Project will result in genetically distinct populations for the species. The species does not breed in Australia. Any occurrence is likely to be related to foraging resources.
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or	Pest fauna such as cats are not known as a major threat to the species. Although there is the possibility of roosting individuals being taken by cats, the frequency of such events is likely to be small. The potential for weeds to impact on the quality of foraging habitat is low. The Project area is already subject to weed invasion and impacts from grazing practices. Nonetheless, weeds will be identified during preclearance surveys. Hygiene protocols, such as wash-down facilities, will also be put in place to ensure weeds are not brought in with vehicles or machinery.
introduce disease that may cause the population to decline, or	This species is not known to be threatened by disease. The Project is unlikely to introduce diseases that cause the species to decline.

Table G.7 MSES significant impact assessment for White-throated Needletail (*Hirundapus caudacutus*)

Species profile	Greater Glider Endangered (NC Act) Endangered (EPBC Act)
interfere with the recovery of the species; or	There is no State or Commonwealth recovery plan for this species. The Approved Conservation Advice for White-throated Needletail (TSSC 2019) outlines conservation actions intended to aid the recovery of the species (identification of important habitat in Australia, improve knowledge of threatening processes and quantify levels of organochlorines in individuals and prey species). Given the relatively minor extent of clearing involved in relation to retained habitat in the region, and the large distances covered by this species, any potential impact on White-throated Needletail habitat will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	This species does not breed in Australia; therefore, the Project will not disrupt the breeding cycle of the White-throated Needletail. As an aerial feeder, habitats for foraging are diverse and occur over woodland, cleared areas, urban environments etc. Although vegetation clearing will occur during Project construction, there are areas of retained vegetation within the Project area, and cleared habitats are still utilised by the species. As described above, as swifts are almost exclusively aerial, direct impacts to their habitat are not expected to occur as a result of the Project.
Conclusion	The Project will not have a SRI on White-throated Needletail habitat.

Table G.8 MSES significant impact assessment for Fork-tailed Swift (*Apus pacificus*)

Species profile	**Fork-tailed Swift** **Special least concern (NC Act)** **Migratory (EPBC Act)**
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
A long-term decrease in the size of a local population; or	Fork-tailed Swift are a non-breeding visitor to Australia arriving in October and departing by April. Numbers fluctuate on an annual basis and the species is widespread across the eastern coast, moving in response to foraging and weather conditions. Numbers will vary annually in response to weather and foraging conditions. It is an aerial insectivore that spend most of its time aloft, and could occur anywhere over the Project area, therefore the whole Project area is considered potential foraging habitat. As swifts are almost exclusively aerial, direct impacts to their habitat are not expected to occur as a result of vegetation clearance for the Project. Due to the large areas of retained suitable habitat within the Project area and in the surrounding region, the Project is unlikely to lead to a long-term decrease in the size of a population.
A reduced extent of occurrence of the species; or	The species is likely to occur on a sporadic basis over the summer months within the Project area. Within the core range of the species, numbers can vary from 0 on one day to over 1,000 the next day with seemingly little pattern, presumably driven by weather and foraging conditions. Large tracts of vegetation will be retained surrounding the Project area and loss of roosting habitat for such a widespread and mobile species will be negligible. Foraging habitat will be maintained above the Project area and the majority of the Project footprint comprises cleared grazing land of limited value.
Fragmentation of an existing population; or	The species is almost exclusively aerial in Australia across a wide range of habitats. It is not expected that the Project will fragment the habitat for this species. The species regularly forages up to 1,000 m ASL.
Result in genetically distinct populations forming as a result of habitat isolation; or	It is unlikely that the Project will result in genetically distinct populations for the species. The species does not breed in Australia. Any occurrence is likely to be related to foraging resources.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	This species does not breed in Australia; therefore, the Project will not disrupt the breeding cycle of the Fork-tailed Swift. As an aerial feeder, habitats for foraging are diverse and occur over woodland, cleared areas, urban environments etc. Although vegetation clearing will occur during Project construction, there are areas of retained vegetation within the Project area, and cleared habitats are still utilised by the species. As described above, as swifts are almost exclusively aerial, direct impacts to their habitat are not expected to occur as a result of the Project.
Conclusion	The Project will not have a SRI on Fork-tailed Swift habitat.

