Atlas Stage 3 Gas Project

Terrestrial and Aquatic Ecology Assessment Report – ATP 2059

8 September 2023

Project No.: 0639876

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Signature Page

8 September 2023

Atlas Stage 3 Gas Project

Terrestrial and Aquatic Ecology Assessment Report – ATP 2059

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Acronyms and Abbreviations

Name	Description
ALA	Atlas of Living Australia
CSG	Coal Seam Gas
DAF	Department of Agriculture and Fisheries
DAMS	Development Assessment Mapping System
DES	Department of Environment and Science
DIWA	Directory of Important Wetlands in Australia
DoEE	Department of Environment and Energy
DoR	Department of Resources
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Fisheries Act	*Fisheries Act 1994*
HES	High Ecological Significance
HEV	High Ecological Value
LC	Least Concern
MSES	Matter of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
OF	Of Concern
PA	*Planning Act 2016*
P&G Act	*Queensland Petroleum and Gas (Production and Safety) Act 2004*
PMAV	Property Map of Assessable Vegetation
PMST	Protected Matters Search Tool
PR	*Planning Regulation 2017*
RE	Regional Ecosystem
SDAP	State Development Assessment Provisions
SEVT	Semi-Evergreen Vine Thicket
SIG 1.1	Significant Impact Guidelines 1.1 - Matters of National Environmental Significance
SLC	Special Least Concern
SPA	*Sustainable Planning Act 2009*
SPRAT	Species Profile and Threats Database
SRI	Significant Residual Impact
TEC	Threatened Ecological Community
VM Act	*Vegetative Management Act 1999*
Water Act	*Water Act 2000*
WO	Wildlife Online
WONS	Weeds of National Significance

EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by Senex Energy Pty Ltd (Senex) to describe the terrestrial and aquatic ecological values to support the development of approvals documentation for the Atlas Stage 3 Gas Project in the Surat Basin in southern-central Queensland. This Ecological Assessment Report (EAR) will be used to support the preparation and submission of approval documentation for an amendment to an Environmental Authority (EA) associated with the development of gas wells on existing Authority to Prospect (ATP) 2059.

The activities within the ATP 2059 tenement will involve up to 31 new gas wells and associated well site facilities; gas and water gathering systems for the producing wells; access tracks for operational purposes; borrow pits; and ancillary supporting facilities. This EAR details ecological values within the ATP 2059 tenement only for the purpose of supporting an amendment to an existing EA across this tenement. Therefore, it will be herein referred to as the ATP 2059 EAR, with the term 'Project Area' to be used for ATP 2059 boundary only.

The gas field will be progressively developed over a period of approximately 5 – 10 years.

This ATP 2059 EAR documents the assessment of terrestrial and aquatic ecological values within the Project Area with a focus on the impacts to Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES). The ATP 2059 EAR identified potential risks to biodiversity values and avoidance, mitigation and management measures.

Both terrestrial and aquatic ecological values of the Project Area were assessed using information obtained from desktop sources and field surveys conducted by suitably qualified ecologists. Desktop sources included available mapping products and species database records. The outcomes of the desktop assessment and field surveys were analysed to inform a likelihood of occurrence assessment relating to listed threatened species and ecological communities.

The Project Area is entirely within the Brigalow Belt Bioregion and occurs within the Taroom Downs subregion and features watercourses on floodplains, surrounded by undulating hills. Several watercourses (stream orders 1 - 4) intersect the Project Area, with named watercourses including Woleebee Creek and Wandoan Creek. It is noted that terrestrial and aquatic habitats demonstrated varying levels of degradation, including cattle grazing, clearing, erosion and invasive species and the majority of aquatic habitats surveyed are of limited ecological value. Across all sample sites, aquatic macrophyte diversity was relatively poor with the highest diversity recorded in a billabong adjacent to Wandoan Creek.

The main land use within the Project Area is grazing of stock for beef production, with some areas developed for irrigated centre-pivot agriculture. The majority of the Project Area is cleared with 16.7% mapped as remnant vegetation and as such 83.3% of the Project Area is classified cleared areas with non-native pastures.

Potential impacts to MNES and MSES were assessed against the following guidelines:

- *MSES: Queensland Environmental Offsets Policy – Significant Residual Impact Guideline (Department of Environment [DoE], 2014) (SRI Guideline); and*
- *MNES: Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of Environment, Heritage, Water and the Arts [DEHWA], 2013) (SIG 1.1).*

MNES Ecological Findings

For MNES protected under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), two listed threatened ecological communities (TEC), five listed threatened species (five fauna) and two listed migratory species were identified as known or likely to occur in the Project Area, due to direct field observations within the Project Area or recent historical records and the presence of suitable habitat.

The TECs were Brigalow (Acacia harpophylla dominant and co-dominant) and Poplar Box Grassy Woodland on Alluvial Plains.

The listed threatened species were the Dulacca Woodland Snail (Adclarkia dulacca), Glossy Black-cockatoo (Calyptorhynchus lathami lathami), Greater Glider (Petauroides volans), Koala (Phascolarctos cinereus) and White-throated Needletail (Hirundapus caudacutus).

The listed migratory species were the White-throated Needletail and Fork-tailed Swift (Apus pacificus).

MSES Ecological Findings

For MSES protected under the Nature Conservation Act *1992 (NC Act) (QLD), the Project Area was found to contain Regulated Vegetation as well as NC Act listed threatened species protected wildlife habitat as follows:*

- *Regulated Vegetation that is Category B - Endangered and Of Concern Regional Ecosystems [RE];*
- *Regulated Vegetation that is within the defined disturbance of a watercourse;*
- *Protected wildlife habitat for vulnerable, endangered, or special least concern listed flora and fauna species which included:*
  - *Australian Painted Snipe (Rostratula australis);*
  - *Belson's Panic (Homopholis belsonii);*
  - *Brown Treecreeper (Climacteris picumnus victoriae);*
  - *Diamond Firetail (Stagonopleura guttata)*
  - *Dulacca Woodland Snail (Adclarkia dulacca);*
  - *Five-clawed Worm-skink (Anomalopus mackayi);*
  - *Fork-tailed Swift (Apus pacificus);*
  - *Glossy Black-cockatoo (Calyptorhynchus lathami lathami);*
  - *Golden-tailed Gecko (Strophurus taenicauda)*
  - *Greater Glider (Petauroides volans);*
  - *Grey Snake (Hemiaspis damelii);*
  - *Koala (Phascolarctos cinereus);*
  - *Painted Honeyeater (Grantiella picta);*
  - *Pale Imperial Hairstreak (Jalmenus eubulus);*
  - *Short-beaked Echidna (Tachyglossus aculeatus);*
  - *Slender Tylophora (Vincetoxicum forsteri);*
  - *Southern Whiteface (Aphelocephala leucopsis); and*
  - *White-throated Needletail (Hirundapus caudacutus).*

Potential Impacts

Potential impacts considered as part of the project include the following:

- *Clearing of native vegetation and habitat for threatened and migratory species and threatened ecological communities;*
- *Introduction and/or spread of weed species;*

- *Disturbance or displacement to fauna species from foraging or roosting habitat, or breeding places;*
- *Degradation of threatened species habitats or threatened ecological communities as a result of dust, erosion or accidental release of hazardous materials;*
- *Habitat fragmentation;*
- *Inhibiting the ability of ecological communities or species to adapt and survive predicted climate change effects (for example through impeding migration pathways or inhibiting access to refuge areas); and*
- *Fauna injury during construction activities and movement of machinery/vehicles.*

It is noted that KCB (2022) have determined that no impacts to Groundwater Dependent Ecosystems are likely as a result of the project.

Mitigation and Management Measures

The project aims to avoid disturbance to TECs, threatened species habitat and, to the greatest possible extent other remnant vegetation (which represents the majority of habitat for threatened and migratory fauna species). Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm on-ground biodiversity values will be undertaken by a suitably qualified person.

Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES and MSES threatened species, with the exception of Koala dispersal habitat (up to 137 ha) and Short-beaked Echidna habitat (up to 137 ha).

Further mitigation measures that will, or have already been implemented to mitigate impacts resulting from the project include:

- *Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-EN-PLN-001];*
- *Atlas Stage 3 Gas Project Significant Species Management Plan;*
- *Implementing the Senex Queensland Fauna and Stock Management Procedure (SENEX-CORP-EN-PRC-021);*
- *Weed and pest management measures through the implementation of the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023);*
- *Environmental Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-015];*
- *Rehabilitation Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-018];*
- *ATP 2059 Coal Seam Gas Water Management Plan [SENEX-ATLS-EN-PLN-013];*
- *Atlas Stage 3 Water Monitoring and Management Plan [SENEX-ATLS-EN-PLN-017];*
- *Delineation of 'no-go' areas clearly indicated for avoidance;*
- *Restricting access tracks to only low-level traffic with restricted speed;*
- *Erosion and sediment control measures;*
- *Dust management; and*
- *Appropriate storage and handling of fuel, oil and chemicals and appropriate spill response equipment.*

Significant Impact Assessment Outcomes

The significant impact assessments undertaken against the relevant guidelines listed above, assessed the potential impacts as well as the implemented mitigation and management measures, to determine whether or not the project would result in any significant residual impacts to likely or known MSES and MNES.

MNES Significant Impact Assessment Outcomes:

The follow details the significant impact assessment outcomes for MNES against the SIG 1.1. The outcomes for TECs in the Project Area are as follows:

- *Brigalow (*Acacia harpophylla *dominant and co-dominant) is present as 9 patches totalling 22.3 ha (1.2%) of the Project Area, all of which will be avoided by the project; and*
- *Poplar Box Grassy Woodland on Alluvial Plains is present as 4 patches totalling 20.7 ha (1.1%) of the Project Area, all of which will be avoided by the project.*

The follow details the significant impact assessment outcomes for listed threatened and/or migratory MNES that are assessed as known or likely to occur in the Project Area:

- *Dulacca Woodland Snail totalling 52.6 ha of habitat, or 2.6% of the Project Area, will be avoided through careful design of the project such that any direct disturbance to habitat for the species will not occur;*
- *Glossy Black-cockatoo (south-eastern subspecies) totalling 236.2 ha of habitat, or 12.8% of the Project Area, will be avoided through careful design of the project such that any direct disturbance to habitat for the species will not occur;*
- *Greater Glider totalling 174.5 ha of habitat, or 9.4% of the Project Area, will be avoided through careful design of the project such that any direct disturbance to habitat for the species will not occur; and*
- *Koala totalling 245.4 ha of foraging and breeding habitat within the Project Area (13.3% of the Project Area), will be avoided through careful design of the project such that any disturbance to foraging and breeding habitat for the species will not occur. A total of 1,602.5 ha of Koala dispersal habitat occurs within the Project Area and impact upon this habitat will be minimised through careful design of the project such that any direct disturbance to habitat for the species will not exceed 137 ha and the ability for Koalas to disperse across the landscape will not be impeded.*

It is noted that the White-throated Needletail was also concluded as known to occur within the Project Area, however it is likely only to be an aerial flyover visitor due to the lack of suitable roosting areas in the Project Area. Therefore, no habitat will be directly or indirectly impacted for this species. Further, the White-throated Needletail along with the Fork-tailed Swift were identified as listed migratory species known and likely to occur. As with the White-throated Needletail, the Fork-tailed Swift was concluded to be an aerial flyover visitor only and so both migratory species were concluded to not be at risk of a significant impact from the project.

MSES Significant Impact Assessment Outcomes:

Based on the assessment conducted in this EAR, there was concluded to be no Significant Residual Impact (SRI) to MSES, based on an assessment against the SRI Guidelines, for the following reasons;

- *Regulated Vegetation that is Category B – Regulated Vegetation that is Category B is present as four patches totalling 199.5 ha (<11%) of the Project Area, all of which will be avoided. Therefore, no SRI will result;*
- *Regulated Vegetation that is within the defined disturbance of a watercourse - all of which will be avoided. Therefore, no SRI will result;*

- *Protected wildlife habitat for listed fauna – for species known or likely to occur, there will be no SRI as Senex have committed to avoiding all areas of MSES threatened species habitats, with the exception of Koala dispersal habitat and Short-beaked Echidna habitat:*
  - *Dulacca Woodland Snail (52.6 ha habitat – 0 ha impacted);*
  - *Glossy Black-cockatoo (236.2 ha habitat – 0 ha impacted);*
  - *Greater Glider (174.5 ha habitat – 0 ha impacted);*
  - *Koala (245.4 ha preferred breeding and foraging habitat and 1,602.5 ha general dispersal habitat – 0 ha of total preferred foraging and breeding habitat and up to 137 ha or 8.5% of total general dispersal habitat will be disturbed);*
  - *Golden-tailed Gecko (Strophurus taenicauda) (308ha of habitat – 0 ha impacted);*
  - *Pale Imperial Hairstreak (Jalmenus eubulus) (48.1 ha habitat – 0 ha impacted);*
  - *Short-beaked Echidna (Tachyglossus aculeatus) (1,847.9 ha habitat - up to 137 ha or 7.4% of total habitat will be disturbed), however this species does not need to be considered for offsets or SRI as it is not a MSES being a special least concern species; and*
  - *White-throated Needletail (no habitat mapped as aerial flyover visitor only to the Project Area).*

  Impacts to the size of the population, extent of occurrence, connectivity, contribution to threats, interference with recovery and disruption to ecologically significant locations are considered when assessed against the relevant guidelines for a SRI to MSES species. Given the small scale of impacts, as well as the existing disturbance within the Project Area, it is unlikely that there will be an SRI to any of these species.

Environmentally Sensitive Areas (ESA)

There are no Category A ESA within the Project Area. Category B ESA within the Project Area are ground-truthed endangered RE (Biodiversity Status), which consists of patches of the following REs: 11.3.17, 11.9.5 and 11.9.10. Category C ESA within the Project Area include ground-truthed essential habitat for EVNT species listed under the NC Act (Stevens, 2023), ground-truthed remnant and regrowth vegetation within government mapped areas of 'essential habitat' or 'essential regrowth habitat', and Of Concern RE (Biodiversity Status), which comprises the following REs: 11.3.2, 11.3.4, 11.3.25, 11.3.27f and 11.9.7. It is noted that there will be no clearing within any ESA as a result of the project.

Concluding Remark

As the vast majority of the Project Area is cleared, the project will generally be able to avoid direct impacts to MNES and MSES species and naturally vegetated habitat areas. Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES and MSES threatened species, with the exception of Koala dispersal habitat and Short-beaked Echidna. The project's mitigation measures, including Senex's Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-EN-PLN-001] will be used to guide infrastructure siting, minimise direct and indirect disturbances and ensure the project's total direct disturbance footprint is limited to 0 ha impact to MNES and MSES habitats that are not already cleared.

As detailed in the MNES and MSES impact assessments provided in Appendix E and Appendix F respectively, the project has been assessed against the relevant Commonwealth and State guidelines and it has been determined that, with the implementation of the proposed controls and mitigation measures, the project is unlikely to result in any significant direct or indirect impacts to any MNES or MSES.

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by Senex Energy Pty Ltd (Senex) to describe the terrestrial and aquatic ecological values to support the development of approvals documentation for the Atlas Stage 3 Gas Project in the Surat Basin in southern-central Queensland.

Senex Energy Pty Ltd (Senex), on behalf of its subsidiaries Senex Assets Pty Ltd and Senex Assets 2 Pty Ltd, proposes to develop, operate, decommission and rehabilitate new coal seam gas wells and associated infrastructure on petroleum lease Authority to Prospect (ATP) 2059, in the central part of the Surat Basin, Queensland. The project is located approximately 14 km southwest of the township of Wandoan in Southern Queensland (Figure 1-1). The gas field will be progressively developed over a period of approximately 5–10 years.

Senex holds an Environmental Authority (EA) EA0002524 to prospect on ATP 2059. An application to convert ATP 2059 from an ATP to a PL under the Queensland *Petroleum and Gas (Production and Safety) Act 2004* (State of Queensland 2020d) is underway. Senex proposes to apply for an EA amendment to authorise CSG production activities associated with the project.

The project is located adjacent to Senex's Project Atlas (PL 1037). Where practicable, and to the extent authorised by current and future approvals, the infrastructure required for ATP 2059 may integrate with existing and future infrastructure within PL 1037. Senex also plan to develop gas wells to the east of ATP 2059 within PL 445 and PL 209. Where practicable, and to the extent authorised by current and future approvals, the infrastructure required for ATP 2059 may integrate with future infrastructure within PL 445 and PL 209. This EAR details ecological values relevant to the ATP 2059 tenement only.

The term 'Project Area' used hereafter refers to the boundaries of the ATP tenement over which the project will occur. The area where impacts will occur within the Project Area, will be referred to as the 'disturbance footprint'.

Ecology field surveys and assessments of ecological values were conducted by subcontractors, with BOOBOOK Ecological Consulting Pty Ltd ('BOOBOOK') completing the terrestrial component and Freshwater Ecology Consulting Pty Ltd ('Freshwater Ecology') conducting the aquatic (BOOBOOK, 2022; Freshwater Ecology, 2022).

This Ecological Assessment Report (EAR) details ecological values within the ATP 2059 tenement and has been developed in conjunction with an EAR prepared for the wider Atas Stage 3 Gas Project, which details ecological values over the PL209, PL445 and ATP 2059 tenements.

1.1 Project Area Context

The Project Area is approximately 1,847.9 ha and is located approximately 10 km southwest of Wandoan and is bisected north to south by Jackson – Wandoan Road, and east to west by Weldons Road, these roads also serve as access within the Project Area. The Project Area is within the boundary of Western Downs Regional Council, southern inland Queensland.

The Project Area is located within the Brigalow Belt Bioregion and the Taroom Downs Subregion. The Project Area and context is presented on Figure 1-1.

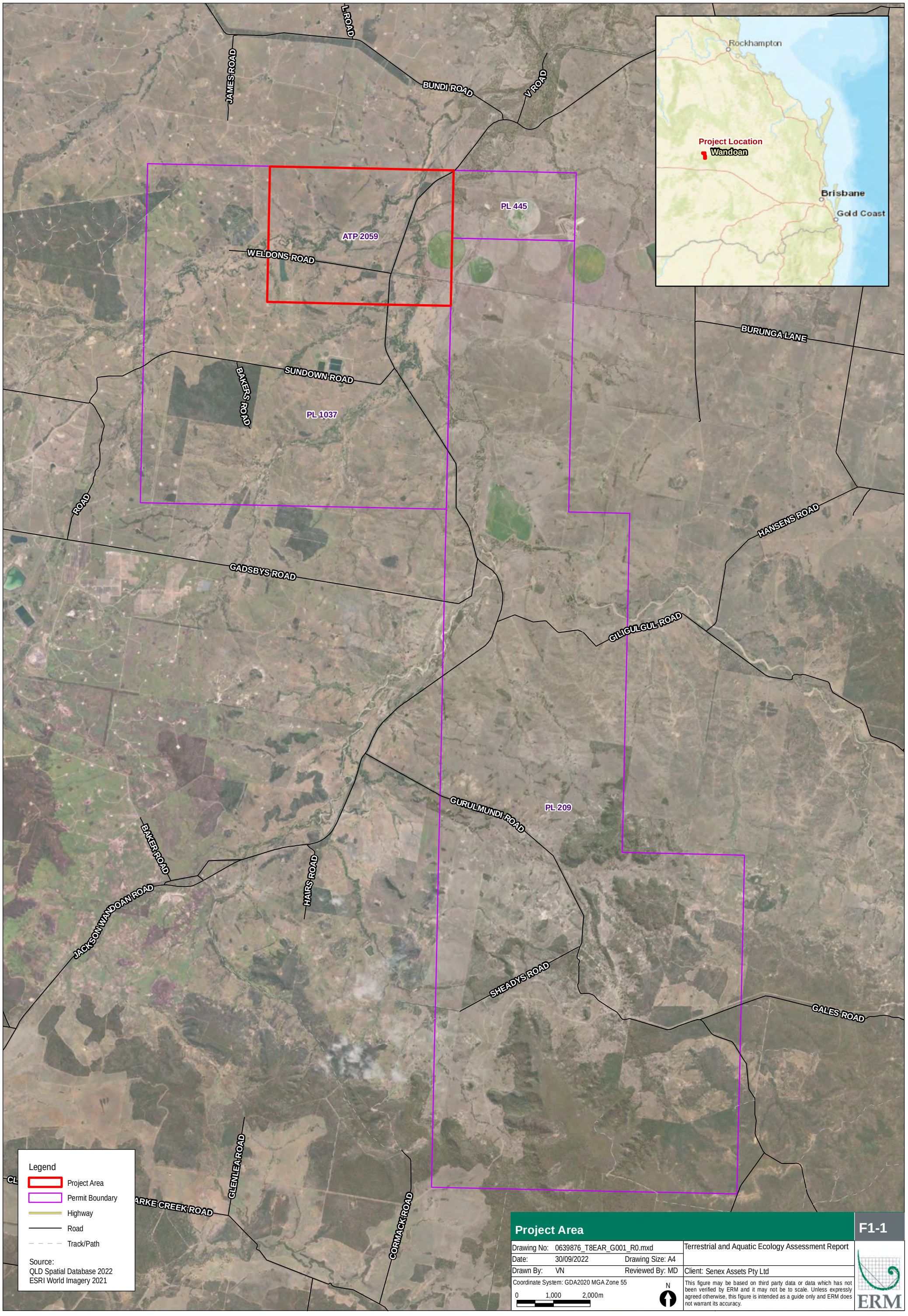
1.2 Purpose of the Ecological Assessment Report

The purpose of this ATP 2059 EAR is to document the assessment of the terrestrial and aquatic ecological values within the Project Area, and in turn identify risks to biodiversity values and avoidance, mitigation and management measures, to support the development of the design, construction and operation of the project and the approval applications required under Queensland State legislation and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.3 Objectives

The scope of the ATP 2059 EAR includes the assessment of terrestrial and aquatic species and habitats associated with the Project Area, with particular focus on the following:

- Identify the potential presence of listed threatened species and their associated habitat in the Project Area, based on desktop and field collected information;
- Describe and map ecologically significant flora and fauna habitats, including Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES), based on desktop and field collected information;
- Evaluate the ecological significance (values and constraints) of the Project Area;
- Assess the potential impacts of the project on the ecological values in the Project Area, including specific species that may be at risk from the project; and
- Provide recommendations for avoidance, mitigation, and management of potential impacts to maintain the ecological values in the Project Area.


L ROAD
JAMES ROAD
BUNDI ROAD
V ROAD
Rockhampton
Project Location
Wandoan
Brisbane
Gold Coast
PL 445
ATP 2059
WELDONS ROAD
BURUNGA LANE
BAKERS ROAD
SUNDOWN ROAD
PL 1037
ROAD
GADSBYS ROAD
HANSENS ROAD
GILIGULGUL ROAD
GURULMUNDI ROAD
PL 209
BAKER ROAD
HAIRS ROAD
JACKSON WANDOAN ROAD
SHEADYS ROAD
GALES ROAD
GLENLEA ROAD
CORMACK ROAD
ARKE CREEK ROAD
Legend
Project Area
Permit Boundary
Highway
Road
Track/Path
Source:
QLD Spatial Database 2022
ESRI World Imagery 2021
Project Area
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Terrestrial and Aquatic Ecology Assessment Report
Date: 30/09/2022
Drawing Size: A4
Drawn By: VN
Reviewed By: MD
Client: Senex Assets Pty Ltd
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1.4 Project Description

The project will involve the installation of up to 31 gas wells and associated well site facilities; gas and water gathering systems for the production wells; access tracks for operational purposes; borrow pits; and ancillary supporting facilities. The production wells will be drilled and constructed in accordance with the 'Code of Practice for the construction and abandonment of petroleum wells, and associated bores in Queensland Version 1' (State of Queensland, 2019).

The gas field will be progressively developed over a period of approximately 5 – 10 years.

1.4.1 Production Wells

Proposed wells will generally be spaced 500 – 750 m apart and will be designed, constructed, decommissioned and rehabilitated in accordance with the Queensland Code of Practice for constructing and abandonment of petroleum wells and associated bores in Queensland (Department of Natural Resources, Mines and Energy [DNRME] (Version 2), 16 December 2019). The code outlines mandatory requirements and good practice to achieve long term well integrity and appropriately reduce the risk of environmental harm.

Well sites will generally be constructed in an area of approximately 80 m x 70 m allowing the initial drilling and completion of the well (installing surface facilities). The layout and size of well sites will vary depending on the size and type of drilling rig, the program for completion of the well and the surrounding environment. Typically, 0.6 ha is required although smaller areas may be utilised where topography and vegetation cover allow. In some cases, additional area is required to accommodate cut and fill construction on steeper slopes or site-specific infrastructure (e.g., water tanks). In these cases, well sites may be up to approximately 1 ha.

Well construction will involve a drill rig and other equipment such as drill fluid pumps, storage and processing and storage for water supply, fuel and chemicals. Following initial drilling and commissioning of the well, sites will be partially rehabilitated, leaving an area of approximately 60 m x 60 m allowing an adequate area for workover rig operations.

Options for the management of residual drilling material to be used for the Project include onsite and offsite options. Where onsite management options are proposed, this will be undertaken in accordance with state approvals which require for the assessment of quality, potential impacts and implementation of management measures.

Following the well drilling phase, the wells will be completed, and a pump installed to dewater the production reservoir. Separate connections will be provided at the well head for the gas and water streams. It is expected that produced water will be pumped to the surface by a downhole progressive cavity pump and connected from the wellhead tubing.

The standard well site facility will be fenced and generally consist of:

- A wellhead gas and water metering package;
- Gas and water separation equipment;
- Initially, natural gas power generation package to provide power for the electric motor driving the downhole pump (noting that it is possible that in future years wells may be powered by alternative sources including solar, hybrid and distributed power);
- Fuel and instrument gas scrubber to power the generator and supply gas to instruments;
- Sand/particulate filter separator for water and gas streams; and
- Surface pressure piping constructed of steel to the required specification and connection to gathering system.

It will generally take up to 6 months to dewater each production well sufficiently for gas to flow; and approximately 18 months to reach peak production. Once depleted of gas, wells will be progressively decommissioned and rehabilitated throughout the Project life. Decommissioning of individual wells is not expected to occur until after the well has been producing for at least 15 years and may be much longer (anticipated to be between 20 and 35 years). The targeted maximum production rate is estimated to be between 300 – 950 Mscf/d per well per day.

In total the disturbance footprint required during construction of the 31 wells will be approximately 20 ha and after construction will occupy up to approximately 13 ha. All of the areas to be utilised have been previously cleared. At the completion of the project all well pads will be rehabilitated to the condition of the adjoining land.

An example of the project infrastructure is provided in Photograph 1-1 to Photograph 1-3 .

Photograph 1-1: Right of Way at pipe installation stage showing temporary disturbance.

Photograph 1-2: Intersection of Two Right of Ways post construction showing no impedance of fauna dispersal.

Photograph 1-3: Typical Coal Seam Gas Well Infrastructure showing small footprint and no barrier to fauna dispersal.

1.4.2 Gathering System

Gas and water from the wellsite facilities will be transported via the gas and water gathering system. The buried gathering system will enable gas at low pressure and water to flow through separate buried High-Density Polyethylene (HDPE) pipelines, up to 650 mm diameter.

To install the gathering lines, 18 m wide right-of-way will require some vegetation to be removed, a trench to be excavated, pipeline laid, the trench backfilled, and right-of-way reinstated (a 24m wide right of way will be required during construction for approximately 5km of major trunk lines). A track will be maintained along the right-of-way for operations. Where possible, the pipeline right-of-way will be aligned with existing roads/tracks, fence or power lines or other linear infrastructure to minimise disturbance to native vegetation and overall impact on land users. In general, the right-of-way will be rehabilitated except for a 6 m wide access track.

The gas gathering system will typically operate at 70 – 400 kPag (with a Maximum Allowable Operating Pressure of 615 kPag). The water gathering system will typically operate at 140 – 700 kPag (with a maximum operating pressure of approximately 1350 kPag).

Water will be transported to water processing facilities and gas to gas processing facilities through the gathering system.

In total the disturbance footprint required during construction of gathering system (including temporary additional construction areas for drainage feature crossings, road crossings, inter-property tie-ins, HDD crossings) will total approximately 50 ha and after post-construction rehabilitation will occupy approximately 20 ha. Almost all of the areas used have been previously cleared. At the completion of the project, any areas not required to remain as access tracks for the use of the landholder will be rehabilitated to the condition of the adjoining land.

1.4.3 Water Management

Groundwater will be abstracted (pumped) from CSG production wells to depressurise the target production of coal seams.

The water management process for the produced water is expected to involve:

- In order to minimise impacts and improve operational efficiency, some of the water from the gathering system will be transferred to centrally located aggregation dams that are already established on Senex Assets Pty Ltd's 'Project Atlas' within PL 1037;
- The existing Project Atlas water treatment facility on PL1037 has ample capacity to treat water from the Project and processes with >80% recovery;
- Treated water will be transferred to third party irrigation dam(s) (approximately 50-200 ML each) on PL1037 and/or PL209. The water will be treated to comply with the standard water quality parameters as specified in (6.1) of ENEW07546918 End of Waste Code – Irrigation of Associated Water (including coal seam gas water). After treatment the water will predominantly be used for irrigation, however other uses such as stock water, hydrogen fuel production or other beneficial uses may also be pursued as a means of using water beneficially;
- There may also be a requirement to develop water transmission pipelines to distribute beneficial use water. It is expected that a number of water transmission pipelines may be fully contained within the Project Area and allowance for these are included in this referral (within the gathering system footprint); and

- Brine from the water treatment process will be stored in a new brine storage dam (up to 300 ML) which will be developed on PL1037 and subject to a separate EA (noting that the expansion of the existing 100ML of 'Project Atlas' brine storage will also be supplemented by up to 200ML of bring storage as part of that existing project). Further works are proposed to ascertain the viability of further processing brine waste produced by reverse osmosis treatment with the objective of allowing more of the produced water to be recovered as treated water and reducing brine volumes. Further treatment options together with concentration due to solar evaporation will result in a concentrated slurry or solid salt product. Where appropriate, salt or salt slurry will be trucked from site and disposed of at a Regulated Waste Facility.

In total, up to approximately 30 ha of Atlas Stage 3 brine storage and up to approximately 30 ha water storage will be established as a result of the project. This infrastructure will be located within previously cleared land. This additional water management infrastructure is planned to be constructed on PL 1037 and will be subject to separate approval application.

Where practicable, produced water will be utilised for beneficial reuse in accordance with the relevant Environmental Authorities or Queensland End of Waste Code requirements. Produced water will also be used for drilling and other project activities. Minor quantities of produced water may be beneficially reused in the proposed action area for dust suppression and construction activities in accordance with the Environmental Management Plan Atlas Stage 3 Gas Project [SENEX-ATLAS-EN-PLN-015].

1.4.4 Temporary Accommodation Facilities

It is expected that a number of temporary accommodation facilities will be required for construction and drilling activities. These facilities would be assembled onsite using prefabricated modular units with basic amenities such as modular sewage treatment plants and water tanks. It is expected that the temporary accommodation facilities would occupy up to approximately 5 ha of previously cleared land.

1.4.5 Other Ancillary Facilities and Incidental Petroleum Activities

It is expected that the following additional facilities and activities will be required to support construction and operations:

- Laydown, stockpile and site office areas (up to approximately 15 ha of previously cleared land);
- Borrow pits (up to approximately 2 ha of previously cleared land);
- Other ancillary facilities and infrastructure with a maximum footprint of approximately 15 ha of previously cleared land, including:
  - Power/communication lines (overhead or underground);
  - Plant and equipment service and maintenance facilities and workshops;
  - Construction support, warehousing and administration buildings;
  - Fuel and chemical storage;
  - Washdown facilities;
  - Ancillary infrastructure such as communications infrastructure, water supply and holding tanks and dams and energy supply;
  - Groundwater monitoring bores;
  - Environmental monitoring equipment and management controls; and
  - Ecological, topographic, cadastral, geological, geophysical and geotechnical surveys.

1.4.6 Pre-construction/Pre-clearing activities

Senex have developed the Queensland Environmental Protocol for Field Development and Constraints Analysis to guide site selection to ensure impacts upon environmental values are avoided and minimised.

The protocol includes the following steps:

- Desktop environmental constraints analysis;
- Site surveys including environmental and cultural heritage clearance surveys (where required, additional species-specific targeted field-based surveys are undertaken) – findings are documented within a standardised Biodiversity Values Report;
- Post-survey environmental constraints analysis (which includes location refinements to further avoid and minimise impacts to field validated values, identification of no-access areas, identify site specific mitigation measures and controls); and
- Environmental constraints reporting (confirming siting complies with relevant approvals including disturbance limits and secondary approvals, quantifying any unavoidable impacts and identifying required mitigation measures).

1.4.7 Clearing and Civils

The Project Area is within an established gas-producing region. The majority of the area has been subject to extensive disturbance with approximately 83.3% being cleared of remnant native vegetation. Of the maximum ground disturbance area of up to 60.3 ha for the entire action, Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES and MSES threatened species, with the exception of Koala dispersal habitat and Short-beaked Echidna habitat. The maximum MNES and MSES disturbance limits for the project are provided in Section 7 of this ATP 2059 EAR.

Before the drill rig is mobilised to site, the drill site and access tracks are prepared through:

- Timbered areas are avoidable in nearly all cases; however, where woody vegetation is present it will be cleared within the well lease and access tracks and stored at the edge of the lease for later use in rehabilitation. Recoverable timber hollows, larger rocks and other features will be stored for later microhabitat rehabilitation. Grasses and other groundcovers will then be graded from the well pad footprint; and
- Topsoil is removed using earthmoving equipment. This is stockpiled to one side of the lease and/or access track for later use in rehabilitation. Final earthmoving equipment preparations, such as site levelling are then completed.

All clearing and civils work will be undertaken in accordance with following management plans:

- Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [OPS-ATLS-EN-PLN-001];
- Atlas Stage 3 Gas Project Significant Species Management Plan;
- Implementing the Senex Queensland Fauna and Stock Management Procedure (SENEX-CORP-EN-PRC-021);
- Weed and pest management measures through the implementation of the Senex Biosecurity Management Plan Queensland Operations [SENEX-QLDS-EN-PLN-001] and Senex Queensland Weed Hygiene Procedure [SENEX-QLD-EN-PRC-023];
- Environmental Management Plan Atlas Stage 3 Gas Project [SENEX-ATLAS-EN-PLN-015];
- Rehabilitation Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-018];
- ATP 2059 Coal Seam Gas Water Management Plan [SENEX-ATLS-EN-PLN-013]; and
- Atlas Stage 3 Water Monitoring and Management Plan [SENEX-ATLS-EN-PLN-017].

1.5 Ongoing Maintenance/Operations

The gas field will be progressively developed over a period of between approximately 5 – 10 years. Once all wells are producing activities will scale back to maintenance and operation of the existing infrastructure.

This will include visual inspection and maintenance of well, gathering and wate infrastructure equipment. All wells will also be monitored remotely with field staff responding through well visits as changes to normal operations are detected.

The well bore itself will generally be serviced by a workover rig approximately every three years, although some wells are expected to require more frequent servicing depending on performance.

The gathering system and access tracks will also be regularly monitored by field staff as they undertake well inspections and maintenance works (e.g., re-grading) completed where required.

Rehabilitated areas will also be regularly monitored and, where necessary maintained, in accordance with the Project Atlas Rehabilitation Management Plan and the requirements of the *Environmental Protection Act 1994* (QLD).

All maintenance and operational work will be undertaken in accordance with following management plans:

- Environmental Management Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-015];
- Rehabilitation Plan Project Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-018];
- Atlas Stage 3 Gas Project Significant Species Management Plan;
- ATP 2059 Coal Seam Gas Water Management Plan [SENEX-ATLS-EN-PLN-013]; and
- Atlas Stage 3 Water Monitoring and Management Plan [SENEX-ATLS-EN-PLN-017].

1.5.1 Decommissioning and Remediation

For the entire action, surface infrastructure and temporary construction footprints will occupy no more than 3.3% of the Project Area. Rehabilitation of some initial construction disturbances will commence early in the action and continue progressively so that a much smaller proportion will be occupied at any point in time. In almost all cases, surface infrastructure and temporary construction footprints will be located in previously cleared and disturbed areas.

Once operations have ceased, infrastructure will be decommissioned unless retention and transfer of ownership of assets is agreed with the landholder. Disturbed areas will be rehabilitated in accordance with the Rehabilitation Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-018] and the requirements of the *Environmental Protection Act 1994* (QLD). Rehabilitation will be undertaken progressively as disturbed land is no longer required for operational purposes in accordance with the relevant Environmental Authorities. This will include reprofiling disturbed land to original contours, re-establishment of surface drainage lines, re-establishment of groundcover vegetation and ensuring the rehabilitated land is safe and stable. Where the landholder and regulatory authority agree in writing, infrastructure such as access tracks and dams may be retained onsite for landholder reuse.

2. LEGISLATIVE AND POLICY CONTEXT

This ATP 2059 EAR has been undertaken with consideration of Commonwealth, State and Local regulatory frameworks and associated legislation. Table 2-1 summarises the relevant legislation and policies to this ATP 2059 EAR.

Table 2-1: Key Legislation and Policies

Act/Policy	Administering Authority	Purpose
Commonwealth Legislation		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Department of Climate Change, Energy, Environment and Water (DCCEEW)	This Act administers the protection of the environment within Australia – in particular MNES, which include: ■ World heritage properties; ■ National heritage properties; ■ Wetlands of international importance; ■ Threatened species and ecological communities; ■ Migratory species; ■ Commonwealth marine areas; ■ The Great Barrier Reef Marine Park; ■ Nuclear Actions (include. uranium mines); and ■ Water Resources.
EPBC Act Environmental Offsets Policy 2012	DCCEEW	This Policy applies where a significant residual impact on an MNES is expected to occur as a result of the proposed development. The policy provides guidance on the role of offsets and when a proposed offset is considered suitable.
State Legislation		
Environmental Protection Act 1994	Department of Environment and Science (DES)	Environmental Authority applications for petroleum activities are assessed under this Act, which considers the impact of proposed projects to environmental values, including biodiversity values. Environmentally Sensitive Areas (ESA) are listed under the subordinate Environmental Protection Regulation 2008. ESAs include three categories i.e. A, B and C, reflecting the hierarchy of their importance to nature conservation. The EA Application Requirements for Petroleum Activities (Department of Environment and Heritage Protection [DEHP], 2013) provide for protection zones around these ESAs i.e.: ■ Primary Protection Zone – an area within 200 m of the boundary of a Category A, B or C ESA; and ■ Secondary Protection Zone – an area within 100 m of the boundary of a Category A or B ESA. The assessment in this EAR identifies the biodiversity values and assesses the impact of the project on those values.
Nature Conservation Act 1992 (NC Act)	DES	The Act and Regulations provides a framework for the creation and management of protected areas and protection of native species. It includes designation of threatened species status and provides for protected plant trigger areas and protection of animal breeding places.
Vegetation Management Act 1999 (VM Act)	Department of Resources (DoR)	The VM Act is the regulatory framework for the management of vegetation using the Regional Ecosystem (RE) classification system. It regulates the broad scale clearing of vegetation, with the intent of conserving remnant vegetation, preventing the loss of biodiversity, maintaining ecological processes and allowing for sustainable use. There are clearing exemptions for some work activities.

Act/Policy	Administering Authority	Purpose
Biosecurity Act 2014 (and Regulation)	Department of Agriculture and Fisheries (DAF)	This Act provides for the management of biosecurity risks in Queensland. The Act provides measures to safeguard Queensland economy, environment, agricultural and tourism industries and way of life from pests, diseases and contaminants. Restricted matters are assigned a category (or categories) from 1 to 7, with each category placing restrictions on the dealings with the matter.
Environmental Offsets Framework (Environmental Offsets Act 2014 and Regulation, Environmental Offsets Policy Version 1.7)	DES	An environmental offset condition may be imposed under various State assessment frameworks for an activity that will or is likely to have a significant residual impact on a prescribed environmental matter that is a MSES. There is a guideline to assist in determining whether or not a significant residual impact is likely.
Fisheries Act 1994 (Fisheries Act)	DAF	The Fisheries Act provides the principal legislative framework for the regulation around fishing activities and areas that are fish habitat within a given area. This outlines how activities are to be conducted given the importance of the habitat for fish. All waters are protected against degradation by direct or indirect impacts associated with development activities. Measures designed to protect fisheries resources include the declaration of fish habitat areas, protection of marine plants and designation of waterways for fish passage.
Water Act 2000 (Water Act)	DoR	The Water Act provides the framework for the planning and sustainable use and management of groundwater and surface water in Queensland. It also sets up conditions and controls the activities that may impact upon water resources and quality. The Department of Resources Watercourse Identification Map identifies watercourses and drainage features mapped under the Water Act.

3. Assessment Methodology

3.1 Overview

This Section outlines the methodology implemented to collect data to describe the ecological values in the Project Area, inform avoidance measures, and assess likely impacts so that appropriate management and mitigation measures can be proposed. The assessment consisted of a desktop review to identify values that may be present, and which then helped to guide the development and implementation of a field survey and sampling program to describe on-ground conditions and to assess the known, likely and potential occurrence of ecological values within the Project Area.

This ATP 2059 EAR has used information gathered from the following sources:

- BOOBOOK Ecological Consulting Terrestrial Ecology Report (refer to Appendix C); and
- Freshwater Ecology Aquatic Ecology Report (refer to Appendix D).

3.2 Desktop Review

A number of desktop sources were reviewed to identify ecological values that may occur within the Project Area (as per Table 3-1). A search area of the broader Senex Project Area and a 10 km buffer was used for the database searches. The Protected Matters Search Tool (PMST) and Wildlife Online (WO) results were cross-checked using Atlas of Living Australia (ALA) database locations of records in the context of the actual Project Area boundary. These database sources were used and refined where appropriate to suit the smaller ATP2059 Project Area.

This desktop review adheres to the requirements of the EPBC Act to undertake a desktop review of available information to identify species, that may be impacted by the project. This desktop review, through the likelihood of occurrence analysis detailed in Section 3.4, and located in Appendix B provides information on species known, likely or with the potential to occur within the Project Area, based on species records, the availability of suitable habitat, breeding, roosting, denning and foraging sites for fauna, wetlands for waterbirds, and habitat for flora.

The PMST has been checked weekly to account for any potential changes in likely or known species distributions, and any listing events under the EPBC Act that will result in consideration of any new conservation advices in relation to listing events.

Additional searches of species records (ALA, 2022; DES, 2022a) were made of well surveyed areas (Gurulmundi SF, Cherwondah SF) within the Western Downs Regional Council area and, separately, of records within Southern and Central Queensland of each threatened species considered as potentially occurring within the Project Area. These datasets provided a baseline for subsequent the field assessment.

Table 3-1: Databases Reviewed for Desktop Analysis

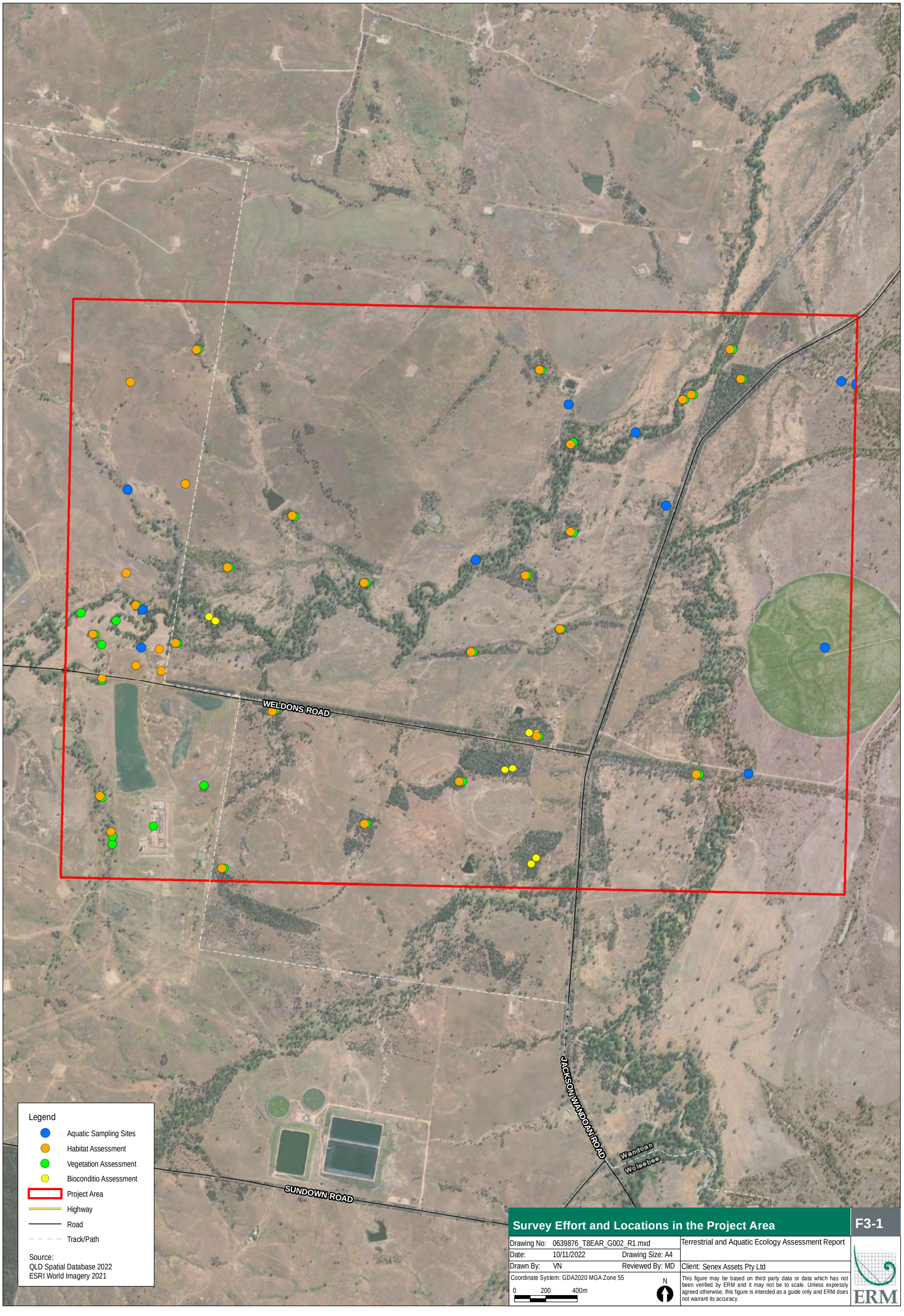
Information Source	Name	Data Description
DCCEEW	Protected Matters Search Tool (PMST) First accessed 21 July 2023	The search tool provides predictive results of MNES based on mapping of known and potential species distribution, habitat, ecological communities and wetlands. The outputs are based on modelling results and do not necessarily reflect known records of species or communities. The features highlighted by the search are considered further through a likelihood of occurrence assessment (see 0). The PMST results can be found in Appendix A. Search area: 10 km buffer around the Project Area.
DoR	Regional Ecosystem (RE) Version 12.2 mapping	This product maps remnant vegetation communities across Queensland and identifies communities listed as endangered, of concern or least concern status.

Information Source	Name	Data Description
DoR	Property Maps of Assessable Vegetation (PMAV) mapping (published 16 September 2021)	This product provides certified property scale maps indicating where landholders can clear regrowth in 'Category X' areas without further approval and areas where approval is required for clearing regulated vegetation. The PMAV provides a property scale regulated vegetation map which replaces the statewide regulated vegetation map published by DoR.
Queensland Government	MSES mapping	This product maps areas of MSES as defined under the QLD State Planning Policy.
DoR	Queensland Globe	A Google Earth based product that allows viewing of spatial data and imagery covering Queensland.
DES	WO	A database that contains records of wildlife sightings including threatened flora and fauna species (protected under the NC Act) that have been provided to the agency by Government departments and external organisations. The WO results can be found with the PMST results, in Appendix A.
ala.org.au	ALA	Australia national biodiversity database (supported by the National Collaborative Research Infrastructure Strategy, CSIRO). Database contains records accessed through an interactive spatial portal. Threatened species are searched to identify known records in proximity to the Project Area.
Darling Downs Regional Council	Darling Downs Regional Plan 2013	The *Darling Downs Regional Plan 2013* provides information relating to biodiversity, and wetland and waterway corridors.
DCCEEW	Species Profile and Threats Database (SPRAT)	The SPRAT profiles and associated conservation advice documents were consulted for the following reasons: They provide detailed information for the Likelihood of occurrence assessment on: ■ Species distribution; and ■ Habitat information including species-specific requirements. The conservation advice documents are particularly important for assessing Threatened Ecological Communities (TECs) found in field surveys, against the listed TEC guidelines.
BOOBOOK	Previous Ecological Surveys	Previous ecological surveys in the Senex Atlas gas field were also considered as part of the analysis for the Project Area (BOOBOOK, 2014, 2020, 2021a, 2021b, 2022; ERM, 2018).

3.3 Field Surveys

BOOBOOK Ecological Consulting undertook terrestrial field ecological surveys via targeted vehicle based and foot traverses of the Project Area, over the periods of 14 – 18th March 2022, 22 – 25th March 2022 and 9 – 13th June 2022. Aquatic field ecological surveys were undertaken by Freshwater Ecology over an eight-day period (14 – 21st March 2022). The results from both the terrestrial and aquatic surveys have been incorporated into this ATP 2059 EAR. The locations of surveys undertaken over the survey periods are shown in Figure 3-1.

It is acknowledged that field surveys undertaken prior to listing events and/or SPRAT likely or known species distribution changes may not have necessarily been accounted for, or targeted species that were not listed or considered likely to be present. Nonetheless, general survey methodologies were designed to detect any MNES/MSES animals or plants present within the survey areas.



Survey Effort and Locations in the Project Area

F3-1

Drawing No:	0639876_T8EAR_G002_R1.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

ERM

3.3.1 Personnel

Terrestrial field ecological surveys were conducted by suitably qualified BOOBOOK personnel Michael Cunningham (Senior Ecologist), Courtney Andrew (Graduate Ecologist) and Rosamund Aisthorpe (Botanist). All aspects of the project including field survey and reporting were conducted under the supervision of Craig Eddie (Principal Ecologist). Aquatic field ecological surveys were conducted by suitably qualified Freshwater Ecology personnel, led by Dr Timothy Howell (CVs for all personnel are included as part of Appendix G).

3.3.2 Terrestrial Ecology Field Survey Methodology

3.3.2.1 Vegetation Assessments

Baseline botanical surveys were undertaken to describe dominant flora and vegetation community structure within the Project Area. Ground-truthing of the RE vegetation communities (DES, 2022g) within the Project Area was undertaken using the quaternary level of data collection as described by Neldner *et al.* (2022).

Vegetation community assessments were undertaken within 50 m x 20 m plots (0.1 ha) within representative locations within the Project Area. Vegetation community polygons were verified in accordance with Queensland RE description and Biodiversity Status as per the latest updates of the Regional Ecosystem Description Database (REDD) (DES, 2021) and TEC criteria (DAWE, 2022b; Threatened Species Scientific Committee [TSSC], 2013; 2019) (BOOBOOK, 2022). The locations of vegetation and habitat survey sites are displayed in Figure 3-1, which is also included in Appendix A of BOOBOOK (2022b), attached to this ATP 2059 EAR as Appendix C.

RE polygons were assigned to remnant or non-remnant status as defined by the *Vegetation Management Act 1999* (VM Act) (Queensland Herbarium, 2021).

Remnant vegetation is considered to have a canopy cover of over 50% and a height over 70% of the benchmark criteria of minimally disturbed vegetation of a given RE.

Areas mapped as TEC follows the specified minimum size criteria for each listed vegetation community (TSSC 2013, 2019); for the Brigalow TEC the minimum size is 0.5 ha and for the Poplar Box TEC the minimum size is 5 ha (or 1 ha if in the highest quality condition, as defined by the EPBC Act Conservation Advice). The patch size used in the assessment against the minimum size criteria included all areas where a patch extended beyond the boundary of the Project Area. No minimum size has been specified for SEVT (McDonald, 2010) however for this ATP 2059 EAR, no patches of this TEC were in the Project Area.

Ground-truthed areas of advanced regrowth vegetation were assigned to the floristically equivalent RE for assessment of potential ESA status.

3.3.2.2 BioCondition Assessment

BioCondition assessments were used to evaluate ecological functionality of vegetation in the Project Area. These assessments applied the methodologies described by Eyre et al. (2015). This involved the following:

- Establishment of a 100 m x 50 m plot for measurements relating to canopy layer structure and diversity;
- 100 m transect to measure canopy cover;
- 50 m x 10 m subplot for measuring plant richness in shrub and ground layers;
- 50 m x 20 m subplot for measuring coarse woody debris; and
- Five 1 x 1 m quadrats to estimate ecological components of ground cover within the assessment area.

These values were used as indicators of ecosystem function relative to minimally disturbed benchmark sites (Queensland Herbarium, 2021). Four BioCondition assessments were undertaken to determine ecological condition of the major vegetation types in the Project Area. These BioCondition assessments were made within remnant and regrowth of each vegetation type present within the Project Area:

- BioCondition assessments involved the collection of the following information;
- General habitat description and RE type;
- Median height for canopy, emergent and sub-canopy strata;
- Slope position/slope degree and slope aspect;
- Tree species richness (within 100 m x 50 m plot);
- Native plant species richness (within 50 m x 10 m plot);
- Non-native plant cover (within 50 m x 10 m plot);
- Total length of coarse woody debris (length >10 cm diameter and >0.5 m long within 50 m x 20 m plot);
- Number and average diameter at breast height (DBH) of large Eucalypt and non-eucalypt trees (within 100 m x 50 m plot);
- Recruitment of canopy species (within the 100 m x 50 m plot);
- Tree and shrub canopy cover (within 100 m transect);
- Ground cover within 1 m x 1 m plots (native perennial grass and organic litter cover in the ground layer); and
- Disturbances (severity, last event and observation type) (BOOBOOK, 2022).

Number of large trees - large tree diameter at breast height (DBH) thresholds were used according to RE benchmarks, where benchmarks were not available >30 cm DBH for eucalypts and >20cm DBH for non-eucalypt trees were used as the qualifying criteria.

BioCondition scores were calculated by comparing in situ values from each survey site, with the corresponding Regional Ecosystem benchmark (Queensland Herbarium, 2021). Sub-scores were calculated for each site, scores close to 0 indicate sites that are ecologically ‘dysfunctional’ and scores closer to 1 indicate increasing functional integrity. BioCondition surveys and score calculations were done in accordance with Eyre *et al*. (2015).

3.3.2.3 Flora Species Survey

Targeted threatened species searches were undertaken for listed EPBC Act and NC Act threatened flora within the Project Area.

Where found, the species, location and number of individuals were recorded. Many areas of vegetation beyond identified focus survey points were not visited but were mapped from viewpoints and imagery and assigned an appropriate level of confidence.

Significant weed species, Weeds of National Significance (WoNS) and *Biosecurity Act 2014* Restricted Matters, were also recorded as part of the assessment (BOOBOOK, 2022b).

3.3.2.4 Fauna Species Survey

Targeted threatened species searches were undertaken for listed EPBC Act and NC Act threatened and/or migratory fauna within the Project Area. This involved both incidental and targeted searches in accordance with species specific survey guidelines. Incidental searches consisted of opportunistic active searches in suitable habitat while traversing the Project Area (BOOBOOK, 2022b). Targeted fauna survey techniques included timed active searches, recordings of bat calls using Anabat recorders at two locations and spotlighting for arboreal mammals. Targeted species surveys involved the following:

- Anabat echolocation bat call detection was undertaken in two locations over two nights (eight trap nights), in the Project Area, with one site in a wetland area to the north of Weldon's Road and another in the south-west corner of the Project Area near Wandoan Creek (BOOBOOK, 2022d).