Table G.9 MSES significant impact assessment for Latham's Snipe (*Gallinago hardwickii*)

Species profile	**Latham's Snipe** **Special least concern (NC Act)** **Migratory (EPBC Act)**
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
A long-term decrease in the size of a local population; or	The species may occur on any wetland habitat within the Project area when conditions are suitable. This includes gilgai and flooded drainage-lines. Suitable habitat on site is represented by all occurrences of these areas of habitat in the Project area. Due to the likely infrequent occurrence of the species in the Project area and large areas of retained suitable habitat within the Project area and in the surrounding region, the Project is unlikely to lead to a long-term decrease in the size of a population.
A reduced extent of occurrence of the species; or	Extensive areas of potential habitat are present within the Project area, in the form of gilgai habitats. Approximately 36.05 ha of habitat will be removed as a result of the Project, although extensive areas of gilgai will be retained surrounding the Project area. Therefore, the Project is not likely to have a significant impact on an area of important habitat for the species. Due to the extensive areas of retained habitat and the transitory nature of any occurrence, the Project area is expected to be able to accommodate Latham's Snipe occurring in the region in the summer months. Therefore, the Project is not likely to have a significant impact on the species' habitat.
Fragmentation of an existing population; or	The Project is unlikely to fragment a population of Latham's Snipe. Although the species is likely to occur sporadically in the Project area, the Project disturbance footprint is largely avoiding areas of suitable habitat. Connectivity between other suitable patches in retained areas of habitat will be maintained. As an aerial species, due to the availability of suitable habitat, fragmentation is not anticipated to be an issue. The species will be able to move between suitable available retained wetlands in the region when present in the area.
Result in genetically distinct populations forming as a result of habitat isolation; or	It is unlikely that the Project will result in genetically distinct populations forming for the species. The species will not breed in the Project area (breeds in Japan). Any occurrence is likely to be related to foraging resources.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	This species does not breed in Australia; therefore, the Project will not disrupt the breeding cycle of the Latham's Snipe. It is unlikely that the Project will disrupt the lifecycle of an ecologically significant proportion of the population – DoE (2017) defines an ecologically significant proportion of the population as being 18 birds. Any population occurring in the Project area would likely number less than a few birds.
Conclusion	Although 36.05 ha of potential habitat will be cleared during construction, the loss of this habitat will not have a significant residual impact on Latham's Snipe and the risk of an impact on an ecologically significant proportion of the population is considered to be low.

Table G.10 MSES significant impact assessment for Short-beaked Echidna (*Tachyglossus aculeatus*)

Species profile	**Short-beaked Echidna** **Special least concern (NC Act)** **Not listed (EPBC Act)**
SRI criteria for endangered and vulnerable wildlife habitat (including essential habitat)	
A long-term decrease in the size of a local population; or	Habitat for the species is broad as it is found over a range of habitats (woodland, cleared areas, urban environments etc). Although vegetation clearing will occur during Project construction, there are significant areas of retained vegetation within the Project area. Due to the large areas of retained suitable habitat within the Project area and in the surrounding region, the Project is unlikely to lead to a long-term decrease in the size of a population.
A reduced extent of occurrence of the species; or	The Short-beaked Echidna Is a widespread mammal and can occupy a range of habitats. The Project is unlikely to reduce the extent of occurrence for the species.
Fragmentation of an existing population; or	The Project is unlikely to fragment a population of Short-beaked Echidna. Connectivity between other preferred patches in retained areas of habitat will be maintained. Echidnas are a mobile species, traversing cleared paddocks.
Result in genetically distinct populations forming as a result of habitat isolation; or	As no significant fragmentation of habitat is expected to occur, it is not expected that genetically distinct populations will form as a result of habitat isolation.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	The Project has the potential to disrupt habitat features for Short-beaked Echidna, such as hollow logs, which may be used for breeding and habitat for foraging. Pre-clearance surveys will reduce the likelihood of impacts through relocating any Echidnas found to outside of the Project footprint. With such mitigation, it is unlikely these impacts will be significant.
Conclusion	The Project will not have a SRI on Short-beaked Echidna habitat.

G.4 SRI Assessment – waterways providing for fish passage

The MSES SRI assessment for waterways providing fish passage using the SRI Guideline is summarised below in Table G.11.

Table G.11 MSES significant impact assessment for waterways providing for fish passage