Spotlighting surveys were made in two sites, was conducted in riparian woodland along Wandoan Creek and in similar vegetation along Woleebee Creek, within the Project Area. Each spotlighting consisted of a two-hour, approximately 2 km meandering transect through habitat suitable for arboreal mammals and covering all vegetation strata along the route (BOOBOOK, 2022dBOOBOOK, 2022b).

3.3.2.5 Fauna Habitat Assessment

Data were collected for fauna habitat features to inform the likelihood of occurrence and significant impact assessments for EPBC Act and NC Act listed fauna species (BOOBOOK, 2022b). These data were collected within the same plots surveyed as part of the vegetation assessments, including proposed infrastructure areas within non-remnant vegetation.

The parameters measured during habitat assessments included:

- Context with regard to landscape features (connectivity, proximity to water);
- Condition (weeds, evidence of disturbance, invasive species);
- Breeding and roosting habitat features (hollows, nests, caves);
- Foraging sources (flowering tree species, termite mounds);
- Microhabitat presence (woody debris, leaf litter specifically important for small mammals and reptiles);
- Wetland presence (presence of aquatic vegetation, water depth); and
- Signs of threatened species (such as scats, scratches, and tracks).

These results of such habitat assessments, along with the vegetation community assessments were used to inform the habitat mapping for EPBC Act and NC Act listed threatened and/or migratory species within the Project Area.

3.3.2.6 Environmentally Sensitive Areas (ESA)

Government mapped ESA include protected estates, such as State Forests and Resource Reserves, as well as ecological features, such as endangered and of concern vegetation communities and mapped essential habitat for threatened species.

Ecological ESA identified in the desktop assessment (DES, 2022d) were ground-truthed in the field to verify the existence and extent of these features. Ground-truthing of vegetation also identified additional areas of ESA (Endangered and Of Concern vegetation communities).

3.3.3 Aquatic Ecology Field Survey Methodology

The aquatic ecology sampling was undertaken by Freshwater Ecology from the 14 - 21st of March 2022. Sampling was conducted under General Fisheries Permit No. 207913, scientific user permit for non-protected areas WISP18336317, and Animal Ethics Approval No. CA 2020/02/1352, held by Freshwater Ecology. A summary of the aquatic survey methods is presented in this ATP 2059 EAR, with the full details of these sampling methods and locations provided in the aquatic ecology report in Appendix D. A total of nine sites were selected across the Project Area to be assessed; sampling techniques followed guidelines outlined in the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES 2018b).

Sampling methods included:

- Aquatic habitat assessment (all sites);
- In-situ water quality assessment (seven sites);
- Macrophytes assessment (eight sites);
- Macroinvertebrate assessment (five sites);
- Backpack electrofishing (five sites);
- Fyke netting (large nets) (three sites); and
- Visual observation.

3.3.3.1 Aquatic Habitat Assessment

Aquatic habitat assessments were undertaken following the Australian River Assessment System (AusRivAS) protocols (DNRM 2001). The assessments were undertaken by Dr. Timothy Howell from Freshwater Ecology who is an AusRivAS accredited ecologist (CV attached as part of 0). The habitat assessments included:

- Substrate composition;
- Flow, water depth and wetted width, noting if surface water was connected or comprised of one or more disconnected pools in the channel;
- Channel morphology;
- Physical habitat features, such as large woody debris, undercut banks and aquatic plants;
- Riparian vegetation cover and condition;
- Any notable disturbances including bank erosion, cattle access to waterway and barriers associated with nearby road crossings or dams; and
- Other on-site observations, such as presence of filamentous or benthic algae, surface scums, unusual sediment deposits, or fish kills.

Additional habitat inventory were completed at each site and included a general description of the environmental features and composition within, and immediately surrounding each site was undertaken at each monitoring location to assist in the interpretation of ecological data.

Aquatic habitat was assessed in accordance with *Queensland Australian River Assessment System (AUSRIVAS) Sampling and Processing Manual* (Department of Natural Resources and Mining [DNRM], 2001). Habitat bioassessment score datasheets (DNRM, 2001) were used to numerically score nine criteria, which were then allocated to one of four categories (excellent, good, moderate and poor). The sum of the numerical rating from each category produced an overall habitat condition assessment score (Table 3-2).

Table 3-2: Aquatic Habitat Bio-assessment Scores

Habitat Category	Category Score Range			
	Excellent	**Good**	**Fair**	**Poor**
Bottom substrate/available cover	16–20	11–15	6–10	0–5
Embeddedness	16–20	11–15	6–10	0–5
Velocity/depth category	16–20	11–15	6–10	0–5
Channel alteration	12–15	8–11	4–7	0–3
Bottom scouring & deposition	12–15	8–11	4–7	0–3
Pool/riffle, run/bend ratio	12–15	8–11	4–7	0–3
Bank stability	9–10	6–8	3–5	0–2
Bank vegetative stability	9–10	6–8	3–5	0–2
Streamside cover	9–10	6–8	3–5	0–2
Total score for the Site	111–135	75–110	39–74	0–38

3.3.3.2 Surface Water Quality

In situ water quality data was recorded using multiparameter water quality meters. Calibrations were regularly checked in the field and all sample collections were completed in accordance with the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES, 2018) and AS/NZ 5667.6:1998 Guidance on sampling of rivers and streams (AS/NZS 1998).

The parameters assessed are presented below in Table 3-3.

Water quality testing was undertaken in conjunction with macroinvertebrate sampling to assist with the interpretation of results.

Table 3-3: In Situ Water Quality Measurement Parameters

Parameter	Units	Measurement Precision
Water temperature	ºC	± 0.1
pH	pH units	± 0.1
Dissolved oxygen	% Saturation	± 1
Electrical conductivity	µS/cm	± 1
Turbidity	NTU	± 0.1

3.3.3.3 Aquatic Flora

Macrophyte surveys were completed following fish and macroinvertebrate surveys. All macrophyte species at each sampling site were recorded. Species were identified using Stephens & Dowling (2002), Sainty & Jacobs (2003) and MacDonald & Haslam (2016). The relative site coverage of each macrophyte species was recorded (E – extensive, M – moderate, S – some and L – little).

Macrophyte species were categorised by growth form in accordance with definitions provided in Sainty and Jacobs (2003), as follows:

- **Free floating –** Species that are normally unattached and float on the surface but may become attached and rooted in drying mud when water levels drop;
- **Floating attached –** Species that are rooted in the substrate but normally have at least the mature leaves floating on the water surface;
- **Submerged–** Species rooted in the substrate or free-floating submerged; and
- **Emergent –** Species rooted in the bank substrate with stems, flowers and most of the mature leaves projecting above the water surface.

No free floating or submerged macrophytes were recorded during field surveys.

3.3.3.4 Aquatic Macroinvertebrates

Freshwater macroinvertebrates were sampled in accordance with the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES, 2018).

Sample Collection

A 250-micron (µm) mesh dip net fitted to a triangular frame (250 mm x 250 mm x 250 mm) was used to collect samples by first disturbing the benthos and sweeping the net through the water. The sample was evenly distributed into sorting trays and field (live) picking was completed for each sample for a minimum of 30 minutes and a maximum of one hour. Picked macroinvertebrates preserved in a 70% methylated spirits solution.

Laboratory Identification

In the laboratory, macroinvertebrates were sorted, identified to the family taxonomic level and relative abundance enumerated. Samples were identified to family level with the exception of lower phyla (e.g., porifera, nematoda), oligochaetes (freshwater worms), acarina (freshwater mites) and microcrustacea (ostracoda, copeopoda and cladocera). Chironomids were identified to sub-family level in accordance with standard AusRivAS protocols (DNRM, 2001).

Enumeration and identification of macroinvertebrate samples was conducted by Susan Jones, an experienced AusRivAS accredited taxonomist. Sorting, enumeration and data entry was cross-checked by a second ecologist for 10% of the samples.

3.3.3.5 Fish

Fish surveys were conducted at five monitoring locations in line with the approach outlined in the Monitoring and Sampling Manual: Environmental Protection (Water) Policy (DES, 2018).

Backpack electrofishing was undertaken in waterways containing sufficient water. Sampling was carried out over a site reach spanning at least 100 m (where sufficient water was available), with care being taken to sample all macro and microhabitat types.

All electrofishing was undertaken in compliance with the Australian Code of Electrofishing Practice (NSW Fisheries, 1997) with the minimum power setting used to effectively attract and stun the fish.

Unbaited box trapping is a passive fish sampling technique that targets small bodied pelagic and benthic species. Five to ten unbaited box traps were strategically placed at all five survey sites for between 30 minutes and 2 hours.

3.3.3.6 Turtle

Three sites were assessed as having sufficient water to potentially support turtles. Two double winged fyke nets (one large and one small) were set overnight. At one site, two cathedral traps were also deployed. The nets and traps were baited with tinned sardines with the cod end suspended above the water line with ropes to prevent drowning of air breathing animals. Nets were set in the late afternoon and were checked early the following morning.

3.3.3.7 Platypus

The habitat at each site was assessed for the suitability for supporting platypus. The criteria used to assess each site are shown in Table 3-4 and included water permanency, volume of water present, water quality, microhabitat diversity, submerged macrophytes, foraging habitat and burrowing habitat (Grant, 2007).

Table 3-4: Platypus Habitat Suitability Criteria

Suitability	Reason
Good	Sections dominated by deeper pools with steep undercut banks, overhanging vegetation and flowing water. Water is known, or likely, to be permanent. These areas are considered likely to be frequented by platypus.
Average	A mix of deeper pools and stretches of shallower water (<0.5m). Some pools of water may be semi-permanent, possibly drying during severe drought. Undercut banks and overhanging vegetation is frequent, though water may be turbid. Platypus should not be excluded from these areas, though the likelihood that they could occur is lower than in 'good' habitat. These sections may not permanently support platypus through periods of prolonged drought.
Poor	Sections with shallow water; widely separated or no deep pools. Water flow is likely to be less frequent, possibly drying on a regular basis. Undercut banks and overhanging vegetation is infrequent. Poor sections are unlikely to permanently support platypus but may provide access between good and average quality habitat.

3.3.3.8 Frogs

Sampling of frogs was restricted to opportunistic visual encounter surveys and call surveys. These were undertaken during general aquatic ecology surveys. At each site suitable habitat searched for any frogs present. No frogs were heard calling and no tadpoles were recorded.

3.4 Likelihood of Occurrence

A likelihood of occurrence assessment was undertaken and informed by the field survey results and desktop sources. Desktop sources identified a number of flora and fauna species listed under the EPBC Act (i.e., PMST search) and NC Act WO records) that have previously been recorded or predicted to occur within a 10 km buffer of the Project Area. The PMST and WO results are attached as Appendix B. The buffered area is from here on referred to as the 'adjoining areas'. The 10 km buffer was chosen as this is the standard buffer distance utilised and adopted for the EPBC Act referral process.

The likelihood of occurrence approach refines the desktop generated list using site-specific information and specific-species habitat information obtained from field surveys. Desktop sources are indicative only and likelihood rankings, particularly regarding the presence of specific habitat requirements, are conservative. The assessment ranks the likelihood of the species occurring within the Project Area through analysis of species distribution information, nearest known records and the presence of specific habitat attributes as identified through the desktop analysis and field surveys. The criteria applied are outlined in Table 3-5.

According to the MNES terminology, suitable habitat are areas or a location which has the potential to provide necessary resources needed for the maintenance of a population. This includes the presence of desired habitat features for a species whereby activities such as breeding, nesting, and foraging contributes to the maintenance of the population. Suitable habitat can also include habitat critical to the survival of the species, whether denoted by the relevant species guidelines (such as conservation advice, recovery plans or scientific literature), or by the definition provided by SIG 1.1.

Potential habitat for a species are areas or a location which have the potential to host a species for a limited amount of time or to support an ecological function (such as foraging or dispersal) that is not restricted to that area. Habitat may be considered potential for a species, but not suitable, where there are some desired features but not all, and so a population may not be maintained; may have poor connectivity to known suitable habitat; or may be known to be disturbed.

Habitat and distribution information for MNES is sourced from SPRAT profiles and/or Conservation Advice where available, supplemented by other primary sources (e.g., published literature). In regard to species records, these were sourced from WO and/or ALA.

Recent records within the adjoining areas are defined as less than 20 years.

Impact assessments have been undertaken for species and TECs confirmed as known or considered to be likely to occur in the Project Area (Section 7). Given the disturbed nature of the landscape and in the context of the proposed activities, the risk of impact to 'potential' species is considered low, so assessment of impact for threatened species has focussed on confirmed species and those assessed as likely to occur.

Table 3-5: Likelihood of Occurrence Criteria

Criterion	Preferred habitat exists	General habitat exists[1]	Habitat does not exist[2]
Records within Project Area (based on site surveys and recent (within 20 years) records	Known	Known	Known
Records in the adjoining areas[3]	Likely	Potential	Unlikely
No records in the adjoining areas, but Project Area is within known distribution	Potential	Potential	Unlikely
No records in the adjoining areas, and Project Area is outside of distribution	Unlikely	Unlikely	Unlikely

[1]Habitat may be considered general, but not preferred because: some desired habitat features may be present, but not all; habitat may have poor connectivity; or habitat may be known to be disturbed.

[2]Based on sources reviewed and/or field survey results.

[3] 'Adjoining areas' refers to a 10 km buffer of the Project Area.

3.5 Threatened Species and Communities Habitat Mapping

Habitats for those listed threatened and/or migratory species and threatened communities known, likely or with potential to occur have been mapped based on ground-truthed vegetation communities and defined habitat preferences and conditions (as observed from field surveys). The mapped habitats have been used to inform impact assessments. Mapping of 'potential' habitat has also been undertaken for those species and communities with potential to occur. Field surveys were developed to verify desktop information and vegetation boundaries. Data collected from the field surveys was used to determine the habitat mapping for listed threatened and/or migratory species and threatened communities from the likelihood of occurrence. This effort of habitat mapping and vegetation verification was further informed by data obtained from desktop sources (e.g., SPRAT profiles and/or Conservation Advice where available, supplemented by other primary sources as required).

Overall, vegetation and habitat mapping has been prepared based on a collation of the following datasets and field information:

- Ground-truthed vegetation assessments and aerial imagery observations to generate vegetation boundaries and delineate vegetation characteristics;
- DoR RE mapping; where reflective of observed conditions, with minor amendments to an extent as a result of field observations;
- DoR high value regrowth mapping: where reflective of observed conditions, with minor amendments to an extent as a result of field observations; and
- Regrowth mapping prepared from the ground-truthed field observations and recent aerial imagery.

Habitat and vegetation community mapping was prepared to reflect as accurately as possible actual ground conditions (based on data collected from 2022 field surveys). This habitat mapping used RE mapping to guide field investigations; however, the overall mapping results are defined by determining vegetation boundaries and floristic composition based on ground-truthed observations.

3.6 Limitations and Assumptions

The field and desktop assessments undertaken provides an overview of the ecological values that exist within the Project Area. As described, surveys were undertaken in a number of sections of the Project Area to gain a detailed understanding of the types of species and habitat features that occur. Detailed field surveys were completed mainly in the wet/post-wet season, due the large amount of rain present. Sampling sites were distributed across the Project Area to obtain a spread of survey locations well distributed across areas where the disturbance footprint is expected to occur to understand potential direct and indirect impacts.

The absence of a species from a database list or observational studies does not confirm its absence from the Project Area. The lack of existing records from databases is more likely to indicate a low historic sampling effort in the region, as opposed to an absence of threatening processes and species. To overcome these limitations, the likelihood of occurrence takes a precautionary approach and identifies species that have potential to occur (considering habitat features), in order to assess potential impacts accordingly.

The weather during the survey period was mild and wet with a total of 425.8 mm rainfall recorded from January to May (Bureau of Meteorology, 2022). This is significantly higher than the long term (1912-2021) median value of 204.2 mm (BOOBOOK, 2022b). As such, wet weather caused impact to the field survey schedule and the soil remained moist with some areas waterlogged throughout the survey periods. Abundant plant growth occurred during the period of initial surveys, which then turned to withering and haying off in the later survey period (BOOBOOK, 2022b).

Although the field schedule was impacted by wet weather, it was determined that conditions during the survey periods were generally suitable for detection and identification of threatened flora. Planned targeted fauna searches were limited due to the increased rainfall. Due to this predictive mapping of threatened flora and fauna occurrence are conservative estimates of occurrence that assume species presence within areas of potentially suitable habitat (BOOBOOK, 2022b).

3.7 Survey Conditions

3.7.1 Aquatic Surveys

3.7.1.1 Rainfall

Rainfall in November 2021 through to February 2022 had monthly rainfalls significantly higher than the mean rainfall for those months (1912-2022). As a result, the rainfall is more likely to have saturated the area and increased the surface water availability when the field surveys were completed in comparison to a typical year.

3.7.1.2 In situ Water Quality

The *in-situ* water quality parameters recorded for sites containing surface water in March 2022 included:

- **Water temperatures-** ranged from 20.7 – 29.8^{o}C during the late wet sampling period;
- **Dissolved oxygen (DO)-** fluctuated between sites ranging from 9.1 – 94.5 % saturation;
- **pH of surface water**- ranged from weakly to strongly alkaline (7.7 – 9.0);
- **Electrical conductivity**- ranged from 214 to 1171 µs/cm; and
- **Turbidity**- was widely variable across all sites ranging from 11.9 to 620 NTU.

Further information on water quality is described in Section 4.3 in Appendix D.

4. ENVIRONMENTAL VALUES

The following sections present the ecological values of the Project Area based on the findings from the desktop review and field survey efforts. General information of the Project Area within the landscape context and classification and descriptions of the vegetation communities and broad habitats are presented in Section 0 and 4.3. Information specific to MNES and MSES is presented in Sections 0 and 4.5 respectively. While detailed descriptions of values are provided, a brief summary of MNES and MSES is included at the beginning of each Section.

4.1 Project Area Overview and Context

The Project Area occurs within the Brigalow Belt bioregion. The Project Area features watercourses on floodplains, surrounded by undulating hills. Watercourses (stream orders 1-4) intersect the Project Area, named watercourses include:

- Woleebee Creek runs south – north through the Project Area; and
- Wandoan Creek running from the northwestern boundary, meandering to the northern boundary of the Project Area, west of Jackson – Wandoan Road.

The Project Area is located entirely within the Brigalow Belt Bioregion and the Taroom Downs subregion.

Landscapes in the Project Area are dominated by meandering watercourses traversing broad alluvial plains flanked by rolling rises on fine-grained sediments, with a few scattered patches of colluvial sand deposits. Elevation in this area varies from 250 m above sea level on Woleebee Creek at the northern limit of the Project Area, with the bulk of the Project Area being on flats and gentle slopes below 300 m above sea level.

The Project Area is extensively cleared of native vegetation and converted to non-remnant pasture dominated by native and introduced grasses, notably Buffel Grass (*Cenchrus ciliaris*) and Sabi Grass (*Urochloa mossambicus*). Riparian woodland dominated by Queensland Blue Gum (*Eucalyptus tereticornis*) with some fringing areas of Poplar Box (*Eucalyptus populnea*), Brigalow (*Acacia harpophylla*) and Belah (*Casuarina cristata*), follows the winding course of major watercourses through this landscape.

These narrow woodland corridors are disturbed by thinning, regrowth, grazing, tracks, weeds, gaps and edge effects causing death of some peripheral trees. However, these corridors have high faunal habitat values, in particular for arboreal mammals and birds, due to features such as an abundance of large trees with hollows occurring on alluvial soils near water sources and ephemeral wetlands in floodplain depressions or cut-off oxbows from changes in stream path.

The corridors along Wandoan Creek and Woleebee Creek form part of an extensive dendritic network of riparian woodland with connectivity north to the Dawson River at Taroom but isolated from other large woodland patches to the east, south and west. In the rolling downs beyond the watercourses, remaining fragments of woodland are small, scattered, isolated and disturbed.

Significant ongoing threats to biodiversity within the Project Area include further loss of remnant and regrowth vegetation in an area that is already extensively cleared; potential loss of connectivity among areas of remnant and regrowth vegetation, especially though disruption of riverine corridors by tracks, powerlines and other linear infrastructure; loss of ecological integrity of vegetation patches through edge effects around fragments and along narrow corridors, death of larger trees without corresponding recruitment, disturbance of understorey vegetation, and invasion by weeds and pastoral grasses.

The main land use within the Project Area is grazing of stock for beef production.

4.2 Vegetation Communities and Broad Habitats

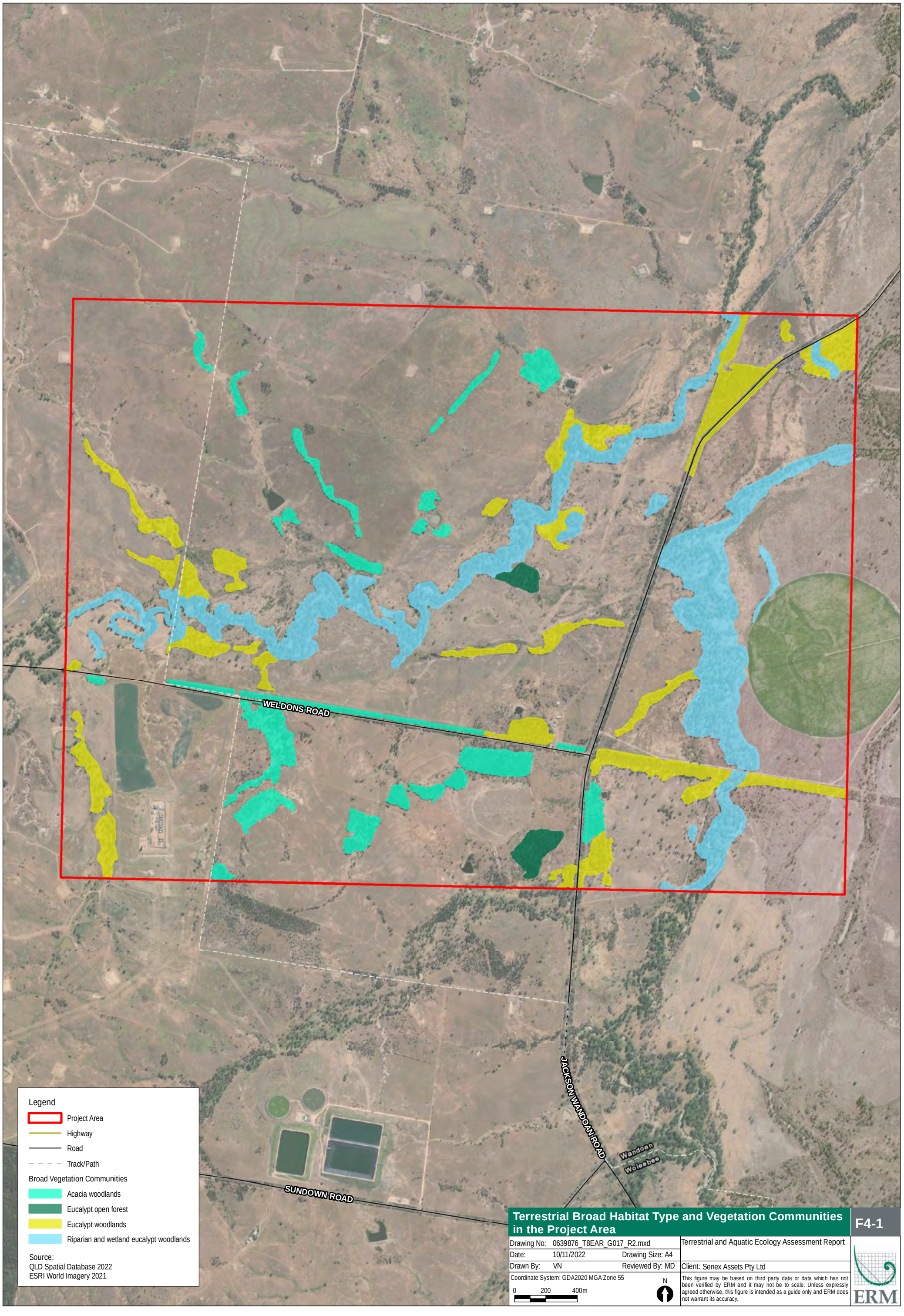
The Project Area has been classified into five broad habitat types, defined based on vegetation community type, structure and is based on ground-truthed mapping using the (RE) verification method. These habitat types have then been considered as respective foraging, breeding, roosting, denning, dispersal and movement functions for listed threatened and/or migratory species that are known, likely or have the potential to occur within the Project Area. This ground-truthed habitat mapping has been informed by these five habitat types, and subsequently used to identify areas of habitat for listed threatened species.

The habitats in the Project Area are mostly in moderate to low condition, with signs of degradation and fragmentation due to cattle grazing, erosion, and the presence of introduced flora species. A summary of these habitat types, along with their vegetation community classifications and attributes, are provided in Table 4-1 and their location across the Project Area shown in Figure 4-1.

Table 4-1: Terrestrial Broad Habitat Types and Vegetation Communities in the Project Area

Habitat Type and Vegetation Community	Photographic Example
Acacia woodlands dominated by Brigalow (*Acacia harpophylla*) This habitat type corresponds to areas with the floristic structural characteristics of the following REs: ■ 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks.	
Eucalypt dominated woodlands mainly of *Eucalyptus crebra, E. populnea* and *E. melanophloia* This habitat type corresponds to areas with the floristic structural characteristics of the following REs: ■ 11.3.2 - *Eucalyptus populnea* woodland on alluvial plains; ■ 11.3.4 - *Eucalyptus tereticornis* and/or Eucalyptus spp. woodland on alluvial plains; ■ 11.3.17 - *Eucalyptus populnea* woodland with *Acacia harpophylla* and/or *Casuarina cristata* on alluvial plains; ■ 11.5.1 - *Eucalyptus crebra* and/or *E. populnea*, *Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces; and ■ 11.9.7 - *Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks.	

Habitat Type and Vegetation Community	Photographic Example
Riparian and wetland Eucalypt woodlands dominated by *E. tereticornis*. This habitat type corresponds to areas with the floristic structural characteristics of the following REs: ■ 11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines; and ■ 11.3.27f - Freshwater wetlands with *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	
Eucalypt open forest dominated by *E. populnea* This habitat type corresponds to areas with the floristic structural characteristics of the following RE: 11.9.10 - *Eucalyptus populnea* open forest with a secondary tree layer of *Acacia harpophylla* and sometimes Casuarina cristata on fine-grained sedimentary rocks.	
Cleared exotic pasture This broad habitat type is the predominate type found throughout the Project Area. The dominant introduced grasses, are notably Buffel Grass (*Cenchrus ciliaris*) and Sabi Grass (*Urochloa mosambicensis*).	



Terrestrial Broad Habitat Type and Vegetation Communities in the Project Area

F4-1

Drawing No:	0639876_T8EAR_G017_R2.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

ERM

4.3 Aquatic Ecology and Habitat Values

The waterways present within the Project Area are ephemeral, with most waterways drying completely during dry periods. Very few of these waterways retain pooling water during dry periods. At the time of the field surveys, the majority of waterways present in the Project Area had already ceased surface water flows with disconnected pools noted along the watercourses. There was some subsurface flow present at sites along most creeks that contained sandy substrates. The gaps between water pools was often separated by open grasslands and poorly defined channels.

Riparian vegetation was present, and density of such vegetation varied from moderate to non-existent, with most surveys sites having relatively low vegetation present. The in-stream habitats present were concluded to be mostly of 'fair' condition across the majority of sites that were surveyed (17 of 24), with the remaining seven concluded to be of 'poor' condition.

The information gathered from the field surveys and the condition of the habitats has been used to inform the broad aquatic habitat types and vegetation communities within the Project Area. These broad habitat types and vegetation communities are further detailed in Table 4-2. It is noted that these habitat types are based on the two main creek systems present within the Project Area: Wandoan Creek and Woleebee Creek.

Table 4-2: Aquatic Vegetation Communities and Broad Habitat Types within the Project Area

Habitat Type and Vegetation Community*	Photographic Example
Woleebee Creek Aquatic Habitat This waterbody was concluded as likely to retain subsurface (hyporheic flows) for some time after heavy rainfall. The wetland type of this habitat was riverine, with a stream order of 5. In terms of species, the habitat had a presence of Palaemonidae (freshwater Prawns) and Parastacidae (freshwater Crayfish), as well as the Eastern Long-Necked Turtle, which was captured. The overall habitat bioassessment score for this habitat was of fair condition.	
Wandoan Creek Aquatic Habitat This waterbody had subsurface flows expressing in some areas. It was concluded as overall uncertain as to whether these were hyporheic or groundwater expressions, and the watercourse was regarded as shallow and highly ephemeral. The wetland type of this habitat was riverine, with a stream order of 4. In terms of species, the habitat had a presence of Palaemonidae (Freshwater Prawns) and Parastacidae (Freshwater Crayfish). The Green-stripe Frog was also recorded. The overall habitat bioassessment score for this habitat was of fair condition.	

**Images and data in this table are accredited to KCB, 2022.*

Appendix D summarises the aquatic fauna field results from field surveys within the Project Area. For further detail refer to Appendix D.

Table 4-3: Aquatic Fauna Field Results

Fauna	Field Survey Results
Aquatic macroinvertebrates	■ Low abundance of aquatic macroinvertebrates and taxa diversity across all samples in the Project Area, likely due to the largely ephemeral nature of the waterways (typical for ephemeral streams in central Queensland). ■ Relatively low PET (Plecoptera, Ephemeroptera, and Trichoptera orders) taxa diversity. ■ Relatively low Signal2 scores, indicating the aquatic macroinvertebrate assemblages were relatively depauperate. Further detail presented in Section 4.6 of Appendix D.
Microcrustaceans	Three families were detected: ■ Atyidae (Glass Shrimp) – recorded at only one site; ■ Palaemonidae (Freshwater Prawn) – recorded at all sites sampled; and ■ Paratacidae (Freshwater Crayfish) – recorded at all sites sampled. Further detail presented in Section 4.7 of Appendix D.
Fish	Eight species were collected from 14 sites sampled. Native species listed from most to least abundant include: ■ Spangled Perch (*Leiopotherapon unicolor*)-100% of sites; ■ Agassiz's Glassfish (*Ambassis agassizii*)- 79% of sites; ■ Midgely's Carp Gudgeon (*Hypseleotris bucephala*) – 79% of sites; ■ Eastern Rainbowfish (*Melanotaenia splendida splendida*) – 71% of sites; ■ Bony Bream (*Nematalosa erebi*) – 50% of sites; ■ Eel-tailed Catfish (*Tandanus tandanus*) – one specimen; and ■ Sleepy Cod (*Oxyeleotris lineolata*) – one specimen. All the native fish species recorded are relatively common and widespread across their distributions. Further detail presented in Section 4.8 of Appendix D.
Turtles and Platypus	■ A single specimen of eastern long-necked turtle (*Chelodina longicollis*) was captured just outside the Project Area, however the water system it was found in continues into the Project Area. This species can move long distances overland between waterholes, particularly after heavy rainfall. ■ No Platypuses (*Ornithorhynchus anatinus*) were recorded in the March 2022 surveys and there are no available historical records within 50 km of the Project Area. ■ One site was assessed as being average for habitat suitability for platypus, while all remaining sites were considered poor habitat suitability for platypus. ■ It is considered unlikely that platypus would occur across the Project Area. ■ Further detail presented in Section 4.9 in Appendix D.
Frogs	Three species of frog were recorded in the March 2022 sampling: ■ Green-Stripe Frog (*Cyclorana alboguttata*) – recorded at five sites; ■ Broad-Palmed Rocket Frog (*Litoria latopalmata*) – recorded at one site; and ■ Cane Toad (*Rhinella marina*) - recorded at one site. Further detail provided in Section 4.10 in Appendix D.

Information sourced from Appendix D (Freshwater Ecology, 2022).

4.4 Matters of National Environmental Significance (MNES)

The MNES within the Project Area are summarised in Table 4-4, with detailed descriptions provided in the following Sections.

Following ground-truthing of vegetation mapping during field surveys, the presence of two (TECs) have been confirmed within the Project Area.

Based on the outcomes of the targeted field surveys, five listed threatened fauna (Glossy Black-cockatoo, Koala, Greater Glider, White-throated Needletail and the Dulacca Woodland Snail), have been identified as known or likely to occur within the Project Area (Table 4-4). No listed threatened flora species have been concluded as known or likely to occur in the Project Area.

The Project Area occurs within the distribution for the Greater Glider (southern and central) (*Petauroides volans*). It is noted in the Conservation Advice, that it is likely that two separate taxa exist, to the level of subspecies in this area. However, it is noted that until such ambiguity is resolved, the listed entity will be referred to as *Petauroides volans* (DCCEEW, 2022). For this analysis, this species will be referred to herein as the Greater Glider.

An additional, five listed threatened species and six migratory species were determined to be potentially occurring given the overlap of distribution with the Project Area. For these species, potential future presence cannot be ruled out, although no records occur within the Project Area or in the locality, nor observations made during the field surveys.

The full likelihood of occurrence is attached in Appendix B.

The following sections detail the confirmed TECs and listed threatened species known and likely to occur in the Project Area, and potential habitat for species with potential to occur. TECs and species habitats have been mapped and presented.

Table 4-4: MNES within the Project Area

Matter	Relevance to the Project Area
World heritage properties	There are no world heritage properties within the Project Area.
National heritage properties	There are no national heritage properties within the Project Area.
Wetlands of international importance	There are no wetlands of international importance associated with the Project Area.
Threatened species and ecological communities	There are five EPBC Act listed threatened species that are **known or likely** to occur within the Project Area: ■ Koala (*Phascolarctos cinereus*) likely to occur) – Endangered; ■ Greater Glider (*Petauroides volans*) (central and southern) (known to occur) *(Petauroides volans*) – Endangered; ■ White-throated Needletail (*Hirundapus caudacutus*) (known to occur) – Vulnerable; ■ Dulacca Woodland Snail (*Adclarkia dulacca*) (likely to occur) – Endangered; and ■ Glossy Black-cockatoo (*Calyptorhynchus lathami lathami*) (likely to occur) – Vulnerable. There are an additional nine (9) listed threatened species (two flora and seven fauna) with **potential** to occur within the Project Area (Section 4.4.2 and 4.4.4.6). Two TECs are confirmed as **known** within the Project Area: ■ Brigalow (*Acacia harpophylla* dominant and codominant); and ■ Poplar Box grassy woodland on alluvial plains.

Matter	Relevance to the Project Area
Migratory species	There are two EPBC Act listed migratory species that are regarded as **known** and **likely** to occur within the Project Area, the White-throated Needletail and Fork-tailed Swift (*Apus pacificus*). There are six listed migratory species with **potential** to occur within the Project Area (Section 4.4.6.1).
Commonwealth marine area	There are no Commonwealth marine areas within the Project Area.
The Great Barrier Reef Marine Park	The Great Barrier Reef is not associated with the Project Area
Nuclear actions	N/A to this Project.
Water resources	Considered as part of assessments by others.

Table 4-5: Summary of Habitat for Listed Threatened Species Known or Likely to Occur within the Project Area

MNES	Total Habitat in Project Area	Vegetation/Habitat Group/s
EPBC Act listed species (threatened and/or migratory)		
Dulacca Woodland Snail	■ 52.6 ha. ■ Likely to occur from historical record in the Project Area. No observations in field surveys.	■ Acacia woodlands dominated by Brigalow (*Acacia harpophylla*). ■ Eucalypt dominated woodlands mainly with *Eucalyptus crebra* and *E. populnea.*
Glossy Black-cockatoo	■ 236.2 ha. ■ Likely to occur from historical record in the Project Area. No observations in field surveys.	■ All remnant and regrowth vegetation of most broad terrestrial broad habitat types particularly those dominated by Eucalypt species with large hollow bearing trees, along with remnant and regrowth RE with potential feed trees (Casuarinaceae spp.).
Greater Glider (central and southern)	■ 174.5 ha. ■ Known to occur from field survey observations.	■ All remnant vegetation of most broad terrestrial broad habitat types particularly those dominated by Eucalypt species wherever large trees with hollows occur in woodland connected with these corridors and also in the extensively wooded in the south of the Project Area.
Koala	■ 245.4 ha foraging and breeding habitat and 1,602.5 ha dispersal habitat. ■ Likely to occur from historical records and scratches/scats observed during field surveys.	■ Eucalypt woodlands and open forests. ■ Potential food trees occur including *E. tereticornis, E. populnea, E. crebra, E. longirostrata, E. melanophloia, E. exserta* and *Corymbia citriodora subsp. variegata*). ■ Brigalow-dominant woodlands and cleared area with occasional regrowth of eucalypt woodland are considered dispersal habitat.
White-throated Needletail	■ 0 ha mapped as a likely flyover visitor only. ■ Known to occur from field survey observations.	■ No habitat mapped, flyover visitor only.

4.4.1 Threatened Ecological Communities

The desktop review identified the potential occurrence of five TECs listed under the EPBC Act in the Project Area, including:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) – Endangered;
- Coolibah – Black Box woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions – Endangered;
- Poplar box grassy woodland on alluvial plains – Endangered;
- Semi-evergreen vine thickets (SEVT) of the Brigalow Belt (North and South) and Nandewar Bioregions – Endangered; and
- Weeping Myall woodlands – Endangered.

Following ground-truthing of vegetation mapping during field surveys, it has been confirmed the presence of two TECs within the Project Area, being Brigalow TEC and Poplar Box TEC. The remaining three TECs are not present within the Project Area.

The extent of Brigalow TEC and Poplar Box TEC is considerably smaller than the total mapped extent of the component RE. This is because smaller areas of RE 11.3.1, 11.9.5 and 11.9.5a (Brigalow TEC) and RE 11.3.2 (Poplar Box TEC) did not meet TEC size and/or condition criteria (patch size too small, ground stratum was dominated by exotic weeds and/or patch was not dominated by relevant tree species).

A brief description of the confirmed TECs are listed in Table 4-6, together with the constituent REs which are further described and defined in Section 4.4.1.1 and 4.4.1.2. The following Sections provide further supporting information for each confirmed TEC.

Table 4-6: Description and Ground-truthed Extent of TEC within the Project Area

TEC Description	EPBC Act Status	RE Codes	Ground-truthed Extent (ha)	Number of Patches (Size Range [ha])	Comment
Brigalow (*Acacia harpophylla* dominant and codominant)	Endangered	11.9.5	22.3	9 (1.12 – 4.15)	14 patches and total of 30.28 ha aren't qualified for TEC
Poplar Box grassy woodland on alluvial plains[2]	Endangered	11.3.2	20.7	4 (2.1 – 9.58)	11 patches and total of 3.28 ha aren't qualified for TEC

TEC condition criteria and thresholds found in [1] DoE (2013); and [2] DoEE (2019).

4.4.1.1 Brigalow TEC

The Brigalow TEC is currently listed as Endangered under the EPBC Act, effective 4 April 2001 (TSSC, 2001a). This community occurs within QLD and New South Wales (NSW) and is characterised by *Acacia harpophylla* being either dominant in the tree layer, or co-dominant with other species – notably *Casuarina cristata*, other species of Acacia, or species of Eucalyptus (Butler, 2007). In QLD, Brigalow TEC comprises of 16 REs (DoE, 2013).

Within the Project Area, nine patches of Brigalow TEC were detected in RE 11.9.5, covering a total area of 22.3 ha, which is shown on Figure 4-2. An example of a remnant patch of Brigalow TEC within the Project Area is shown in Photograph 4-1.

Photograph 4-1: Example Brigalow TEC within Project Area

4.4.1.2 Poplar Box Grassy Woodland TEC

Poplar Box Grassy Woodland on Alluvial Plains ecological community is currently listed as Endangered under the EPBC Act, effective 4 July 2019 (DoEE, 2019). This community is typically a grassy woodland with a canopy dominated by *Eucalyptus populnea* and understorey mostly of grasses and other herbs, mostly occurring in gently undulating to flat landscapes and occasionally on gentle slopes on a wide range of soil types of alluvial and depositional origin (Webb et al. 1980). In QLD, Poplar Box TEC comprises of five REs, including RE 11.3.2, RE 11.3.17, RE 11.4.7, RE 11.4.12 and RE 12.3.10 (DoEE, 2019)

Within the Project Area, four patches of Poplar Box TEC were detected in RE 11.3.2, covering a total area of 20.7 ha, as shown on Figure 4-2. An example of this TEC is shown in Photograph 4-2.

Photograph 4-2: Example of Poplar Box TEC in Project Area

WELDONS ROAD

JACKSON WANDOAN ROAD

SUNDOWN ROAD

Wandoan

Woleebee

Legend

Project Area

Highway

Road

Track/Path

TEC

Brigalow

Poplar Box grassy woodland on alluvial plains

Source:
QLD Spatial Database 2022
ESRI World Imagery 2021

TEC Mapping in the Project Area

F4-2

Drawing No:	0639876_T8EAR_G003_R1.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

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ERM

4.4.2 Terrestrial Listed Threatened Flora Species

No EPBC Act listed threatened terrestrial flora species were recorded within the Project Area during field surveys.

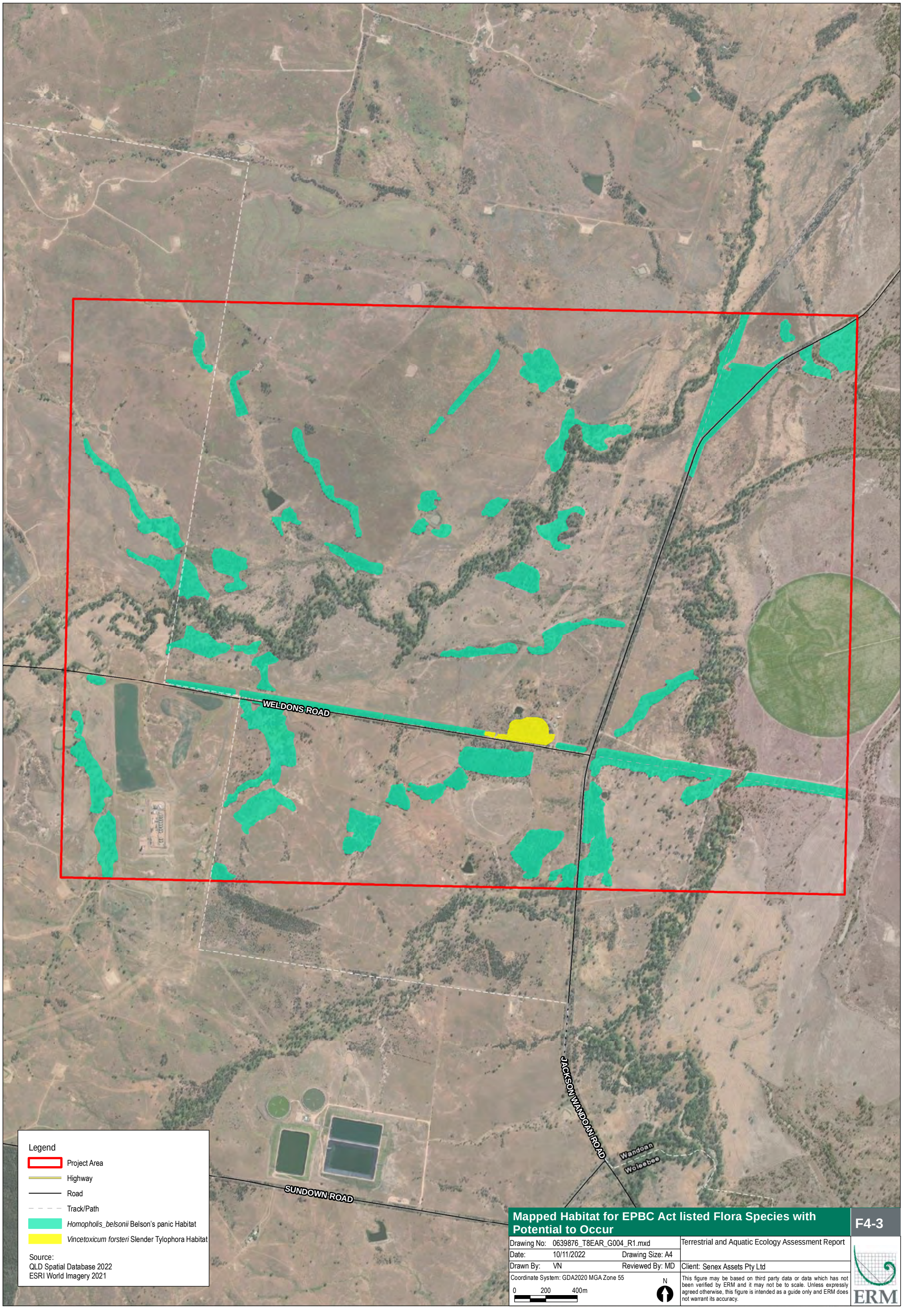
Two listed threatened terrestrial flora species, Belson's Panic (*Homopholis belsonii*) and Slender Tylophora (*Vincetoxicum forsteri*), have been assessed as having the potential to occur within the Project Area. Because part of these species' distributions overlaps the Project Area and suitable habitat is present within the Project Area, their presence cannot be ruled out. This is despite no signs or observations of these species within the Project Area during field surveys using survey techniques aligned with survey guidelines.

Belson's Panic is listed as Vulnerable, with Slender Tylophora listed as Endangered under the EPBC Act. Within the Project Area, suitable habitat for Belson's Panic includes Poplar Box and Brigalow/Belah woodland on alluvium, and totals to 158.8 ha, with potential mapped habitat including:

- Eucalypt dominated woodlands, particularly *Eucalyptus crebra*, *E. populnea* and *E. melanophloia*; and
- Acacia woodlands dominated by Brigalow (*Acacia harpophylla*).

Potential Slender Tylophora mapped habitat within the Project Area totals 4.3 ha and includes Eucalypt dominated woodlands, particularly *E. crebra, and E. melanophloia*.

In accordance with the precautionary principle, 'potential habitat' for Belson's Panic and Slender Tylophora has been mapped and shown on Figure 4-3.



Mapped Habitat for EPBC Act listed Flora Species with Potential to Occur

F4-3

Drawing No:	0639876_T8EAR_G004_R1.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

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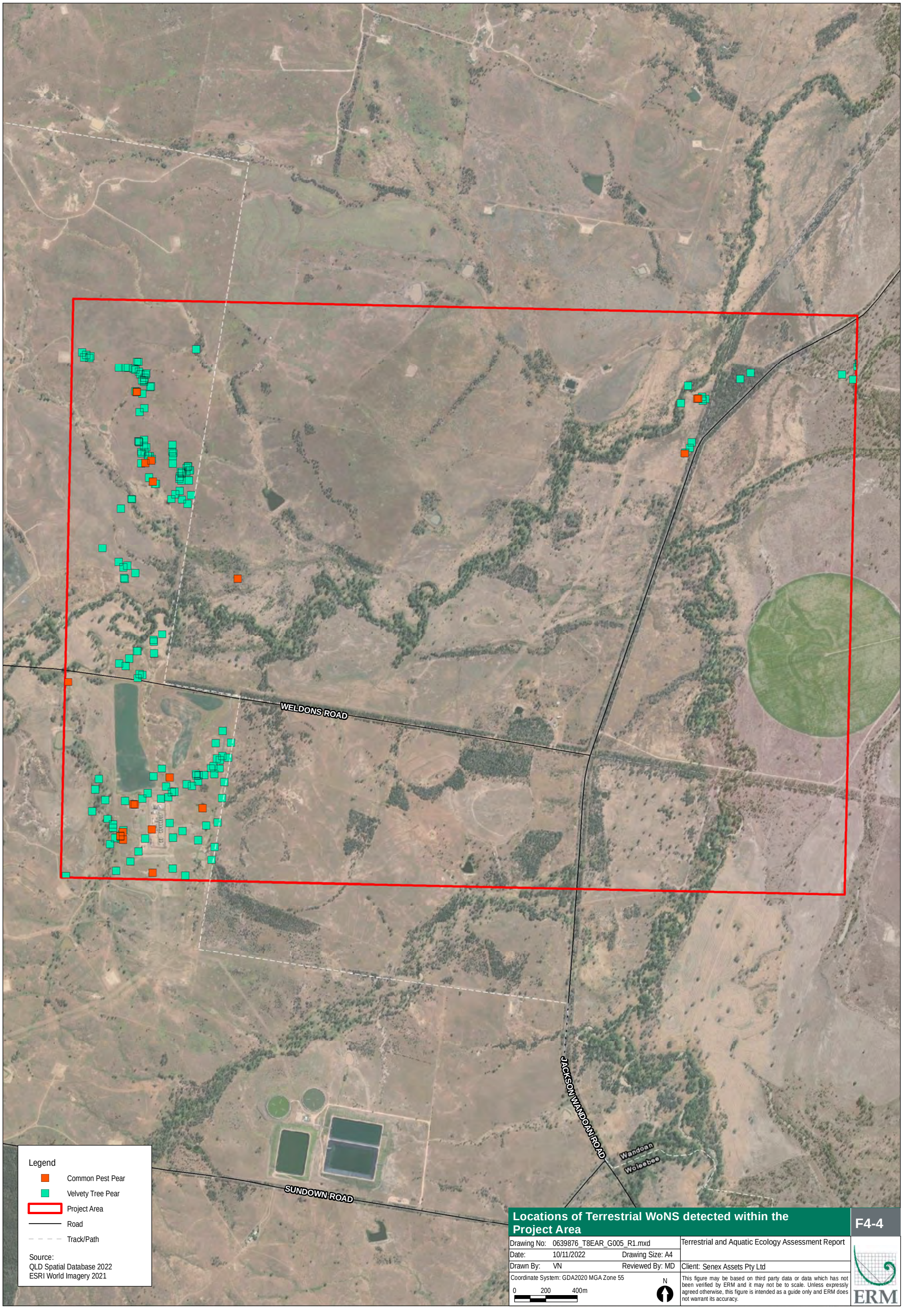
4.4.2.1 Weeds of National Significance

Desktop searches of the Queensland Government WildNet database (DES, 2022a) found six species of Weeds of National Significance (WoNS) recorded within 10 km of the Project Area (the 'adjoining areas'). These species and WoNS detected during field surveys are provided in Table 4-7. Locations of WoNS detected within the Project Area are shown in Figure 4-4.

Table 4-7: Terrestrial WoNS detected or Potentially Occurring within the Project Area.

Scientific Name	Common Name	WoNS/ Biosecurity Act Status	Comments*
Parthenium hysterophorus	Parthenium Weed	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Previously recorded within the adjoining areas.
Senecio madagascariensis	Fireweed	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Previously recorded within the adjoining areas (DES, 2022a).
Anredera cordifolia	Madeira Vine	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Previously recorded within the adjoining areas (DES, 2022a).
Opuntia aurantiaca	Tiger Pear	WoNS, Cat. 3 Restricted Matter	Detected during field surveys at moderate densities in Brigalow woodland around survey site 873-S74. The closest records in ALA (2022) are over 45 km away, around Yuleba North, Barakula and Taroom. No previous records in WildNet from the Project Area (DES, 2022a).
Opuntia stricta	Common Pest Pear	WoNS, Cat. 3 Restricted Matter	Previously recorded within the adjoining areas (DES, 2022a). Detected in field surveys throughout the Project Area at low densities.
Opuntia tomentosa	Velvety Tree Pear	WoNS, Cat. 3 Restricted Matter	Previously recorded within the adjoining areas (DES, 2022a). Detected in field surveys throughout the Project Area at low densities.

**Information sourced from BOOBOOK (2022)*



Locations of Terrestrial WoNS detected within the Project Area

F4-4

Drawing No:	0639876_T8EAR_G005_R1.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

ERM

4.4.3 Aquatic Listed Threatened Flora Species

A total of four floating attached macrophyte species and 15 emergent macrophyte species were recorded across all sites. No listed aquatic flora species were recorded during field surveys or considered likely to occur in the Project Area. See likelihood of occurrence (0).

4.4.4 Terrestrial Listed Threatened Fauna Species

Five EPBC Act listed threatened fauna species (Glossy Black-cockatoo, Greater Glider, Koala, White-throated Needletail and Dulacca Woodland Snail) are considered known or likely to occur within the Project Area (a full likelihood of occurrence is shown in Appendix B). A summary of listed threatened species that are known or likely to occur and their associated habitat within the Project Area is provided in Sections 4.4.4.1 to 4.4.4.5.

4.4.4.1 Koala

The Koala is currently listed as Endangered under the EPBC Act, effective 12 February 2022. The Koala is generally found in temperate to tropical forests as well as woodlands and semi-arid communities dominated by eucalyptus species (Martin and Handasyde, 1999). The species can be found in habitat broadly defined as woodlands and open forests, if food trees are present (DOE, 2022). The Koala has one of the broadest distributions of threatened terrestrial species under the EPBC Act with a range extending from north-eastern Queensland to the south-east corner of Southern Australia. The biological species distribution is widespread in coastal and inland areas that extends over approximately one million square kilometres (Martin & Handasyde, 1999).

Under the revised *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022c), released on 12 February 2022, habitat for the Koala is described as:

> *Koala habitat includes both coastal and inland areas that are typically characterised by Eucalyptus forests and woodlands. Biophysical habitat attributes for the koala include places that contain the resources necessary for individual foraging, survival (including predator avoidance), growth, reproduction and movement.*

Habitat critical to the survival of the species is defined as those that the species relies on to avoid or halt decline and promote the recovery of the species. Under the EPBC Act, the following factors are considered when identifying habitat that is critical to the survival of the species:

> *(a) Whether the habitat is used during periods of stress (examples: flood, drought or fire);*
>
> *(b) whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes);*
>
> *(c) the extent to which the habitat is used by important populations;*
>
> *(d) whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development;*
>
> *(e) whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements;*
>
> *(f) whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation;*
>
> *(g) any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community.*

A targeted field survey was undertaken in the Project Area in 2022, in accordance with the most recent Commonwealth guidance on Koala survey and habitat mapping. Targeted searches for Koalas were completed, including spotlighting, searches for scats and scratch marks by two ecologists. Despite targeted surveys, no Koalas were observed during the 20 days of field surveys completed from 14–18 March; 22–25 March; 30 April–5 May, and 9–13 June across the wider Atlas Stage 3 Project Area. This survey effort is considered sufficient to detect koala presence in the Project Area.

Koalas are known to occur within urban and rural landscapes, utilising regrowth and remnant eucalypt dominated vegetation communities for foraging and breeding resources. Targeted searches for the species were conducted in suitable habitat throughout the Project Area. The field investigations conducted throughout 2022 did not directly record an individual Koala but did find evidence of Koalas through indirect signs of potential scratch marks on riparian Queensland Blue Gum trees in several locations along Wandoan Creek. However, as the presence of scratch marks are an indirect method of recording presence for the species, there is uncertainty that the scratches were indeed from Koalas.

The potential for Koala presence in the Project Area was observed in the form of potential scratch marks on *Eucalyptus tereticornis* (Forest Red Gum) trees in several locations along Wandoan Creek, (but there is uncertainty regarding which species made the scratches). No direct observations of Koalas occurred, nor were any Koala faecal pellets observed. No records or evidence of Koalas occurs elsewhere in the Project Area, despite targeted searches. From this information, it is concluded that there is a general absence of Koalas in the Project Area, and it is considered that koala occurrence in the Project is very rare.