Criteria	Discussion
result in the mortality or injury of fish; or	The Project proposes one watercourse crossing being over Goonyella Creek. These will be temporary crossings to be installed during construction of the pipeline. Detailed design has not been completed. However this crossing will be completed using open cut trenching methods and reinstated on completion. Works will occur when watercourses are dry to avoid impacting on fish passage and water quality. Appropriate mitigation measures will be put in place to avoid any spills or contamination into watercourses that may result in mortality of fish and aquatic ecosystems. These measures will be outlined in a CEMP.
result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment, or confined schooling behaviour in fish; or	As identified above there is only one watercourse crossing proposed and these will be temporary. Detailed design has not been completed. Works will occur when watercourses are dry to avoid impacting on fish passage and water quality. Appropriate mitigation measures will be put in place to avoid any spills or contamination into watercourses that may result in mortality of fish and aquatic ecosystems. These measures will be outlined in a CEMP. Hydrology conditions including bed and banks of the watercourse will be maintained.
reduce the extent, frequency or duration of fish passage previously found at a site; or	The Project is not expected to reduce the extent, frequency, or duration of fish passage. Information on the hydrology of the Project area and how surface flows will be maintained are described in the surface water assessment Appendix D of the EAR.
substantially modify, destroy, or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank, or riffle formations) necessary for the breeding and/or survival of fish; or	The Project will not significantly alter the in-stream vegetation within Goonyella Creek. The installation of the pipeline through Goonyella Creek will be completed during the dry-season and rehabilitated in accordance with the self-assessable code. Design of the creek crossing, and selection of suitable rehabilitation methods to be informed by local flow velocity and scour potential. The rehabilitation works will be designed to achieve a stable creek profile and minimise bed scouring and bank slumping. No changes are expected to occur to the geomorphology of the watercourse once rehabilitation has occurred.
result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration, and frequency of flows; or	Therefore the Project is not expected to significantly change the volume and duration of overland flow into these larger watercourses.
lead to significant changes in water quality parameters such as temperature, dissolved oxygen, pH, and conductivity that provide cues for movement in local fish species.	The Project is not expected to result in a significant change in water quality parameters. The Project will be undertaken in accordance with conditions of the EA. Further detail is provided in Appendix D of the EAR.
Conclusion	The Project is not expected to have a significant impact on fish passage.

G.5 SRI Assessment – connectivity

The analysis has determined any impact on connectivity areas is NOT significant. The log file is provided overleaf.

Department of Environment and Heritage Protection (DEHP)
Landscape Fragmentation and Connectivity (LFC) Tool version 1.4
LOGFILE
Process started at 28-07-2022 10:06:13 AM
Python version: 2.7.18 (v2.7.18:8d21aa21f2, Apr 20 2020, 13:19:08) [MSC v.1500 32 bit (Intel)]
Arcpy version: 10.8.1
Username: mforbes

INPUT PARAMETERS
Output Workspace: \\emmsvr1\emm3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\05_Working\20220728_ConnectivityTool
Threshold lookup table: \\10.0.0.75\gis\GIS\04_SoftwareAndTools\Landscape_Fragmentation_And_Connectivity_Tool\LFC_data.gdb\tbl_Regional_frag_local_threshold
Remnant cover layer: \\10.0.0.75\gis\GIS\04_SoftwareAndTools\Landscape_Fragmentation_And_Connectivity_Tool\LFC_data.gdb\QLD_VEG_RVM_100K_v2p0
Remnant cover layer edited: False
Regional buffer extent: 20 kilometres
Local buffer extent: 5 kilometres
Impact layer: \\emmsvr1\emm3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\01_Data\ProposedDisturbanceFootprint_01pg_EMM_20220721.shp
layer projection: GDA_1994_MGA_Zone_55
Raster cell resolution for analysis: 10 metres
Edge Width: 50 metres
(The distance from non-remnant landscapes through to the core ecosystem - the edge of remnant ecosystems)
Default projection: \\10.0.0.75\gis\GIS\04_SoftwareAndTools\Landscape_Fragmentation_And_Connectivity_Tool\scripts\QLD Albers Equal Area Conic.prj

10:06:13 Checking out the spatial analyst tool - required for LFC

10:06:13 _____BEGINNING LANDSCAPE FRAGMENTATION AND CONNECTIVITY ANALYSIS_____

10:06:13 This tool will categorise the landscape into: {0: 'non-rem', 1: 'patch', 2: 'edge', 3: 'perforated', 4: 'core (< 100 hectares)', 5: 'core (100-500 hectares)', 6: 'core (> 500 hectares)', 7: 'water'}