Due to the presence of open forests and woodlands dominated by eucalypts, and in accordance with current DCCEEW habitat definitions for Koala, it has been conservatively concluded that habitat critical to the survival of the species does occur within the Project Area. Habitat has been classified and mapped based on recent habitat guidance for the species (Youngentob, K.N, et al, 2022). In this case the vegetated areas of the Project Area containing Koala food trees (e.g., *E. tereticornis, E. populnea, E. crebra, E. longirostrata, E. melanophloia, E. exserta and Corymbia citriodora subsp. variegata*) were mapped as Koala foraging and breeding habitat.

This habitat mapping method and the corresponding three potential habitat types of foraging and breeding, dispersal and non-koala habitat, as well as the amounts of each in the Project Area, are provided in Table 4-8. Only foraging and breeding habitat and dispersal habitat are considered to meet the definition of habitat critical to the survival of the species under the EPBC Act.

Photograph 4-3: Potential Koala Scratch Marks on a Queensland Blue Gum Tree

Table 4-8: Koala Habitat Types within the Project Area

	Potential Foraging and Breeding Habitat	Potential Dispersal Habitat	Potential Non-koala Habitat
Description	■ Any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. ■ This includes remnant and regrowth vegetation.	■ Part of the broader landscape that includes grass/bare ground, rural land-uses, dwellings/towns, buildings, farm dams, sealed or unsealed roads and existing rail infrastructure. ■ Contains isolated or scattered foraging or shelter trees. ■ Contains vegetation generally not used frequently for foraging and breeding purposes by the species.	■ Not suitable habitat includes barriers defined in the DCCEEW Guidelines (natural or artificial) that prevent the movement of koalas, such as mountain ranges, water bodies or treeless areas that are greater than 2 km wide.
Presence within the Project Area	Regrowth and remnant vegetation of: ■ Callitris and Eucalypt dominated woodlands; ■ Eucalypt dominated woodlands mainly of *E. crebra, E. populnea and E. melanophloia;* ■ Riparian and wetland Eucalypt woodlands dominated by *E. tereticornis*; ■ Eucalypt open forest dominated by *E. populnea*; and ■ Open regrowth eucalypt woodland vegetation.	■ Cleared areas with occasional regrowth eucalypt woodlands along drainage lines; and ■ Acacia woodlands dominated by Brigalow (*Acacia harpophylla*).	■ None present.
Total in the Project Area	■ **245.4 ha foraging and breeding habitat**	■ **1,602.5 ha dispersal habitat**	■ **0 ha non-koala habitat**

Records for where evidence of this species has been located in the Project Area, as well as the Koala habitat mapping for foraging and breeding habitat, and dispersal habitat, is shown on Figure 4-5.

WELDONS ROAD

SUNDOWN ROAD

JACKSON WANDOAN ROAD

Wandoan

Woleebee

Legend

- Project Area
- Road
- Track/Path
- Tree With Scratches that May be Caused by Koala
- Koala Foraging and Breeding Habitat
- Koala Dispersal Habitat

Source:
QLD Spatial Database 2022
ESRI World Imagery 2021

Koala Habitat within the Project Area

F4-5

Drawing No:	0639876_T8EAR_G006_R2.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

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4.4.4.2 Greater Glider

The Greater Glider (southern and central) was upgraded from a listing of Vulnerable to Endangered under the EPBC Act, effective 5 July 2022. This species has been concluded as known to occur within the Project Area as the species was detected during spotlighting surveys of riparian woodland along Wandoan Creek, as shown on Photograph 4-4 (BOOBOOK, 2022).

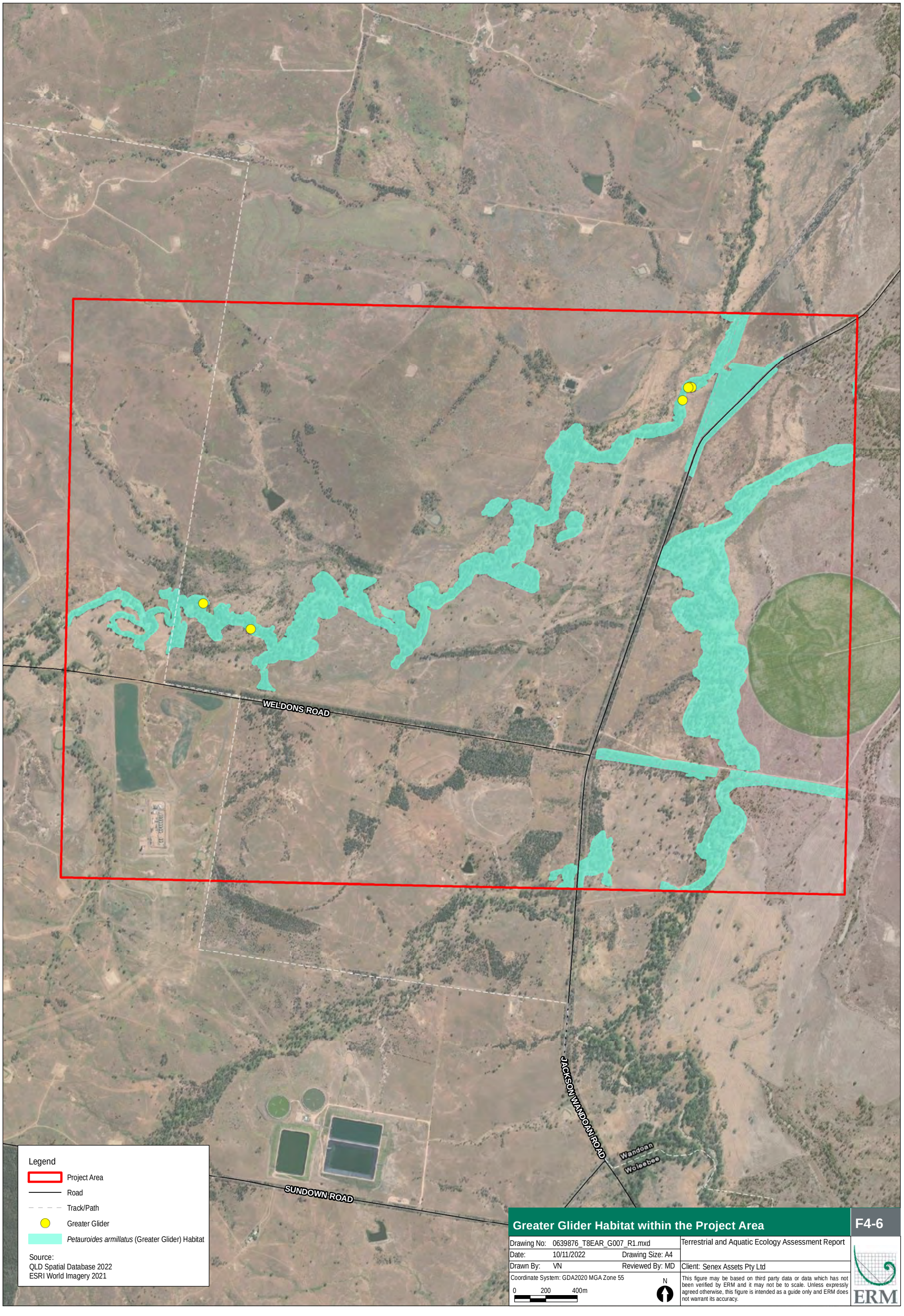
The Project Area occurs within the distribution for the Greater Glider. It is noted in the Conservation Advice, that it is likely that two separate taxa exist, to the level of subspecies in this area. However, it is noted that until such ambiguity is resolved, the listed entity will be referred to as *Petauroides volans* (DCCEEW, 2022).

Greater Glider habitat consists of tall, Eucalypt forests with mature hollow-bearing trees (Eyre, 2004). Eyre et al., (2022) has listed habitat for the species that are REs with confirmed Greater Glider records and contain habitat attributes such as live and dead hollowing bearing denning trees, feed and large trees and habitat connectivity. Habitat critical to survival for the Greater Glider has been defined in the species conservation advice (DECCEW, 2022).

Greater Glider habitat within the Project Area aligns with the conservation advice description of “large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species’ preferred food species”. Suitable Greater Glider foraging habitat has been identified within the Project Area based on ground-truthing of habitats listed in Eyre et al. (2022), as well as the identification of habitat attributes for the species such as mature hollow bearing trees. Therefore, Greater Glider habitat within the Project Area is considered habitat critical to survival of the species.

The total amount of Greater Glider foraging habitat within the Project Area is 174.5 ha and is shown in Figure 4-6. The mapped Greater Glider foraging habitat includes mature Eucalypt woodland to open forests and woodlands to open forest associated with stream channels and rivers.

Photograph 4-4: Greater Glider Located in the Project Area



Greater Glider Habitat within the Project Area

F4-6

Drawing No:	0639876_T8EAR_G007_R1.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

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4.4.4.3 Glossy Black-cockatoo

Glossy Black-cockatoo is currently listed as Vulnerable under the EPBC Act, effective 10 August 2022. The likelihood of occurrence has concluded this species as likely to occur within the Project Area due to the presence of suitable habitat and historical records within the locality (Figure 4-7).

The species is distributed through coastal areas and ranges of eastern Australia with scattered records further inland. This is a specialised feeder dependent on seeds of Casuarinaceae (She-oak) trees. Breeding pairs nest in large hollows generally high up in large Eucalypt trees or stags near water and food sources (Pavey et al. 2016). The species is capable of moving among isolated trees and small habitat patches within fragmented landscapes (Pavey et al. 2016, Holmes 2012). The species roves widely across this landscape, with some evidence of seasonal movements following maturation of She-oak fruits (Stock & Wild 2005; Hourigan 2012; BOOBOOK, unpubl. data).

Casuarinaceae food trees are abundant within the Project Area. These include Belah which occurs throughout the Project Area, Bull Oak (*Allocasuarina luehmannii*) in scattered woodland patches on sandy soils. Potential nest trees occur in remnant Eucalypt woodland and forest and in well-developed riparian corridors across the Project Area. No evidence of feeding (chewed cones) was observed during field surveys. However, this species has previously been recorded within the Project Area (BOOBOOK 2021a).

The total amount of Glossy Black-cockatoo habitat within the Project Area is 236.2 ha and is shown on Figure 4-7. The mapped Glossy Black-cockatoo habitat includes mature Eucalypt woodland to open forests and woodlands to open forest associated with stream channels and rivers.

WELDONS ROAD

JACKSON WANDOAN ROAD

SUNDOWN ROAD

Wandoan

Woleebee

Legend

- White Throated Needletail – 23/11/2022
- White Throated Needletail – 24/11/2022
- Glossy Black Cockatoo – 19/11/2020
- Project Area
- Road
- Track/Path
- *Calyptorhynchus lathami* (Glossy Black-cockatoo) Habitat

Source:
QLD Spatial Database 2022
ESRI World Imagery 2021

Glossy Black Cockatoo Habitat within Project Area and White-throated Needletail Record

F4-7

Drawing No:	0639876_T8EAR_G008_R3.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	24/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

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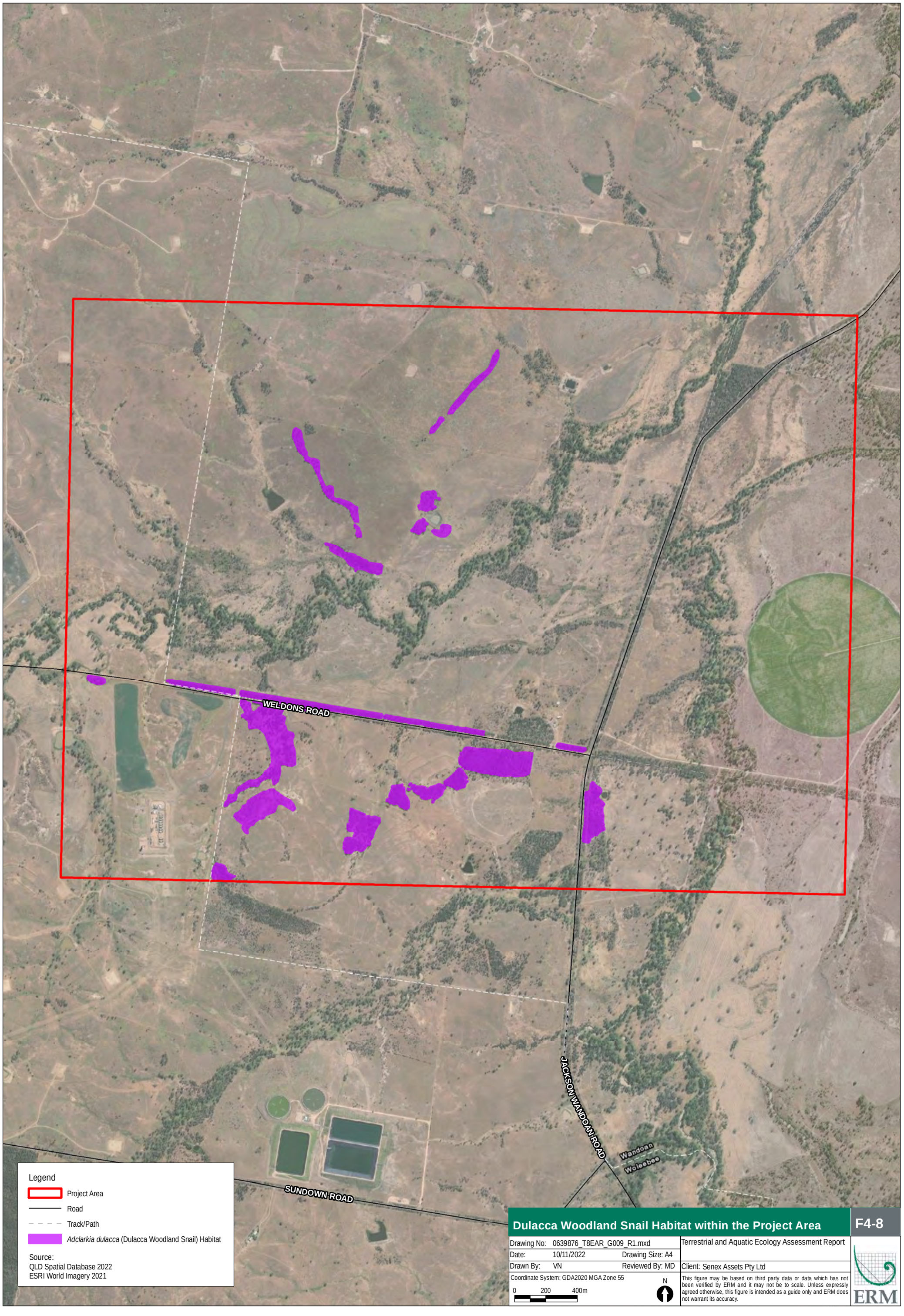
4.4.4.4 Dulacca Woodland Snail

The Dulacca Woodland Snail is currently listed as Endangered under the EPBC Act, effective 7 December 2016 (TSSC, 2016). The likelihood of occurrence has concluded this species as known to occur within the Project Area due to the presence of suitable habitat and previous records within the Project Area (Figure 4-8).

The Dulacca Woodland Snail inhabits vine thicket, Brigalow (*Acacia harpophylla*) woodland/open forest, ironbark (Eucalyptus spp.) woodland, Lancewood *(Acacia shirleyi*) woodland and Gum-topped Box (*E. woollsiana*) woodland (TSSC, 2016). It is largely confined to the Dulacca Downs subregion where it is found in a highly fragmented landscape, living in patches or strips of habitat retained on roadsides, shade lines and/or ridges (Stanisic et al., 2010; ALA, 2022). The Dulacca Woodland Snail is also able to exist in areas of Brigalow regrowth and even in cleared paddocks but only where logs, woody debris or other suitable microhabitat sites remain (TSSC, 2016).

The Project Area includes several small patches of suitable habitat for the Dulacca woodland snail (Brigalow woodlands), and the species has previously been collected from an area of RE 11.9.5a and RE 11.7.2 in south of the Project Area (ALA, 2022). The total amount of Dulacca Woodland Snail habitat within the Project Area is 52.6 ha and is shown in Figure 4-8.



Dulacca Woodland Snail Habitat within the Project Area

F4-8

Drawing No:	0639876_T8EAR_G009_R1.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	10/11/2022	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

ERM

4.4.4.5 White-throated Needletail

The White-throated Needletail is listed as Vulnerable under the EPBC Act, effective 4 July 2019. The likelihood of occurrence has concluded this species as known to occur within the Project Area annually (September-April), following storm fronts, as a transient aerial flyover visitor only. The White-throated Needletail was not observed during field investigations for the current Project, however, was observed within the Project Area during subsequent field surveys for Senex on 24 November 2022 (Cunningham, M pers. comm.), as shown on Figure 4-7. A flock of eight birds were observed flying low near Weldons Road. A search of the ALA database did not identify any historical known White-throated Needletail records within 10 km of the Project area.

This species is predominantly aerial when on migration in Australia, occasionally stopping to roost in large patches of rainforest, wooded vegetation and open Eucalypt forests (Coventry, 1989; Higgins, 1999), generally associated with elevated areas. While occasional aerial observations occur for this species, the Project Area is unlikely to contain important foraging habitat for the species. Additionally, no threshold area for important habitat for this species can be determined at present and has not been identified (TSSC, 2019). The Project Area contains no rainforests and no elevated open forests with dense foliage that could be used for occasional roosting. While potential flights over the Project Area may occur from time to time, only elevated areas regarded as roosting habitat. Thus, potential habitat has not been mapped for this species, and so no subsequent impact area has been calculated.

4.4.4.6 Listed Threatened Terrestrial Fauna Species with Potential to Occur

Seven EPBC Act listed threatened fauna species have been assessed as having the potential to occur within the Project Area as a result of the likelihood of occurrence presented in Appendix B. In essence, because part of the species distributions overlaps with the Project Area, their presence cannot be ruled out. This is despite no signs or observations of these species within the Project Area during field surveys using survey techniques aligned with survey guidelines.

Table 4-9 details the terrestrial threatened species that have been assessed as having the potential to occur within the Project Area and describes the potential habitat that has been mapped for this species.

In accordance with the precautionary principle, ‘potential habitat’ for the Australian Painted Snipe and Diamond Firetail are shown in Figure 4-9, whereas Brown Treecreeper, Painted Honeyeater and Southern Whiteface are shown in Figure 4-10. Additionally, potential habitat for the Five-clawed Worm-skink and Grey Snake are presented in Figure 4-11.

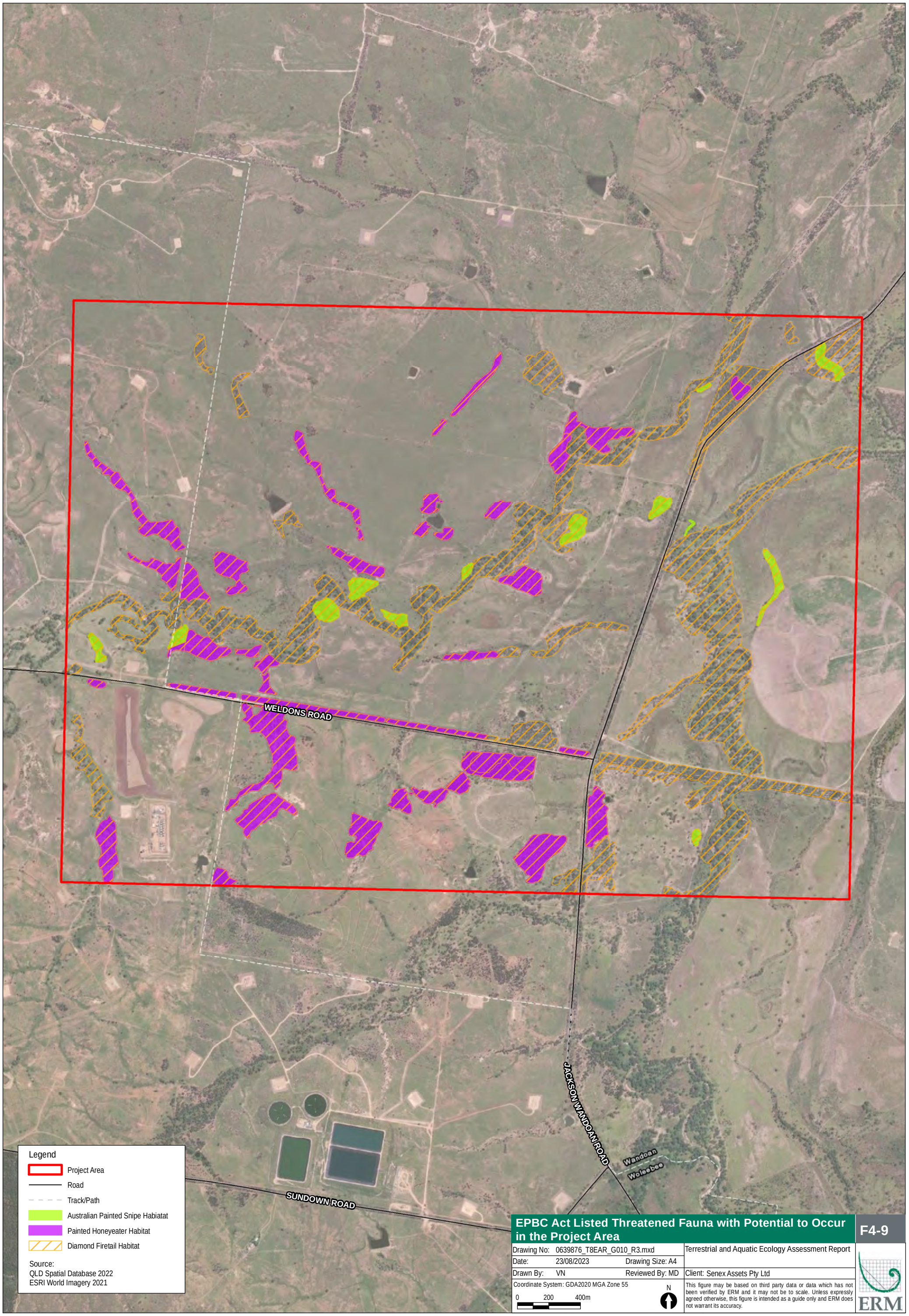
Table 4-9: EPBC Act Listed Terrestrial Fauna Species with Potential to Occur within the Project Area

Species Name	Common Name	EPBC Act Status	Potential Habitat Mapped within the Project Area*
Birds			
Rostratula australis	Australian Painted Snipe	E	■ 13.9 ha of potential habitat is present within the Project Area. ■ Potential habitat includes small areas of ephemeral wetland habitat within the Project Area; however, these may only periodically provide temporary refuges for this species. These areas correspond with riparian with riparian woodlands. This aligns with the broad habitat type of Riparian and wetland Eucalypt woodlands dominated by *E. tereticornis*.
Climacteris picumnus victoriae	Brown Treecreeper	V	■ 102.88 ha of potential habitat is present within the Project Area. ■ Potential habitat includes small patches of suitable dry Eucalyptus woodland and/or forests habitats throughout the Project Area.
Stagonopleura guttata	Diamond Firetail	V	■ 307.93 ha of potential habitat is present within the Project Area. ■ Potential habitat includes small patches of suitable dry Eucalyptus woodland and/or forests habitats throughout the Project area, including Acacia dominated areas.
Anomalopus mackayi	Five-clawed Worm-skink	V	■ 60.27 ha of potential habitat is present within the Project Area. ■ Potential habitat includes Brigalow woodlands with coarse woody debris and deep leaf litter cover, as well as ephemeral wetlands and creek lines along with cracking clay soils in some areas.
Hemiaspis damelii	Grey Snake	E	■ 74.67 ha of potential habitat is present within the Project Area. ■ Potential habitat in the form of Brigalow and Belah woodlands are present in the Project Area, as well as ephemeral wetlands and creek lines with cracking clay soils in some areas.
Grantiella picta	Painted Honeyeater	V	■ 95.1 ha of potential habitat is present within the Project Area. ■ Potential habitat comprises remnant and regrowth communities with abundant Acacia and Casuarina hosts of Mistletoes. Potential habitat comprises larger contiguous areas of remnant and regrowth woodland and open forest, more specifically with a multilayered shrubby understorey which the species prefers. This is made up of broad habitat type Eucalypt dominated woodlands mainly of *E. crebra*, *E. populnea* and *E. melanophloia*.
Aphelocephala leucopsis	Southern Whiteface	V	■ 307.93 ha of potential habitat is present within the Project Area. ■ Southern Whiteface has the potential to utilise almost all habitats present within the Project Area, with the exception of grazed land.

Status listing per the EPBC Act = Endangered; V= Vulnerable.

For the full reasoning for the potential outcomes for such species, refer to 0.

**Information on potential habitat sourced from Appendix C (BOOBOOK, 2022)*



EPBC Act Listed Threatened Fauna with Potential to Occur in the Project Area

F4-9

Drawing No:	0639876_T8EAR_G010_R3.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd
Coordinate System: GDA2020 MGA Zone 55			This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

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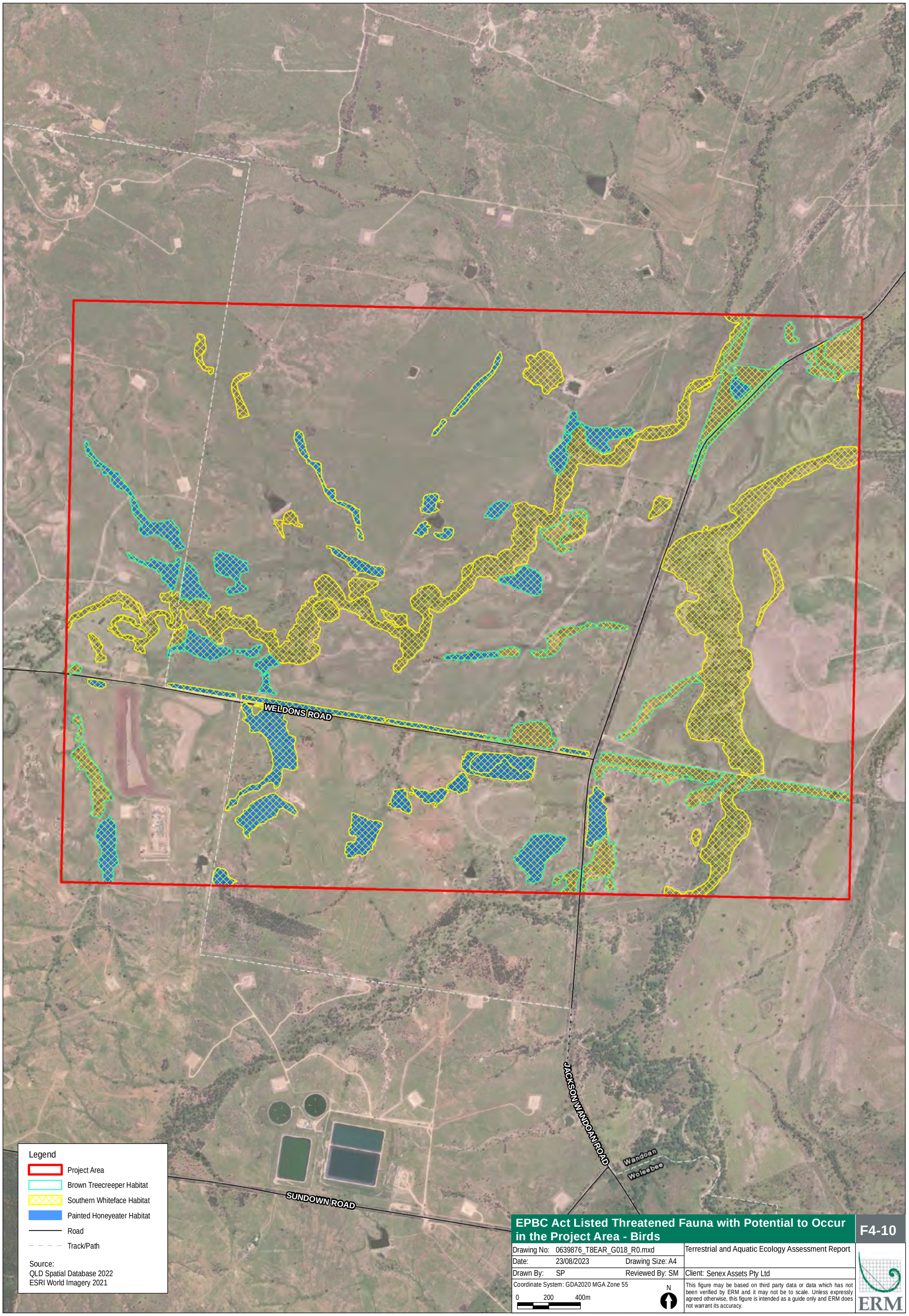

EPBC Act Listed Threatened Fauna with Potential to Occur in the Project Area - Birds

F4-10

Drawing No:	0639876_T8EAR_G018_R0.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	SP	Reviewed By: SM	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

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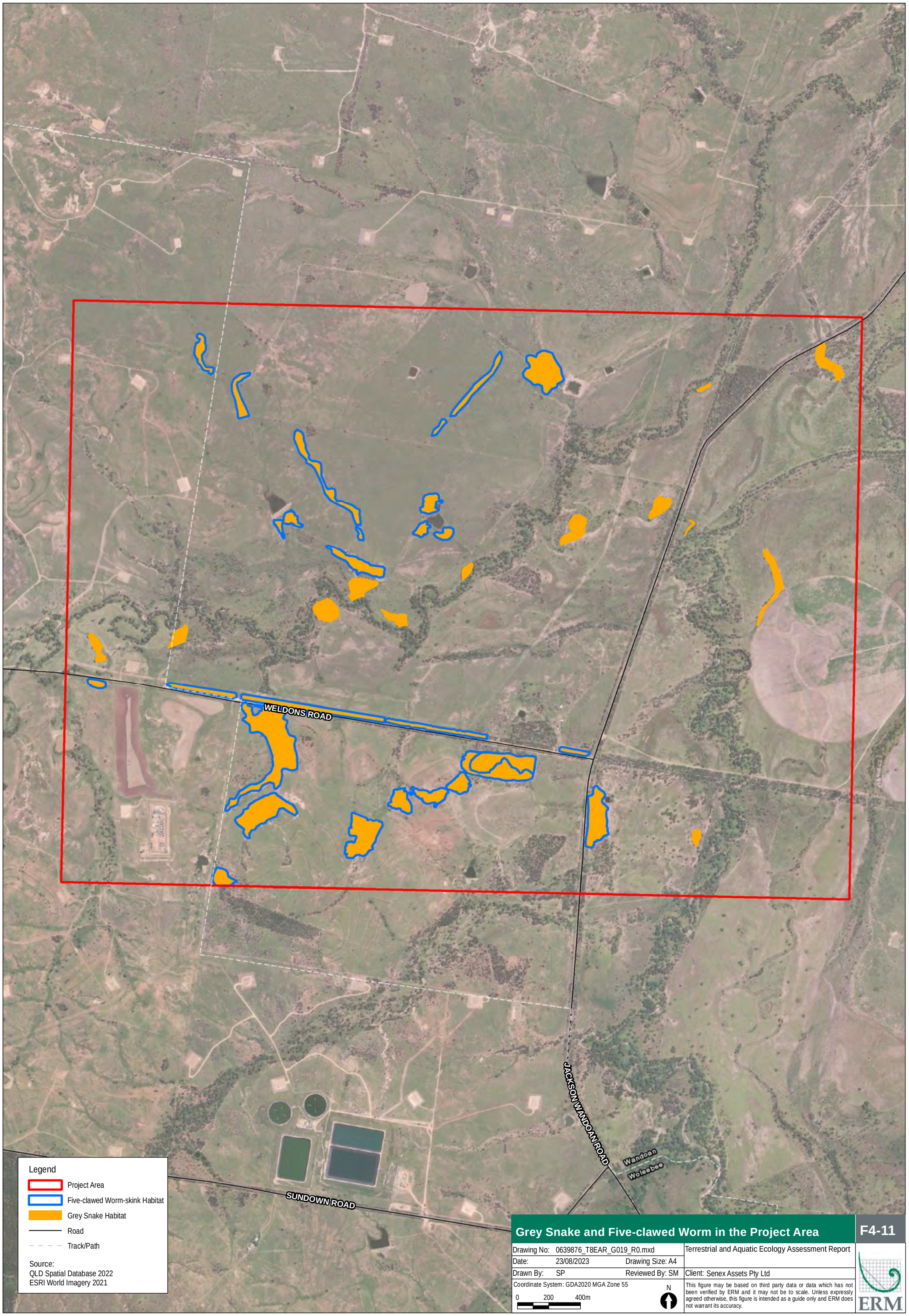

Grey Snake and Five-clawed Worm in the Project Area

F4-11

Drawing No:	0639876_T8EAR_G019_R0.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	SP	Reviewed By: SM	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

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4.4.5 Aquatic Listed Threatened Fauna Species

A total of 2,192 individual fish from eight species, one species of turtle and three species of frog were recorded. No listed threatened species were identified during the field surveys. Two EPBC Act listed threated aquatic fauna species were identified in the desktop review as potentially occurring in and adjacent to the Project Area, these being:

- White-Throated Snapping Turtle (*Elseya albagula*) – Critically Endangered; and
- Fitzroy River Turtle (*Rheodytes leukops*) – Vulnerable.

After completing a likelihood of occurrence, both species were considered unlikely to occur within the Project Area (Appendix B).

4.4.6 Listed Migratory Species

Two EPBC Act listed migratory species have been considered as known, and likely to occur within the Project Area, the White-throated Needletail and the Fork-tailed Swift, respectively.

The White-throated Needletail is largely an aerial species when on migration through Australia, only occasionally stopping to roost in Eucalypt forests (Higgins, 1999). As a result, it is considered unlikely there will be a significant impact. It should be noted that this species is also listed as Vulnerable under the EPBC Act, however due to its aerial nature, it is also unlikely to be significantly impacted by Project activities. Additionally, the White-throated Needletail was observed during subsequent field surveys for Senex on 24 November 2022 (Cunningham, M pers. comm.), as shown on Figure 4-7. This species is further described in Section 4.4.4.5.

The Fork-tailed Swift is almost exclusively aerial and occur mostly over inland plans and sometimes above foothills and coastal areas (Higgins, 1999). The Fork-tailed Swift was not observed during field surveys, and potential foraging habitat was assessed to occur over dry open habitats, where it would likely fly aerially over. Therefore, no habitat mapping was mapped on the ground.

4.4.6.1 Listed Migratory Species with Potential to Occur

Six listed migratory species have been determined as having the potential to occur within the Project Area (likelihood of occurrence found in Appendix B). There were no signs or observations of the species within the Project Area based on targeted field investigations across the field survey events using survey techniques aligned with survey guidelines, including:

- Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (Department of Environment, Water, Heritage and the Arts [DEHWA], 2017);
- Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act (DoE, 2015); and
- Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE, 2017).

The potential occurrence conclusion for these species was therefore based off presence of suitable habitat only, and/or the presence of records in the adjoining areas. Potential habitat for these species is largely associated with waterbodies and drainage features (predominately farm dams), that may occasionally be used. Therefore, even though no records for these species occur within the Project Area, they have been conservatively concluded as potentially occurring based on adjoining area records and/or the presence of habitat requirements.

The migratory species that have the potential to occur and their habitat within the Project Area is listed in Table 4-10. These include species that just have the potential to fly aerially overhead, and species that have the potential to stop over within the Project Area in very limited suitable habitat in (ephemeral wetlands on drainage lines and farm dams).

Table 4-10: EPBC Act Listed Migratory Species with Potential to Occur within the Project Area

Species Name	Common Name	EPBC Act Status	Potential Habitat within the Project Area*
Actitis hypoleucos	Common Sandpiper	Mi	■ Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.
Gallinago hardwickii	Latham's Snipe	Mi	■ Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.
Cuculus optatus	Oriental Cuckoo	Mi	■ There are limited areas of potential habitat in the form of remnant woodlands and non-remnant patches of native vegetation, within the Project Area.
Rhipidura rufifrons	Rufous Fantail	Mi	■ There is some limited potential habitat present in the form of remnant and non-remnant woodlands within the Project Area.
Myiagra cyanoleuca	Satin Flycatcher	Mi	■ There is some limited potential habitat present in the form of remnant and non-remnant woodlands within the Project Area.
Calidris acuminata	Sharp-tailed Sandpiper	Mi	■ Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.

Status listing per the EPBC Act; Mi =Migratory.
For the full reasoning for the likelihood of occurrence conclusions for these species, refer to 0.
**Information on potential habitat sourced from Appendix C (BOOBOOK, 2022)*

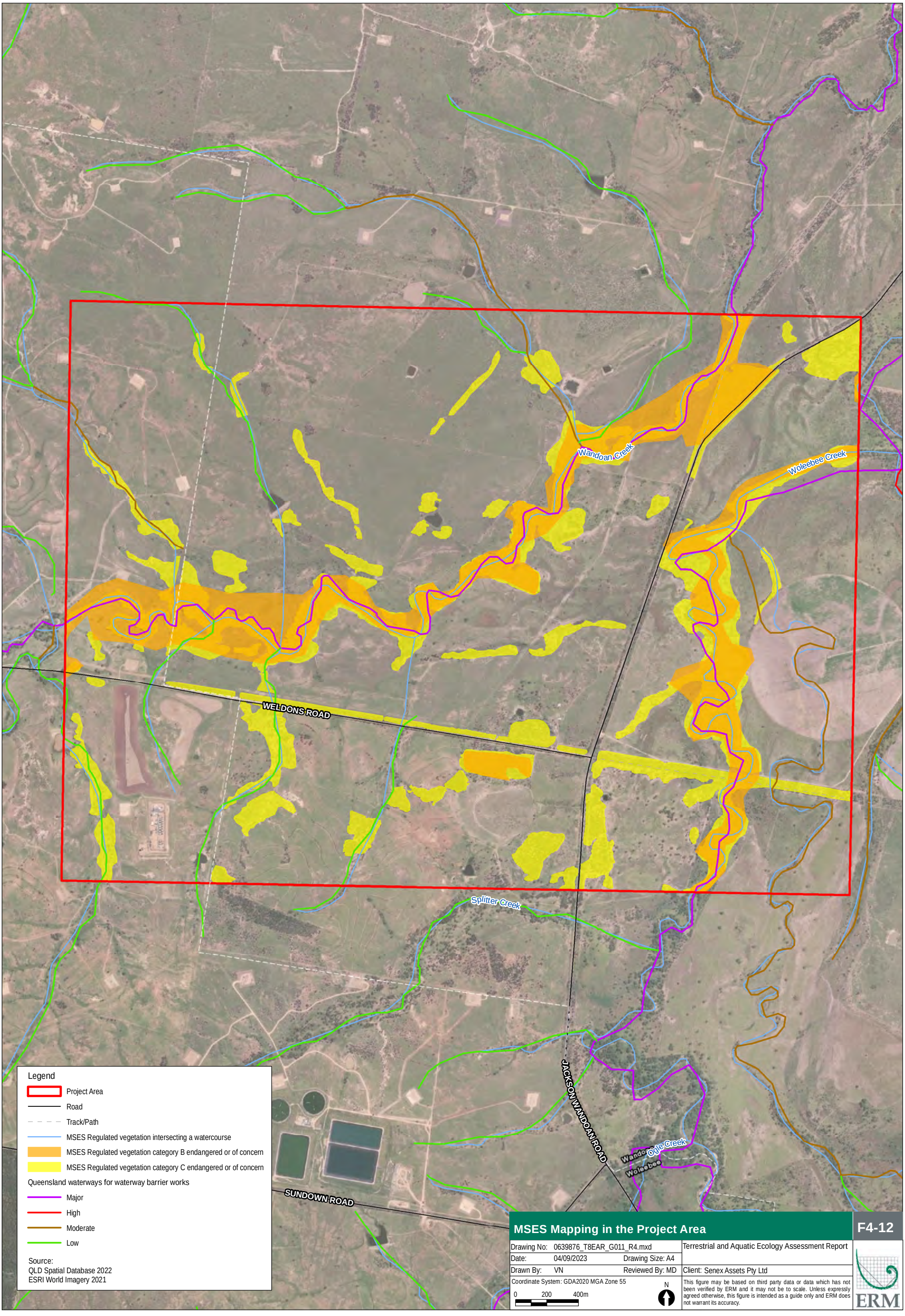
4.5 Matters of State Environmental Significance (MSES)

MSES are defined within the *Queensland Environmental Offsets Policy 2014* (QLD Offset Policy) for Significant Residual Impacts (SRI) (Department of State Development, Infrastructure and Planning, 2014) and prescribed activities assessable under the *Sustainable Planning Act 2009* (SPA). SPA has been superseded by the *Planning Act 2016*, but the QLD Offset Policy only references the SPA at this time.

The MSES relevant to the Project Area considered as part of this assessment are summarised in Table 4-11. MSES requiring assessment include Regulated Vegetation and protected wildlife habitat and are further detailed in this Section. MSES in the Project Area, based on desktop mapping supported by ground-truthing of representative locations, are presented on Figure 4-12.

Table 4-11: MSES within the Project Area

Prescribed Matter	Relevance to the Project	Assessment
Regulated Vegetation	1. **Category B remnant vegetation** – there is Endangered and Of Concern remnant vegetation present within the Project Area, totalling 199.5 ha. 2. **Defined distance of a watercourse** – watercourses intersect with regulated vegetation within the Project Area, totalling 0.3 ha. 3. **Wetland** – no regulated vegetation is within 100 m of a Vegetation Management Wetland within the Project Area. 4. **Essential Habitat** – there are no areas of essential habitat present within the Project Area.	**1-2 required**
Connectivity Areas	Connectivity areas within the Project Area are comprised chiefly of vegetation associated with watercourses, including Woleebee Creek. The main connectivity areas within the adjoined areas (10 km buffer of Project Area) are located to the south and east and will not be affected by the proposed development.	Not required
Wetlands and Watercourses	In accordance with the Development Assessment Mapping Systems (DAMS) mapping, there are no wetlands or watercourses mapped as high ecological significance, or high ecological value, within the Project Area.	Not required
Designated Precincts in Strategic Environmental Areas	In accordance with the DAMS mapping, no Regional Interest areas are recorded over the Project Area. This mapping is in accordance with the *Regional Planning Interests Act 2014* which governs the framework for Strategic Environmental Areas.	Not required
Protected Wildlife Habitat	Habitat for seven listed threatened fauna species were considered known or likely to occur within the Project Area: ■ Greater Glider listed as Endangered (174.5 ha habitat) (see Figure 4-6); ■ Dulacca Woodland Snail listed as Vulnerable (52.6 ha habitat) (see Figure 4-8); ■ Glossy Black-cockatoo listed as Vulnerable (236.2 ha habitat) (see Figure 4-7); ■ Golden-tailed Gecko listed as Near Threatened (308 ha habitat) (see Figure 4-15); ■ Koala listed as Endangered (245.4 ha preferred breeding and foraging habitat and 1,602.5 ha general dispersal habitat) (see Figure 4-5); ■ Pale Imperial Hairstreak listed as Vulnerable (48.1 ha habitat) (see Figure 4-16); ■ White-throated Needletail listed as Vulnerable (no habitat mapped as aerial flyover visitor only to the Project Area).	**Required**
Protected Areas	There are no Protected Areas within the Project Area.	Not required
Declared Fish Habitat Areas and Highly Protected Zones of State Marine Parks	In accordance with DAMS mapping, there are no declared fish habitat areas within the Project Area.	Not required
Waterways Providing for Fish Passage	In accordance with DAMs mapping, there are a number of waterways defined by the Fisheries Act within the Project Area. Any works will be in accordance with the Fisheries Act and relevant waterway barrier codes as per QLD legislation.	**Required if works cause a waterway barrier**
Marine Plants	There are no marine plant communities within the Project Area.	Not required
Legally Secured Offset Areas	There are no legally secured offset areas within the Project Area.	Not required


Wandoan Creek
Woleebee Creek
WELDONS ROAD
Splitter Creek
JACKSON WANDOAN ROAD
Wandoan Ogle Creek
Woleebee
SUNDOWN ROAD
Legend
Project Area
Road
Track/Path
MSES Regulated vegetation intersecting a watercourse
MSES Regulated vegetation category B endangered or of concern
MSES Regulated vegetation category C endangered or of concern
Queensland waterways for waterway barrier works
Major
High
Moderate
Low
Source:
QLD Spatial Database 2022
ESRI World Imagery 2021
MSES Mapping in the Project Area
F4-12
Drawing No: 0639876_T8EAR_G011_R4.mxd
Terrestrial and Aquatic Ecology Assessment Report
Date: 04/09/2023
Drawing Size: A4
Drawn By: VN
Reviewed By: MD
Client: Senex Assets Pty Ltd
Coordinate System: GDA2020 MGA Zone 55
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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
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4.5.2 Regional Ecosystems

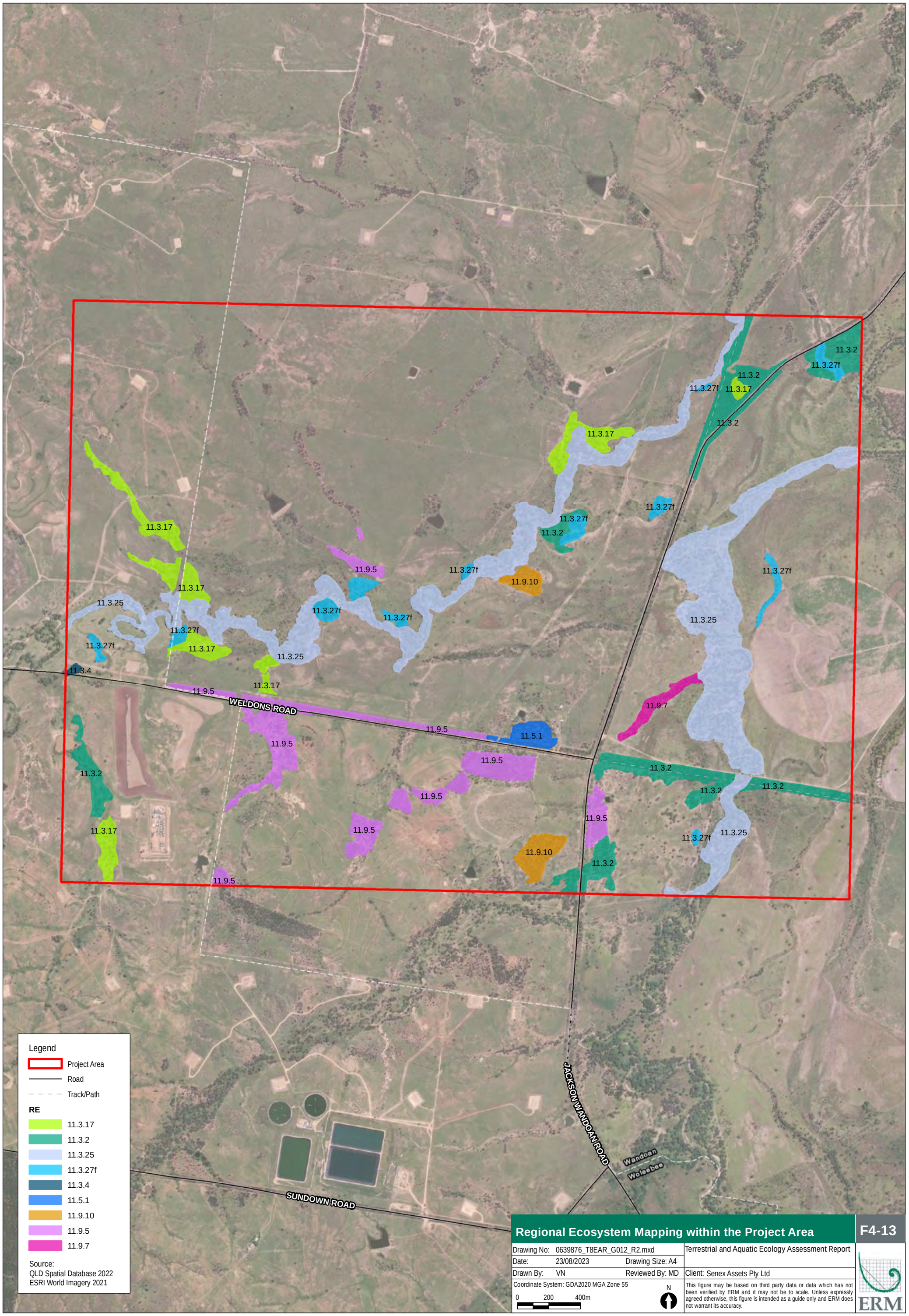
The VM Act distinguishes between vegetation that is Endangered, Of Concern, or Least Concern REs are Queensland vegetation communities found within a particular bioregion that have a consistent combination of geology, landform, and soil type, as determined by the Queensland Herbarium.

There are 10 REs mapped within the Project Area that account for a total of 307.9 ha of native vegetation. Eight of these REs are classed under the VM Act as Endangered or Of Concern. The dominant vegetation communities identified in desktop searches and verified by field surveys were RE 11.3.25: *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.

REs ground-truthed within the Project Area are listed in Table 4-12 and mapped in Figure 4-13.

Table 4-12: Ground-truthed Regional Ecosystems Detected within the Project Area

RE Code	Description	Structure Category	VMA Class	Biodiversity Status	Area within Project Area (ha)	% of Project Area
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata open forest* on alluvial plains	Mid-dense	E	E	8.2	0.44
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Sparse	OC	OC	51.9	2.81
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains	Sparse	OC	OC	0.5	0.03
11.3.17	*Eucalyptus populnea* woodland with *Acacia harpophylla* and/or *Casuarina cristata* on alluvial plains	Sparse	OC	E	33.8	1.83
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Sparse	LC	OC	130.5	7.06
11.3.27f	Freshwater wetlands: *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	Other	LC	OC	13.8	0.75
11.5.1	*Eucalyptus crebra* and/or *E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces	Sparse	LC	NC	4.3	0.23
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Mid-dense	E	E	52.6	2.85
11.9.7	*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	Sparse	OC	OC	3.6	0.20
11.9.10	Eucalyptus populnea open forest with a secondary tree layer of Acacia harpophylla and sometimes Casuarina cristata on fine-grained sedimentary rocks	Mid-dense	OC	E	8.7	0.47


11.3.2
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11.3.27f
11.3.17
11.3.25
11.3.4
11.3.17
11.9.5
WELDONS ROAD
11.9.5
11.9.7
11.5.1
11.9.5
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11.3.2
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11.9.5
11.9.5
11.3.17
11.9.5
11.3.27f
11.3.25
11.9.10
11.3.2
11.9.5
JACKSON WANDOAN ROAD
Wandoan
Woleebee
SUNDOWN ROAD
Legend
Project Area
Road
Track/Path
RE
11.3.17
11.3.2
11.3.25
11.3.27f
11.3.4
11.5.1
11.9.10
11.9.5
11.9.7
Source:
QLD Spatial Database 2022
ESRI World Imagery 2021
Regional Ecosystem Mapping within the Project Area
F4-13
Drawing No: 0639876_T8EAR_G012_R2.mxd
Terrestrial and Aquatic Ecology Assessment Report
Date: 23/08/2023
Drawing Size: A4
Drawn By: VN
Reviewed By: MD
Client: Senex Assets Pty Ltd
Coordinate System: GDA2020 MGA Zone 55
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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
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4.5.3 Regulated Vegetation

A vegetation clearing permit will be required for any disturbance to Category B Regulated Vegetation, while Category C will be required to be avoided. However, disturbance to Of Concern and Endangered REs will likely also require an assessment against the SRI Guideline with the potential to trigger offsets if impact thresholds are exceeded. Where disturbance to Least Concern REs occurs that is also regarded as habitat for listed threatened species, the *Queensland Environmental Offsets Policy – Significant Residual Impact Guideline 2014* will apply (also applies to MSES, regulated under the VM Act and NC Act).

The Project Area contains patches of both Category B, Category C and Category R Regulated Vegetation, as shown in Figure 4-12. There is approximately 199.5 ha of Category B and 8.4 ha of Category C Regulated Vegetation within the Project Area. There is a total of 102 ha of Category R Regulated Vegetation.

4.5.4 Environmentally Sensitive Areas

There are no Category A ESA within the Project Area. Category B ESA within the Project Area are ground-truthed Endangered RE (Biodiversity Status), which consists of patches of the following RE: 11.3.17, 11.9.5 and 11.9.10.

Category C ESA within the Project Area includes ground-truthed habitat for EVNT species listed under the NC Act (Stevens, 2023) and ground-truthed remnant and regrowth vegetation within government mapped areas of ‘essential habitat’ or ‘essential regrowth habitat’, and Of Concern RE (Biodiversity Status), which comprises the following RE: 11.3.2, 11.3.4, 11.3.25, 11.3.27f and 11.9.7.

ESA in the Project Area include the extensive riparian corridors along Wandoan Creek and Woleebee Creek (Category C). ESA also comprise small fragments of Brigalow and/or Belah woodland, including areas with co-dominant Poplar Box, either fringing riparian corridors or scattered across the surrounding undulating downs (Category B). There is 308.25 ha of Category C ESA within the Project Area, as presented on Figure 4-12.

Koala dispersal habitat is defined by DCCEEW pursuant to the EPBC Act, however, dispersal habitat does not meet the criteria for ‘essential habitat’ under the VM Act. Essential habitat is defined as Category A (declared, offset or exchange area), Category B (remnant) or Category C (regrowth) areas of regulated vegetation on the regulated vegetation management map, that have at least 3 essential habitat factors for the protected wildlife. This must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or in which the protected wildlife, at any stage of its life cycle, is located.

Koala foraging and breeding habitat have been mapped in Figure 4-12 as eucalypt woodlands and open forests. However, since Koala dispersal areas within the Project Area do not meet the criteria for ‘essential habitat’ as they do not contain remnant or regrowth eucalypt woodlands as defined by the VM Act, they have not been mapped in Figure 4-12 as Category C ESAs.

4.5.5 Habitat Assessments

4.5.5.1 Terrestrial Habitat

The vegetation conditions of four REs, that represented the major vegetation types in the Project Area, were assessed using the BioCondition methodology of Eyre *et al*. (2015). All BioCondition sites were in remnant vegetation, resulting in a total of nine AU’s being assessed (AU defined by a combination of RE and growth status (remnant or regrowth)).

All AU received moderate (0.40 – 0.60) to high (0.60 – 0.80) BioCondition scores, reflecting:

- Significant disturbance and consequent loss of ecosystem integrity relative to intact areas of each RE; and/or
- landscape level fragmentation with small patch size, low connectivity and a low proportion of remnant and regrowth vegetation in the surrounding landscape.

Terrestrial BioCondition site characteristics and scores are summarised in Section 3.2.2 in Appendix D.

4.5.5.2 Aquatic Habitat

Full descriptions of physical parameters and habitat for each site assessed in March 2022 field surveys are provided in Appendix D. The availability and quality of aquatic habitat is strongly influenced by water permanency. five of the nine sites held water in March 2022 while all other sites were dry. Instream habitat was mostly found to be in 'fair' condition across all sites sampled, except for one (TH2) which was determined to be in 'poor' condition.

Further information found in Section 4.4 of Appendix D.

4.5.6 Terrestrial Flora Species

No threatened flora species listed under the NC Act were recorded during field surveys.

Based on the likelihood of occurrence assessment, five NC Act listed threatened flora species, were considered as having potential to occur within the Project Area (Figure 4-13). A summary of the six other listed threatened terrestrial flora species that have potential to occur and their associated habitat within the Project Area per the MSES Guidelines, is presented in Table 4-13. Potential habitat mapping for those species that are listed under the NC Act only (Red-soil Woolly Wrinklewort, Thomby Range Wattle and Winged Nightshade) is presented on Figure 4-14. Habitat mapping is presented for Slender Tylophora and Belson's panic in Figure 4-3 as they are also MNES.