10:06:19 \\emmsvr1\emm3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\05_Working\20220728_ConnectivityTool\lyr_file does not exist, creating it now.
10:06:19 Copying across impact site feature(s) and calculating area in hectares (AreaHA)
10:06:21 Making a local copy of the impact site
10:06:22 Preparing remnant cover layer for analysis

```
10:06:23   Created regional scale buffer of 20 kilometres
10:06:23   Created local scale buffer of 5 kilometres
10:06:35   Clipped the remnant cover to the regional buffer
extent
10:06:37   Unioned the pre impact remnant layer with the impact
site
10:06:42   Attributed the impact area as not RVM Cat B
10:06:42   Area of RVM Cat B clearing is 9.98 hectares
10:06:42   SQL selection used is "RVM_CAT" = 'B' and "Cover" =
'Not RVM Cat B' on shapefile
\\emmsvr1\emm3\2021\E210671 - QPM Moranbah gas pipelines -
approvals\GIS\05_Working\20220728_ConnectivityTool\main_output
\clip_remcover_post.shp

10:06:46   Categorised the cover attributes in
clip_remcover_pre.shp ready for raster conversion
10:06:57   Converted clip_remcover_pre.shp to raster

10:07:00   Categorised the cover attributes in
clip_remcover_post.shp ready for raster conversion
10:07:12   Converted clip_remcover_post.shp to raster

10:07:12   Run Landscape fragmentation analysis on the pre impact
regional landscape

REGULATED VEGETATION TYPES BEING EXTRACTED FROM LAND COVER
IDENTIFICATION OF CORE, PATCH, EDGE AND PERFORATIONS
COMBINING FRAGMENTATION CLASSES
CLASSIFYING CORE FOREST PATCHES BY AREA
COMPOSING FINAL FRAGMENTATION MAP
COMPOSING FINAL FRAGMENTATION MAP
(FRAGMENTATION CALCULATION TIME WAS 5.9 MINUTES)

10:13:04   Run Landscape fragmentation analysis on the post
impact regional landscape

REGULATED VEGETATION TYPES BEING EXTRACTED FROM LAND COVER
IDENTIFICATION OF CORE, PATCH, EDGE AND PERFORATIONS
COMBINING FRAGMENTATION CLASSES
CLASSIFYING CORE FOREST PATCHES BY AREA
COMPOSING FINAL FRAGMENTATION MAP
COMPOSING FINAL FRAGMENTATION MAP
(FRAGMENTATION CALCULATION TIME WAS 5.9 MINUTES)

Extracting a local subset of lfc_regional_pre_impact
Extracting a local subset of lfc_regional_post_impact

Collating pre and post impact statistics and trigger assessment
10:19:18   Summarising area statistics for:
lfc_localmsk_pre_impact
10:19:18   Summarising area statistics for:
lfc_localmsk_post_impact
```

10:19:18 Summarising area statistics for:
lfc_regional_pre_impact
10:19:18 Summarising patch count for lfc_localmsk_pre_impact
10:19:24 Summarising patch count for lfc_localmsk_post_impact

Analysing impact on Connectivity Areas

SIGNIFICANCE TEST ONE

The regional total area is 196092.47
The regional extent of core remnant is 84538.71
The regional extent of core remnant is 43.11 percent
This level of regional fragmentation sets a local impact threshold of: 10.0 percent

The table below lists the local impact thresholds for categories of regional core remnant extent:

REGIONAL CORE CATEGORY	LOCAL IMPACT THRESHOLD
< 10	2.0
10 - 30	5.0
30 - 50	10.0
50 - 70	20.0
70 - 90	30.0
>90	50.0

Area of core at the local scale (pre impact): 7475.37
Area of core at the local scale (post impact): 7464.92
Percent change of core at the local scale (post impact): 0.14 percent

SIGNIFICANCE TEST TWO

The number of core remnant areas occurring on the site: 2
The number of core remnant areas remaining on the site post impact: 2
(Only core polygons greater than or equal to 1 hectare are included)

RESULT

10:19:34 This analysis has determined any impact on connectivity areas is NOT significant
(A significant reduction in core remnant at the local scale is False OR a change from core to non-core remnant at the site scale is False)

The significance table has been written to: ..\main_output\lfc_significance_assessment.csv
The local scale summary table has been written to: ..\main_output\lfc_local_scale_summary.csv

The site scale summary table has been written to: ..\main_output \lfc_site_scale_summary.csv
GIS layer files copied into folder \lyr_file within the project folder.
View layers in ArcMAP using..\\\emmsvr1\emm3\2021\E210671 - QPM Moranbah gas pipelines - approvals\GIS\05_Working\20220728 _ConnectivityTool\lyr_file\lyr_file\Connectivity Area Impact Assessment.lyr

Please scrutinise the output tables and spatial layers to confirm the desktop modelling of connectivity area impact

This analysis used an unedited copy of the Regulated Vegetation layer.

10:21:34 _____COMPLETED LANDSCAPE FRAGMENTATION AND CONNECTIVITY ANALYSIS_____

Australia

SYDNEY
Ground floor 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
Level 2 Suite 2.04
15 London Circuit
Canberra City ACT 2601

ADELAIDE
Level 4 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Suite 8.03 Level 8 454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 9.02 Level 9 109 St Georges Terrace
Perth WA 6000

Canada

TORONTO
2345 Younge Street Suite 300
Toronto ON M4P 2E5

VANCOUVER
60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1

linkedin.com/company/emm-consulting-pty-limited

emmconsulting.com.au