Table 4-13: NC Act Listed Threatened Flora with Potential to Occur in the Project Area

Scientific Name	Common Name	NC Act Status	Likelihood of Occurrence	Potential Habitat in the Project Area*
Homopholis belsonii	Belson's Panic	VU	Potential	■ Potential habitat for this species includes the broad habitat types of Eucalypt dominated woodlands mainly of *E. crebra, E. populnea* and *E. melanophloia* and Acacia woodlands dominated by Brigalow (*Acacia harpophylla*). ■ 158.8 ha of potential habitat has been mapped within the Project Area.
Rutidosis lanata	Red-soil Woolly Wrinklewort	NT	Potential	■ Potential habitat for this species is ecotonal transitions of the broad habitat types of Eucalypt dominated woodlands mainly of *E. crebra, E. populnea* and *E. melanophloia* and Acacia woodlands dominated by Brigalow (*Acacia harpophylla*). ■ 69.2 ha of potential habitat has been mapped within the Project Area.
Vincetoxicum forsteri	Slender Tylophora	EN	Potential	■ Potential habitat for this species includes Eucalypt dominated woodlands mainly of *E. crebra,* and *E. melanophloia.* ■ 4.3 ha of potential habitat has been mapped within the Project Area.

Scientific Name	Common Name	NC Act Status	Likelihood of Occurrence	Potential Habitat in the Project Area*
Acacia wardellii	Thomby Range Wattle	NT	Potential	■ Potential habitat is comprised of small amounts of the Eucalypt dominated woodlands mainly of *E. crebra, E. populnea* and *E. melanophloia.* ■ 4.3 ha of potential habitat has been mapped within the Project Area.
Solanum stenopterum	Winged Nightshade	VU	Potential	■ Potential habitat includes the broad habitat types of Eucalypt dominated woodlands mainly of *E. crebra, E. populnea and E. melanophloia* and Acacia woodlands dominated by Brigalow (*Acacia harpophylla*). ■ 158.8 ha of potential habitat has been mapped within the Project Area.

Status listing per the NC Act: EN = Endangered, VU = Vulnerable, NT = Near Threatened.
**Information on potential habitat sourced from BOOBOOK, 2022 in 0.*

WELDONS ROAD

SUNDOWN ROAD

JACKSON WANDOAN ROAD

Wandoan

Woleebee

Legend

- Project Area
- Road
- Track/Path
- Red-soil Woolly Wrinklewort (*Rutidosis lanata*) Habitat
- Thomby Range Wattle (*Acacia wardellii*) Habitat
- Winged Nightshade (*Solanum stenopterum*) Habitat

Source:
QLD Spatial Database 2022
ESRI World Imagery 2021

NC Act listed threatened flora species with Potential to Occur in the Project Area

F4-14

Drawing No:	0639876_T8EAR_G013_R2.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

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4.5.6.1 Invasive Flora Species

Four species of weeds (invasive plants) proscribed as Category 3 restricted matter under the Biosecurity Act were detected during field surveys within the Project Area:

- Velvety Tree Pear (*Opuntia tomentosa*) - common throughout the Project Area occurring at low to moderate density in remnant and regrowth woodland and in non-remnant pasture;
- Common Pest Pear (*O. stricta*) - common throughout the Project Area occurring at low to moderate density in remnant and regrowth woodland and in non-remnant pasture;
- Harrisia Cactus (*Harrisia martinii*) - low density in two locations in the Project Area; and
- Mother-of-millions (*Kalanchoe delagoensis*) - detected in one location, each of which are in Poplar Box woodland on floodplains with numerous shallow drainage channels (BOOBOOK, 2022).

Opuntia species recorded are classified as WoNS and is described in Section 4.4.2.1.

4.5.6.2 Aquatic Flora Species

Across all survey sites, aquatic macrophyte diversity was relatively poor with the highest diversity recorded in a billabong adjacent to Wandoan Creek. Two floating attached macrophyte species and nine emergent macrophyte species were recorded across all sites. Floating attached macrophytes were recorded at only two sites and no submerged or floating attached macrophyte species or species listed under state legislation as threatened were detected (Freshwater Ecology, 2022). Further information is provided in Section 4.5 of Appendix D.

4.5.7 Terrestrial Fauna Species

Four reptiles, 13 mammals, 123 birds and three butterfly non-NC Act listed species were located in the Project Area during field surveys. Eight NC Act listed threatened species are considered as known or likely to occur within the Project Area: Dulacca Woodland Snail, Koala, Greater Glider, Glossy Black-cockatoo, Golden-tailed Gecko, Pale Imperial Hairstreak, Short-beaked Echidna and White-throated Needletail. A summary of listed threatened species that are known or considered likely to occur and their associated preferred and general habitat within the Project Area per the SRI Guidelines, is provided in Table 4-14.

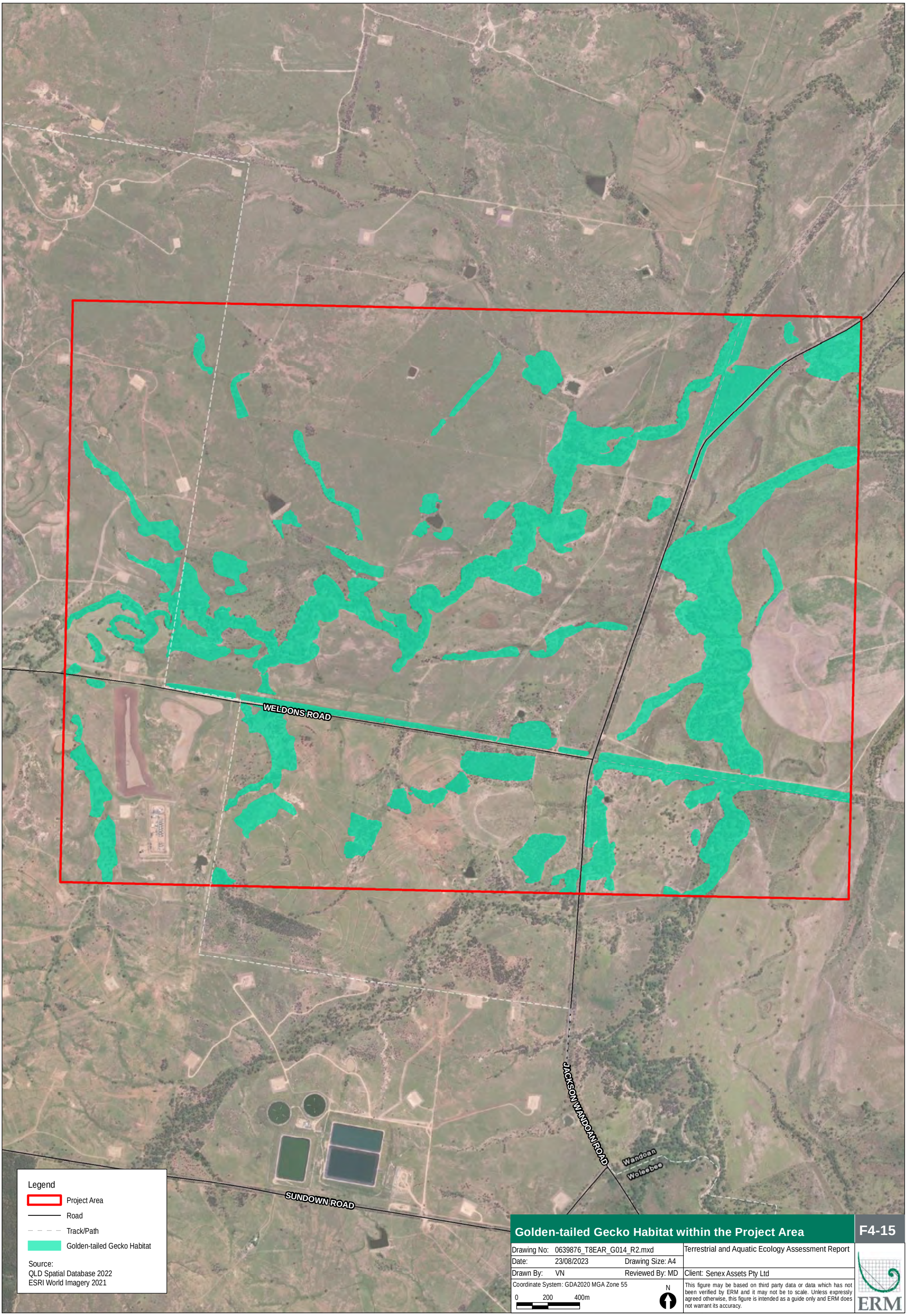
Habitat mapping is provided for the Koala in Figure 4-5, for the Greater Glider in Figure 4-6, for the Glossy Black-cockatoo in Figure 4-7, for the Dulacca Woodland Snail in Figure 4-8, for the Golden-tailed Gecko in Figure 4-15, and the Pale Imperial Hairstreak in Figure 4-16. No habitat mapping was prepared for the White-throated Needletail as it is considered to only be a likely transient fly-over visitor to the Project Area. Additionally, no mapping was prepared for the Short-beaked Echidna as its habitat is likely to be present for the whole Project Area.

Table 4-14: NC Act Listed Threatened Fauna Species Known or Likely to Occur within the Project Area

Scientific Name	Common Name	Status	Likelihood of Occurrence	Habitat Definition, Records and Regional Importance of the Species
		NC Act		
Adclarkia dulacca	Dulacca Woodland Snail	EN	Likely	■ The Dulacca Woodland Snail has been recorded within the adjoined areas to the Project Area (a 10 km buffer) in Brigalow woodland areas (ALA, 2022). Suitable habitat of woodland consisting of *Brigalow woodlands dominated by Acacia harpophylla* is present within the Project Area. It has therefore been concluded as likely to occur within the Project area. ■ Figure 4-8 identifies the habitat for the Dulacca Woodland Snail in the Project Area. The total amount of habitat for this species within the Project Area is 52.6 ha.
Calyptorhynchus lathami lathami	Glossy Black-cockatoo	VU	Likely	■ The Glossy Black-cockatoo has previously been recorded within the Project Area (BOOBOOK 2021a, DES 202a), and two recent sightings (2009) have been reported within the adjoined areas of the Project Area). This is a specialised feeder dependent on seeds of Casuarinaceae (She-oak) trees. Breeding pairs nest in large hollows generally high up in large eucalypt trees or stags near water and food sources (Pavey et al. 2016). The species is capable of moving among isolated trees and small habitat patches within fragmented landscapes (Pavey et al. 2016, Holmes 2012). Casuarinaceae food trees are abundant within the Project Area including Belah (*Casuarina cristata*), which occurs throughout the Project Area and Bull Oak (*Allocasuarina luehmannii*), which occurs in scattered woodland patches on sandy soils, however no evidence of feeding (chewed cones) was observed during field surveys. Potential nest trees also occur in remnant Eucalypt woodland and forest and in well-developed riparian corridors across the Project Area (BOOBOOK, 2022). ■ Figure 4-7 identifies the habitat for the Glossy Black-cockatoo in the Project Area. The total amount of preferred habitat for this species within the Project Area is 236.2 ha.
Strophurus taenicauda	Golden-tailed Gecko	NT	Likely	■ The Golden-tailed Gecko has been recorded within the adjoined areas to the Project Area (a 10 km buffer) in woodland and regrowth areas. (ALA, 2022). Suitable habitat of woodland consisting of Acacia spp. are present within the Project Area. ■ Figure 4-15 identifies the potential habitat for the Golden-tailed Gecko in the Project Area. The total amount of preferred habitat for this species within the Project Area is 308 ha.
Petauroides armillatus (Petauroides volans)	Greater Glider	EN	Known	■ The species was detected in Queensland Blue Gum woodland in the north of the Project Area, in the remnant riparian corridors along Wandoan Creek. The species is likely to occur wherever large trees with hollows occur in woodland connected with these corridors and also in the extensively wooded in the south of the Project Area. ■ Figure 4-6 identifies the habitat Greater Glider in the Project Area. The total amount habitat for this species within the Project Area is 174.5 ha.

Scientific Name	Common Name	Status NC Act	Likelihood of Occurrence	Habitat Definition, Records and Regional Importance of the Species
Phascolarctos cinereus	Koala	EN	Likely	■ The field investigations conducted throughout 2022 did not directly record an individual Koala but did find evidence of the Koala through indirect signs of scratch marks on riparian Queensland Blue Gum (*Eucalyptus tereticornis*) trees in several locations along Wandoan Creek. The Koala is generally found in a range of temperate to tropical forests as well as woodlands and semi-arid communities dominated by *Eucalyptus spp.* (Martin & Handasyde, 1999). Koalas are also known to inhabit regrowth habitat. Due to the indirect method of recording Koala presence from scratch marks, there is a level of uncertainty that the scratches were from Koalas. No Koala faecal pellets were observed. No records or evidence of Koalas occurs elsewhere in the Project Area, despite targeted searches. From this information, it is considered that koala occurrence in the Project is very rare however applying the precautionary principle it's likelihood of occurrence has been assessed as likely. ■ Figure 4-5 identifies the preferred and general habitat for the Koala in the Project Area. The total amount of foraging and breeding habitat for this species within the Project Area is 245.4 ha, and general habitat for the species is 1,602.5 ha. It is noted that Koala habitat that is mapped as foraging and breeding is preferred habitat, and the dispersal habitat is regarded as general habitat, per the SRI Guidelines.
Jalmenus eubulus	Pale Imperial Hairstreak (Butterfly)	VU	Likely	■ The Pale Imperial Hairstreak has been recently recorded in the nearby Gurulmundi State Forest. ■ Occurs in Poplar box and Casuarina woodland, as well as grassland in clay and loam soils. Distributed across the Darling Downs region. The species has been recorded from the Condamine floodplain around Dalby, Chinchilla and Condamine and also from two localities along Channing Creek (ALA 2022). ■ Figure 4-16 identifies the potential habitat for the Pale Imperial Hairstreak in the Project Area. The total amount of preferred habitat for this species within the Project Area is 48.1 ha.
Tachyglossus aculeatus	Short-beaked Echidna	SLC	Likely	■ Recent records are present for this species in the adjoining areas. This species can be found across a wide range of habitats, including open woodland, semi-arid and arid areas as well as in agricultural areas (Aplin et al., 2016). Their foraging requirements include ant nests and termite mounds (Nicol et al., 2011). ■ The total amount of habitat for this species within the Project Area is 1,847.9 ha. This habitat has not been mapped as the species will inhabit the entire of the Project Area.

Scientific Name	Common Name	Status NC Act	Likelihood of Occurrence	Habitat Definition, Records and Regional Importance of the Species
Hirundapus caudacutus	White-throated Needletail	VU	Known	■ The White-throated Needletail was recorded during subsequent field surveys for Senex on 24 November 2022 (Cunningham, M pers. comm.), as shown on Figure 4-7. ■ Species likely only to fly aerially over the Project Area (through September to April on its migration), which contains no rainforest vegetation. The Project Area does not contain habitat in the form of elevated Eucalypt forests or wooded ridges to act as foraging and roosting habitat for the species. ■ Habitat mapping has therefore not been undertaken for this species as it is only likely to fly aerially over the Project Area.
Status listing per the NC Act: EN= Endangered, VU = Vulnerable; NT = Near Threatened; and SLC = Special Least Concern				



Golden-tailed Gecko Habitat within the Project Area

F4-15

Drawing No:	0639876_T8EAR_G014_R2.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

N

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

WELDONS ROAD

JACKSON WANDOAN ROAD

SUNDOWN ROAD

Wandoan

Woleebee

Legend

- Project Area
- Road
- Track/Path
- Pale Imperial Hairstreak Habitat

Source:
QLD Spatial Database 2022
ESRI World Imagery 2021

Pale Imperial Hairstreak Habitat within the Project Area

F4-16

Drawing No:	0639876_T8EAR_G015_R2.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

0 200 400m

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ERM

4.5.7.1 Terrestrial Fauna Species with Potential to Occur

Based the likelihood of occurrence, eight NC Act listed fauna species are considered to have the potential to occur within the Project Area (Table 4-15). In essence, because part of these species' distributions overlaps with the Project Area and the occurrence of suitable habitat, their presence cannot be ruled out. This is despite no signs or observations of these species within the Project Area during field surveys using survey techniques aligned with survey guidelines. In accordance with the precautionary principle, 'potential habitat' for species with habitat present was mapped.

Table 4-15 provides details on these two species that have been assessed to have a potential to potential to occur, and there general and/or preferred habitat mapped within the Project Area, in accordance with the requirements within the MSES SRI Guideline. Mapping for all species has been presented in the MNES Section, in Figure 4-12.

Table 4-15: NC Act Listed Threatened Fauna Species with Potential to Occur within the Project Area

Species Name	Common Name	NC Act Status	Potential Habitat Mapped within the Project Area*
Birds			
Rostratula australis	Australian Painted Snipe	EN	■ 13.9 ha of potential habitat is present within the Project Area. ■ Potential habitat includes small areas of ephemeral wetland habitat within the Project Area; however, these may only periodically provide temporary refuges for this species. These areas correspond with riparian with riparian woodlands. This aligns with the broad habitat type of Riparian and wetland Eucalypt woodlands dominated by *E. tereticornis.*
Climacteris picumnus victoriae	Brown Treecreeper	V	■ 102.88 ha of potential habitat is present within the Project Area. ■ Potential habitat includes small patches of suitable dry Eucalyptus woodland and/or forests habitats throughout the Project Area.
Stagonopleura guttata	Diamond Firetail	E	■ 307.93 ha of potential habitat is present within the Project Area. ■ Potential habitat includes any Eucalypt woodlands and/or forests throughout the Project Area, including Acacia dominated areas.
Anomalopus mackayi	Five-clawed Worm-skink	V	■ 60.75 ha of potential habitat is present within the Project Area. ■ Potential habitat includes Brigalow woodlands with coarse woody debris and deep leaf litter cover, as well as ephemeral wetlands and creek lines along with cracking clay soils in some areas.
Hemiaspis damelii	Grey Snake	E	■ 74.67 ha of potential habitat is present within the Project Area. ■ Potential habitat in the form of Brigalow and Belah woodlands are present in the Project Area, as well as ephemeral wetlands and creek lines with cracking clay soils in some areas.
Grantiella picta	Painted Honeyeater	V	■ 95.1 ha of potential habitat is present within the Project Area. ■ Potential habitat comprises remnant and regrowth communities with abundant Acacia and Casuarina hosts of Mistletoes. Potential habitat comprises larger contiguous areas of remnant and regrowth woodland and open forest, more specifically with a multilayered shrubby understorey which the species prefers. This is made up of broad habitat type Eucalypt dominated woodlands mainly of *E. crebra*, *E. populnea* and *E. melanophloia*.

Species Name	Common Name	NC Act Status	Potential Habitat Mapped within the Project Area*
Aphelocephala leucopsis	Southern Whiteface	V	■ 307.93 ha of potential habitat is present within the Project Area. ■ Southern Whiteface has the potential to utilise almost all habitats present within the Project Area, with the exception of grazed land.

Status listing per the NC Act: EN = Endangered; VU = Vulnerable.
For the full reasoning for the potential outcomes for such species, refer to 0.
**Information on potential habitat sourced from* Appendix C *(BOOBOOK, 2022)*

4.5.7.2 Invasive Fauna Species

Evidence of pest fauna detected within the Project Area included infrequent Rabbit (*Oryctolagus cuniculus*) latrines, frequent Dingo or Dog (*Canis familiaris*) tracks, and Pig (*Sus scrofa*) scats and diggings. These species are listed as Category 3,4,5,6 or Category 3,4,6 restricted matter under the Biosecurity Act.

Locations for Biosecurity Act listed pest fauna recorded within the Project Area are shown in Appendix G of Appendix C (BOOBOOK, 2022).

4.5.8 Aquatic Fauna Species

A total of two 2,192 fish from eight species, one species of turtle and three species of frog were recorded. No listed threatened species were identified during the field surveys. Two EPBC Act listed threated aquatic fauna species were identified in the desktop review to potentially occur in and adjacent to the Project Area, these being:

- White-Throated Snapping Turtle - Critically Endangered; and
- Fitzroy River Turtle – Vulnerable.

After completing a likelihood of occurrence and the subsequent field surveys, both species were considered unlikely to occur within the Project Area (1.1).

4.5.8.1 Invasive Aquatic Fauna Species

One introduced species, Tilapia (*Oreochromis mossambicus)*, was recorded as juveniles at a single site. Tilapia is a restricted noxious fish under the Biosecurity Act.

4.5.9 Watercourses And Wetlands

The Project Area is located within the upper Dawson River catchment in the Fitzroy River Basin. The largest watercourse that passes through the Project Area is Woleebee Creek which drains into Juandah Creek approximately 15 kilometres to the north of the Project Area, before entering the Dawson River approximately 55 kilometres north of the Project Area. Watercourses present within the Project Area are ephemeral, flowing after rainfall periods. (Freshwater Ecology, 2022). The Project Area features watercourses on floodplains, surrounded by undulating hills. Watercourses (stream orders 1-4) intersect the Project Area, named watercourses include:

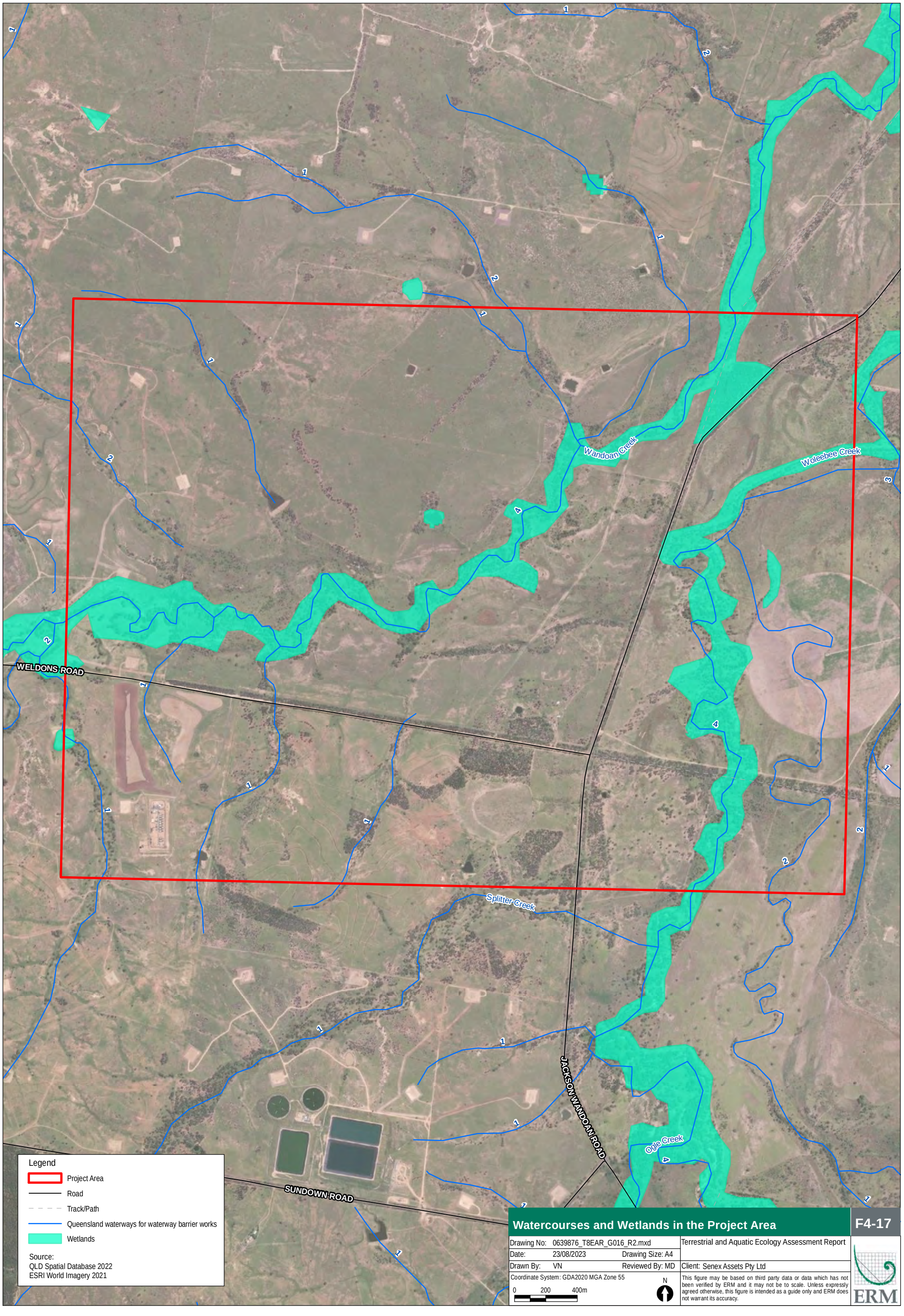
- Woleebee Creek runs south – north through the Project Area; and
- Wandoan Creek running from the northwestern boundary, meandering to the northern boundary of the Project Area, west of Jackson – Wandoan Road.

The Project Area contains watercourses mapped under the VM Act. The VM Act protects riparian vegetation associated with watercourses (Riparian Protection Zone [RPZ]), with the level or protection afforded dependent on the stream order:

- RPZ includes 10 m from the defining bank of a Stream Order 1 or 2 watercourse or drainage feature;
- RPZ includes 25 m from the defining bank of a Stream Order 3 or 4 watercourse or drainage feature; or
- RPZ includes 50 m from the defining bank of a Stream Order 5 or higher, watercourse of drainage feature.

The Project Area contains stream orders 1-4 watercourses. The Project Area contains watercourses mapped under the VM Act.

There are no Wetland Protection Areas or High Ecological Value (HEV) Wetlands mapped within the Project Area. There are no HEV Waterways that occur in the Project Area. Figure 4-17 shows the relevant drainage features and wetlands mapped throughout the Project Area.



Watercourses and Wetlands in the Project Area

F4-17

Drawing No:	0639876_T8EAR_G016_R2.mxd		Terrestrial and Aquatic Ecology Assessment Report
Date:	23/08/2023	Drawing Size: A4	
Drawn By:	VN	Reviewed By: MD	Client: Senex Assets Pty Ltd

Coordinate System: GDA2020 MGA Zone 55

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5. POTENTIAL IMPACTS

Activities associated with the project have the potential to cause both direct and indirect impacts to MNES and MSES, with the level of impact depending on the type and location of the activity proposed.

As previously described, the Project activities include the development of up to 31 gas wells and associated well site facilities; gas and water gathering systems for the producing wells; access tracks for operational purposes; brine and produced water storage; borrow pits; and ancillary supporting facilities.

Risks to biodiversity values associated with these activities include:

- Clearing of native vegetation and habitat for threatened and migratory species and threatened ecological communities;
- Introduction and/or spread of weed species;
- Disturbance or displacement to fauna species from foraging or roosting habitat, or breeding places;
- Degradation of threatened species habitats or threatened ecological communities as a result of dust, erosion or accidental release of hazardous materials;
- Habitat fragmentation;
- Inhibiting the ability of ecological communities or species to adapt and survive predicted climate change effects (for example through impeding migration pathways or inhibiting access to refuge areas); and
- Fauna injury during construction activities and movement of machinery/vehicles.

These potential impacts are further described in Table 5-1.

The vast majority of the Project Area is already disturbed (1,540 ha of the 1,847.9 ha area is non-remnant vegetation) and the total disturbance limit will be approximately 137 ha and is located to avoid remnant vegetation (potential habitat for listed threatened species).

Table 5-1: Potential Impacts to MNES and MSES in the Project Area

Potential Impact	Stage of Development	Relevance to the Project
Clearing of native vegetation and habitat for threatened and migratory species and threatened ecological communities, leading to disturbance or displacement of fauna species from foraging or roosting habitat, or breeding place	Construction	Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES and MSES threatened species, with the exception of Koala dispersal habitat and Short-beaked Echidna habitat. The areas of potential habitat for MNES and MSES that are known, likely or potentially occur within the Project Area are: ■ Australian Painted Snipe – 13.9 ha; ■ Belson's Panic – 158.8 ha; ■ Brown Treecreeper – 102.88 ha; ■ Diamond Firetail – 307.93 ha; ■ Dulacca Woodland Snail – 52.6 ha; ■ Five-clawed Worm-skink – 60.27 ha; ■ Glossy Black-cockatoo – 236.2 ha; ■ Greater Glider – 174.5 ha; ■ Grey Snake – 74.67 ha; ■ Koala foraging and breeding habitat – 245.4 ha;

Potential Impact	Stage of Development	Relevance to the Project
		■ Koala dispersal habitat - 1,602.5 ha and up to 137 ha impacted; ■ Painted Honeyeater – 95.1 ha; ■ Pale Imperial Hairstreak – 48.1 ha; ■ Short-beaked Echidna – 1,847.9 ha; ■ Slender Tylophora – 4.3 ha; ■ Southern Whiteface – 307.93 ha; and ■ White-throated Needletail – aerial only (no impacts). The maximum area to be disturbed represents a small portion of the overall Project Area (7.4%). A maximum of 8.5% of the previously cleared Koala dispersal habitat will be disturbed. However, despite minimising impacts where possible, this disturbance will result in the permanent removal of a relatively small proportion of these vegetation types and the habitat values they provide for native flora and fauna. It is noted that the flexibility in spacing of wells and the alignment of the gathering rights-of-way helps ensure that unavoidable clearing of RE / TEC avoided, and impacts are limited to smaller isolated locations rather than being in one contiguous area. The final disturbance footprint will aim to avoid and minimise impacts to vegetation and fauna habitat and further refinements will be made in accordance with the implementation of the Senex Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-EN-PLN-001]. This will be further discussed in Section 6.
Degradation of threatened species habitats or threatened ecological communities as a result of dust, erosion or accidental release of hazardous materials (indirect impacts)	Construction and Operation	Disturbances as a result of construction (and decommissioning), such as noise and dust, have the potential to negatively impact adjacent vegetation communities and habitats. Noise disturbances have the potential to influence breeding, roosting or foraging behaviour of native fauna. Studies suggest that the consistency of noise is more important than volume, with irregular and unpredictable noise being more disruptive to wildlife (Jones et al. 2015), as may be emitted during construction. For the general native fauna community, individuals may relocate to adjacent areas during times of noise disturbance. It is noted that noise associated with the project principally relates to well drilling which on average is completed in 3 days per well. Dust generated by vehicle and machinery movements has the potential to smother vegetation directly adjacent to the works and inhibit plant growth and palatability for native fauna. There are measures available to limit dust generation and dispersion. The disturbance footprint will be designed to limit the number of watercourse crossings, particularly where remnant vegetation is associated with the watercourse. The existing aquatic habitat features within the Project Area are generally heavily disturbed drainage features. Given the limited extent water features relative to the Project Area and the typically dry nature of the area, impacts are expected to be minimal. However, there are measures detailed within the Environmental Management Plan Atlas Stage 3 Gas Project {SENEX-ATLAS-EN-PLN-015] to limit erosion and runoff potential during rainfall events that may produce overland flows.

Potential Impact	Stage of Development	Relevance to the Project
Introduction and/or spread of weed species (indirect impacts)	Construction and Operation	The introduction and/or spread of weed and pest species has the potential to negatively impact native flora and fauna communities through competition for resources and/or predation. The majority of the Project Area and surrounds is cleared, pastoral property and introduced flora are common. Three WoNS species were recorded within the Project Area: tiger pear, common pest pear and velvety tree pear, and three additional species are considered potential to occur due to records within the buffered Project Area: parthenium weed, fireweed and madeira vine. Two additional species prescribed as Category 3 restricted matters under the Biosecurity Act, Harrisia Cactus and Mother-of-millions; and three other weeds of management interest, willows cactus, African Lovegrass and Brazilian Nightshade, were detected within the Project Area during field surveys.
Fauna injury during construction activities and movement of machinery/vehicles	Construction	The operation of vehicles and machinery within the Project Area has potential to lead to direct mortality or injury of resident fauna. Peak traffic period will be during the construction period with operational vehicle movements likely to be minimal. It is noted that well pad construction generally involves small crews with minimal truck movements and drill crews travel to site and stay on site whilst drilling. While many fauna groups are highly mobile (e.g., birds) and are likely to move when machinery and vehicles approach other less mobile groups (e.g., reptile and amphibians) may be more vulnerable to this impact. Similarly, there will be trenches excavated (construction only) which may provide a trapping hazard for some fauna groups (e.g., amphibians, small reptiles, small mammals).
Habitat fragmentation	Construction	The Project Area is located in a largely cleared landscape with limited tracts of vegetation to facilitate ecosystem connectivity. Dispersal opportunities within the remainder of the Project Area are largely restricted to riparian areas, primarily in association with Wandoan and Woleebee Creeks. The cleared, non-remnant areas are considered likely to impede dispersal for most (less common) reptiles, amphibians, small ground mammals and arboreal mammals. Well pad size (typically 0.6 ha) and distance between pads and flexibility in their locations as well as flexibility in the alignment of gathering so that gathering right-of ways will cross watercourses perpendicularly. Also, as the majority of the Project Area is made up of previously cleared land, the disturbance footprint will be able to be designed to avoid almost all vegetated corridors with high dispersal opportunity, consequently, the project is unlikely to have a substantial impact on connectivity and fragmentation.

Potential Impact	Stage of Development	Relevance to the Project
Inhibiting the ability of ecological communities or species to adapt and survive predicted climate change effects	Construction and Operation	The construction and operation of the project will involve potential impacts to listed species. Climate change is a listed threatening process for many ecological communities and species in the sense that increasing temperatures may cause the risk of warmer temperatures, the potential for bushfires to occur, as well as limiting available habitat at optimal conditions. Potential risks include impeding migration pathways or inhibiting access to refuge areas for listed species or restricting areas for threatened ecological community succession. The project is not predicted to exacerbate these potential impacts of climate change.
Loss of habitat, or degradation in vegetation quality from impacts associated with changes to groundwater hydrology	Construction and operation	Groundwater Dependent Ecosystems (GDE) have been mapped and identified within and adjoining the Project Area. These GDE occur within the riparian zones of Woleebee Creek and utilise alluvial sources of groundwater. There is potential for the drilling and gas extraction activities to impact on GDE during construction and operation phases. Terrestrial GDE mapped in the vicinity of the Project Area (DES, 2018) are also considered to source groundwater from the shallow alluvium, rather than the underlying Surat Basin units. However no significant impacts to GDEs are likely to occur as a result of the project (KCB, 2022).

6. MANAGEMENT AND MITIGATION MEASURES

Senex will implement an Environmental Protocol for Field Development and Constraints Analysis [SENEX-CORP-EN-PRC-019] (the Protocol) as is implemented for all Senex development in Queensland. The Protocol aims (among other things) to guide infrastructure siting that considers biodiversity values and environmental constraints when selecting preferential locations, aligning with planning principles to avoid, minimise, mitigate and then manage potential environmental impacts.

The project aims to avoid disturbance to TEC and other remnant vegetation (which represents the majority of habitat for threatened and migratory species). Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm on-ground biodiversity values will be undertaken by a suitably qualified person.

Other measures to be implemented will include:

- Atlas Stage 3 Gas Project Significant Species Management Plan;
- Implementing the Senex Queensland Fauna and Stock Management Procedure (SENEX-CORP-EN-PRC-021);
- Weed and pest management measures through the implementation of the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023);
- Environmental Management Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-015];
- Rehabilitation Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-018];
- ATP 2059 Coal Seam Gas Water Management Plan [SENEX-ATLAS-EN-PLN-013];
- Atlas Stage 3 Water Monitoring and Management Plan [SENEX-ATLS-EN-PLN-017];
- Delineation of ‘no-go’ areas clearly indicated for avoidance;
- Restricting access tracks to only low-level traffic with restricted speed;
- Erosion and sediment control measures;
- Dust management; and
- Appropriate storage and handling of fuel, oil and chemicals and appropriate spill response equipment.

These mitigation measures, relevant to each of the potential impacts, are further described in Table 6-1.

Table 6-1: Management and Mitigation Measures for the Project Area

Potential Impacts	Relevant Stage	Key Management and Mitigation Measures
Clearing of native vegetation and habitat for threatened and migratory species and threatened ecological communities, leading to disturbance or displacement to fauna species from foraging or roosting habitat, or breeding place.	Construction	■ The Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-EN-PLN-001] will be implemented. ■ There will be no clearing of any areas confirmed as MNES TECs or areas confirmed as habitat for MNES or MSES threatened species, with the exception of Koala dispersal habitat and Short-beaked Echidna habitat. ■ Vegetation will not be cleared unless authorised under a Senex Access to Work (ATW) permit. The ATW will be approved prior to any vegetation clearance or disturbance occurring. ■ All infrastructure will be located preferentially in pre-disturbed areas of land.

Potential Impacts	Relevant Stage	Key Management and Mitigation Measures
		■ Targeted surveys will be undertaken for threatened flora species with potential to occur, so that disturbance can be avoided where practicable, if they are found to occur. ■ Habitat assessment will be undertaken for threatened fauna where infrastructure is proposed, and habitat may be present. ■ RoW width will be minimised where practicable. ■ To prevent unnecessary land and vegetation disturbance, vehicles and equipment will be retained within the approved work zone. ■ 'No-go' areas will be GPS located and clearly marked e.g., with signage, bunting, flagging tape. ■ Reinstatement of areas which are not required for ongoing operational purposes. ■ Where identified as required, a qualified fauna spotter-catcher will conduct a search immediately prior to clearing of vegetation for the presence of fauna species. Where fauna are detected, the spotter catcher will assess and implement the most appropriate method to avoid or minimise impacts on that fauna as a result of clearing.
Degradation of threatened species habitats or threatened ecological communities as a result of dust, erosion or accidental release of hazardous materials (indirect impacts)	Construction and Operation	■ The Senex Queensland Fauna Stock Management Procedure will be implemented. ■ Staff and contractors will be made aware through general site induction and training of the potential to generate dust emissions and mitigation and management measures that should be implemented. ■ Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. ■ Dust suppression may be used where deemed to be appropriate. ■ Erosion and sediment control to be managed in accordance with the Queensland Erosion and Sediment Control Plan and Contractor's erosion and sediment control procedures. ■ Where required, watercourse crossing points will be adequately stabilised to prevent erosion. ■ RoW construction period in waterways will be minimised. ■ Construction activities must not interfere or block natural drainage e.g., disturbing channel contours.
Habitat fragmentation	Construction	■ Infrastructure will be located preferentially avoiding, then minimize isolating, fragmenting, edge effects or dissecting tracts of native vegetation. ■ Pipeline infrastructure will maximize co-location. ■ RoW widths in native vegetation and waterway crossings will be minimised where possible. ■ Gathering lines are all below ground. ■ RoW rehabilitated to 6m wide access track post construction and all rehabilitated at end of project (unless landholder requests it to be retained for ongoing use purposes).
Inhibiting the ability of ecological communities or species to adapt and survive predicted climate change effects (for example through impeding migration pathways or inhibiting access to refuge areas)	Construction and Operation	■ All infrastructure will be located preferentially in pre-disturbed areas of land. ■ The Senex Protocol for constraints planning and field development will be implemented to minimise habitat fragmentation etc. ■ RoW widths in native vegetation and waterway crossings will be minimised. ■ Reinstatement of areas which are not required for ongoing operational purposes.

Potential Impacts	Relevant Stage	Key Management and Mitigation Measures
Fauna injury during construction activities and movement of machinery/vehicles	Construction and Operation	■ The Senex Queensland Fauna Stock Management Procedure will be implemented. ■ Excavations and trenches must be inspected for trapped fauna daily during construction. ■ Measures to prevent fauna entrapment and facilitate escape must be implemented within open trenches. ■ Where identified as required, a qualified fauna spotter-catcher will conduct a search immediately prior to clearing of vegetation for the presence of fauna species. Where fauna are detected, the spotter catcher will assess and implement the most appropriate method to avoid or minimise impacts on that fauna as a result of clearing.
Introduction and/or spread of weed species	Construction and Operation	■ The Senex Queensland Weed Hygiene Procedure will be implemented. ■ Implementation of the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) which includes requirements for weed washdowns, certification and record keeping for all project vehicles and machinery. ■ Activities will be planned so that movement of vehicles, plant, machinery and equipment avoid moving between properties as required. ■ Access to a landholder's property will not occur unless authorised under a Senex Access to Work (ATW) permit. Site specific weed management requirements will be defined prior to access to any property or work site. ■ Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. ■ Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds. Landowner approval may also be required for imported soils and gravel.

7. IMPACT ASSESSMENTS

7.1 MNES Impact Assessment

The significance of impacts to MNES are determined against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (SIG 1.1) (DoE, 2013), assuming the controls and mitigation measures in Section 6 are implemented. Nine MNES were identified as part of this Ecological Assessment to have a potential for a significant impact due to known or likely presence within the Project Area. These nine MNES, including two TEC, five listed threatened fauna species and two migratory species have been assessed against SIG 1.1 criteria. A summary of the results of the significant impact assessments are provided below in Table 7-1, with the full assessment against SIG 1.1 criteria included in Appendix E.

Impact assessments have been completed for species and species habitat concluded as known and likely to occur within the Project Area.

7.1.1 Threatened Ecological Communities

Disturbance within areas mapped as being potential habitat for TECs within Figure 4-2 will be avoided except where detailed site ecology surveys provide finer scale habitat mapping which confirms that there is in fact no TEC that will be disturbed as part of the project.

The detailed site ecology surveys and habitat mapping refinement will be undertaken in accordance with the Senex Queensland Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-EN-PLN-001] (the Protocol).

7.1.2 MNES Flora Species

Areas of potential habitat for Belson's Panic and Slender Tylophora (Figure 4-3) will be the subject of pre-clearance ecology surveys (undertaken in accordance with the Protocol) to confirm the presence or otherwise of MNES flora species, and if observed individual plants will be avoided where practicable. It should be noted, Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES threatened flora habitat.

7.1.3 MNES Fauna Species

Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES threatened species, with the exception of Koala dispersal habitat.

Disturbance within these areas of identified habitat for MNES areas may occur and not be accounted within the maximum disturbance limits where detailed site ecology surveys (undertaken in accordance with the Protocol) provide finer scale habitat mapping which confirms that there is in fact no habitat actually present within the proposed disturbance location.

Although the placement of wells and gathering provides good flexibility to help avoid habitat areas, it is recognised that in a small number of circumstances the project's linear infrastructure may not be able to totally avoid traversing mapped potential habitat areas due to other constraints (such as cultural heritage sites or artifacts, geological features, landholder/livestock/agricultural requirements and existing or planned landholder, utility or community infrastructure).

Senex recognises that some disturbance of threatened fauna species habitat may be required to accommodate such potential circumstances. As such, with the exclusion of locations where site ecology surveys verify that habitat is in fact not present, Senex commits to the following maximum disturbance limits:

- Up to 137 ha of Koala dispersal habitat as shown in Figure 4-5.

It is noted that impacts within Koala dispersal habitat will be minimised using the Protocol but will, at times, require the unavoidable disturbance of open areas and removal of individual juvenile and non-juvenile trees and seedlings which are located within a predominantly cleared landscape. It is noted that impacts to dispersal habitat will be largely temporary in terms of RoW will be constructed and then rehabilitated. Application of the Protocol means that individual juvenile and non-juvenile trees and seedlings will be avoided unless unavoidable due to other constraints, e.g., environmental features and values, cultural heritage values, geological features, landholder/livestock/agricultural requirements and existing or planned landholder, utility or community infrastructure).

Table 7-1: MNES Significant Impact Assessment Summary

MNES	Project Area (ha)	Maximum Disturbance Limit (ha)	Comments
Australian Painted Snipe	13.9 ha	0 ha	The Australian Painted Snipe is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Australian Painted Snipe habitat (as mapped in Figure 4-9), and therefore no significant impact will occur.
Brigalow TEC	22.3 ha	0 ha	The Brigalow TEC was confirmed to occur within the Project Area (BOOBOOK, 2022). As a result of the project design and inclusion of avoidance measures, there will be no clearing or disturbance of any areas mapped as this TEC in Figure 4-2, and therefore no significant impact will occur.
Brown Treecreeper	102.88 ha	0 ha	The Brown Treecreeper is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Brown Treecreeper habitat (as mapped in Figure 4-10), and therefore no significant impact will occur.
Diamond Firetail	307.93 ha	0 ha	The Diamond Firetail is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Diamond Firetail habitat (as mapped in Figure 4-9), and therefore no significant impact will occur.
Dulacca Woodland Snail	52.6 ha	0 ha	The Dulacca Woodland Snail is considered likely to occur within the Project Area (BOOBOOK, 2022). Senex has committed to not clearing any areas confirmed as potential Dulacca Woodland Snail habitat (as mapped in Figure 4-8), and therefore no significant impact will occur.
Five-clawed Worm-skink	60.27 ha	0 ha	The Five-clawed Worm-skink is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Five-clawed Worm-skink habitat (as mapped in Figure 4-11), and therefore no significant impact will occur.
Glossy Black-cockatoo	236.2 ha	0 ha	The Glossy Black-cockatoo is considered likely to occur within the Project Area. Senex has committed to not clearing any areas confirmed as potential Glossy Black-cockatoo habitat (as mapped in Figure 4-7), and therefore no significant impact will occur.
Greater Glider	174.5 ha	0 ha	The Greater Glider is considered known to occur within the Project Area, with known sightings in the north-eastern corner and western portion of the Project Area. Senex has committed to not clearing any areas confirmed as potential Greater Glider habitat (as mapped in Figure 4-6), and therefore no significant impact will occur.
Grey Snake	74.67 ha	0 ha	The Grey Snake is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Grey Snake habitat (as mapped in Figure 4-11), and therefore no significant impact will occur.

MNES	Project Area (ha)	Maximum Disturbance Limit (ha)	Comments
Koala	Foraging and breeding habitat 245.4 ha Dispersal habitat 1,602.5 ha	0 ha for foraging and breeding Up to 137 ha for dispersal habitat	The Koala is considered as likely to occur within the Project Area, due to the indirect observations of the Koala in the form of scratch marks in the Project Area, it has been conservatively concluded that habitat critical to the survival of the species does occur within the Project Area. Habitat has been classified and mapped based on recent habitat guidance for the species (Youngentob, K.N, et al, 2022). In this case the vegetated areas of the Project Area containing Koala food trees (e.g., *E. tereticornis, E. populnea, E. crebra, E. longirostrata, E. melanophloia, E. exserta and Corymbia citriodora subsp. variegata*) were mapped as Koala foraging and breeding habitat. Senex has committed to not clearing any areas confirmed as potential Koala foraging or breeding habitat (as mapped in Figure 4-5), and therefore no significant impact will occur to these areas. However, this project may result in the disturbance to up to 137 ha of potential Koala dispersal habitat, or 8.5% of the total habitat available. There will be a removal of up to 137 ha of dispersal habitat for the koala (8.5% of the total dispersal habitat available in the Project Area). These impacts are not likely to result in a significant impact to the species based on the fact that they will predominantly be temporary and short-term disturbances that will not impede the koala in its ability to traverse and move across the landscape.
Painted Honeyeater	95.1 ha	0 ha	The Painted Honeyeater is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Painted Honeyeater habitat (as mapped in Figure 4-10) and therefore no significant impact will occur.
Poplar Box TEC	20.7 ha	0 ha	The Poplar Box TEC was confirmed to occur within the Project Area (BOOBOOK, 2022). As a result of the project design and inclusion of avoidance measures, there will be no clearing or disturbance of any areas mapped as this TEC in Figure 4-2, and therefore no significant impact will occur.
Southern Whiteface	307.93 ha	0 ha	The Southern Whiteface is considered potential to occur within the Project Area. Senex has committed to not clearing any areas confirmed as Southern Whiteface habitat (as mapped in Figure 4-10) and therefore no significant impact will occur.
White-throated Needletail	0 ha	0 ha	The White-throated Needletail has been identified as known to occur within the Project Area as the species was recorded during subsequent field surveys for Senex on 24 November 2022 (Cunningham, M pers. comm.), as shown on Figure 4-7. Additionally, there is one recent record within the Cherwondah SF from 2002. This species was conservatively concluded to be an important population in the Project Area and the surrounding landscape due to the following reasons. Firstly, there is an absence of detailed population data for the Project Area, however the species has been recorded within the Project Area and a record from 2002 exists within the locality. However, as the White-throated Needletail is a largely aerial species, the lack of habitat in the Project Area, and Senex's commitment to not clearing areas confirmed as MNES habitat, a significant impact to this species is considered unlikely.

7.2 MSES Impact Assessment

MSES within the Project Area have been considered for Significant Residual Impact (SRI) in accordance with the SRI Guideline (DEHP, 2014), with the outcomes summarised in Table 7-2. Appendix F highlights if the proposed development will potentially affect threatened wildlife habitat MSES, within the Project Area to cause an SRI. Outcomes within Table 7-2 assume that controls and mitigation measures in Section 6 are implemented.

Table 7-2: MSES Significant Residual Impact Assessment Summary

Prescribed Matter	SRI Impact Test	Will the Action Cause an SRI
Regulated Vegetation		
Prescribed Regional Ecosystems located in a Category B area	Table 2.1 of the SRI Guideline states that for clearing for linear infrastructure, clearing in a prescribed Regional Ecosystem that is Endangered or Of Concern will result in an SRI if it is: ■ 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. Regulated Vegetation that is Category B is present as four patches totalling 199.5 ha (<10.8%) of the Project Area, all of which will be avoided, therefore no SRI will result.	No
Prescribed Regional Ecosystems within a defined distance of a watercourse	Table 2.1 of the SRI Guideline states that for a prescribed activity to have an SRI on an RE that is within the defined distance of a watercourse, criteria 1 and 3 must be exceeded. Criteria 1 states that for clearing for linear infrastructure, clearing in a regional ecosystem that is within the defined distance of a watercourse will result in an SRI if it is: ■ Greater than 25 m wide in a grassland (structural category) regional ecosystem; or ■ Greater than 20 m wide in a sparse (structural category) regional ecosystem; or ■ Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem. All Category B REs (11.3.25, 11.3.2 and 11.9.7) will be avoided by the Project, and therefore, no SRI will result.	No
Prescribed Regional Ecosystems within a defined distance of a wetland	Table 2.1 of the SRI Guideline states that for a prescribed activity to have an SRI on an RE that is within the defined distance of a wetland, criteria 1 and 2 must be exceeded. Criteria 1 states that for clearing for linear infrastructure, clearing in a regional ecosystem that is within the defined distance of a wetland will result in an SRI if it is: ■ Greater than 25 m wide in a grassland (structural category) regional ecosystem; or ■ Greater than 20 m wide in a sparse (structural category) regional ecosystem; or ■ Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem. Criteria 2 states that an SRI results from clearing within a RE that is within 50 m of a mapped wetland. There are no mapped wetlands within the Project Area. Criteria 1 and 2 cannot be exceeded. Therefore, no REs occur within 100 m of a wetland and so no SRI will result.	No

Prescribed Matter	SRI Impact Test	Will the Action Cause an SRI
Protected Wildlife Habitat		
Protected wildlife habitat (EN, VU) – fauna	Section 5.1 of the SRI Guideline states that an action is likely to have a significant impact on Endangered and Vulnerable wildlife if the impact to habitat is likely to: ■ Lead to a long-term decrease in the size of a local population; or ■ Reduce the extent of occurrence of the species; or ■ Fragment an existing population; or ■ Result in genetically distinct populations forming as a result of habitat isolation; or ■ Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or ■ Introduce disease that may cause the population to decline, or ■ Interfere with the recovery of the species; or ■ Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species. Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as habitat for MNES or MSES threatened species, with the exception of Koala dispersal habitat and Short-beaked Echidna habitat. The maximum habitat to be impacted for the impacted listed threatened species is: ■ Up to 137 ha of Koala dispersal habitat as mapped in Figure 4-5 (8.5% of dispersal habitat); and ■ Up to 137 ha impact to Short-beaked Echidna habitat (not mapped as includes the entire Project Area) (7.4% of Short-beaked Echidna habitat). Whilst there is a potential impact of up to 137 ha for the short-beaked echidna (listed as Special Least Concern under the NC Act), there is no statutory requirement for offsetting for this species. Therefore, it is not required to be considered as part of the final impact assessments and calculations. Impacts to the size of the population, extent of occurrence, connectivity, contribution to threats, interference with recovery and disruption to ecologically significant locations are considered when assessed against the relevant guidelines. Given the small scale of impacts, as well as the existing disturbance within the Project Area, it is unlikely that there will be an SRI to any of these species.	No SRI triggered

8. CONCLUSION

This ATP 2059 EAR was developed to determine the ecological values within the Project Area, and then to assess the potential impacts to these values. To inform this assessment BOOBOOK Ecological Consulting undertook terrestrial field ecological surveys via targeted vehicle based and foot traverses of the Project Area and the broader Atlas Stage 3 Project Area, over the periods of 14 – 18th March 2022, 22 – 25th March 2022; 30 April – 5th May 2022, and 9 – 13th June 2022. Aquatic field ecological surveys were undertaken by Freshwater Ecology over an eight-day period (14 – 21st March 2022). The results from both the terrestrial and aquatic surveys have been incorporated into this ATP 2059 EAR. The terrestrial field investigations involved using survey techniques aligned with survey guidelines including vegetation assessments, BioCondition assessment, targeted flora and fauna surveys and habitat assessment. The aquatic field surveys involved aquatic habitat assessments, water quality, macroinvertebrate samples and flora and fauna surveys. The ATP 2059 EAR also involved a desktop assessment using several publicly available databases, mapping and aerial imagery.

Baseline botanical surveys were undertaken to describe dominant flora and vegetation community structure within the Project Area. Ground-truthing of the RE vegetation communities within the Project Area was undertaken using the quaternary level of data collection as described by Neldner *et al.* (2022). The DoR mapping was generally consistent with ground-truthing performed during field investigations.

Management practices have been recommended to manage the potential impacts to terrestrial and aquatic ecology associated with the proposed activities in the Project Area. It is expected that by implementing the Queensland Environmental Protocol for Field Development and Constraints Analysis [SENEX-CORP-EN-PRC-019], adherence to the conditions stipulated in the relevant Environmental Authorities, as well as the management practices identified in this ATP 2059 EAR, the extent of habitat removed and associated impacts to flora and fauna (including MNES and MSES species) will be minimal.

Indirect disturbances to terrestrial and aquatic ecosystems relating to weeds and pests, displacement and degradation of habitat, as well as potential for mortality of fauna, will be able to be effectively managed by implementing the environmental management practices outlined.

For MNES protected under the EPBC Act, two listed Threatened Ecological Communities (TEC), five listed threatened species (5 fauna) and two listed migratory species were identified as known or likely to occur in the Project Area, due to direct field observations within the Project Area or recent historical records. The TECs were Brigalow (*Acacia harpophylla* dominant and co-dominant) and Poplar Box Grassy Woodland on Alluvial Plains. The listed threatened species were the Dulacca Woodland Snail, Koala, Glossy Black-cockatoo, Greater Glider, Koala, and White-throated Needletail. The listed migratory species were the White-throated Needletail and Fork-tailed Swift.

For MSES protected under the *Nature Conservation Act QLD 1992 (NC Act),* the Project Area was found to contain Regulated Vegetation as well as NC Act listed threatened species protected wildlife habitat as follows:

- Regulated Vegetation that is Category B (Endangered and Of Concern Regional Ecosystems [RE]);
- Regulated Vegetation that is within the defined disturbance of a watercourse; and
- Protected wildlife habitat for listed flora and fauna species which included (in addition to those five listed threatened MNES fauna and flora who were also listed under the NC Act) were:
  - Pale Imperial Hairstreak (*Jalmenus eubulus*); and
  - Short-beaked Echidna (*Tachyglossus aculeatus*) (listed as Least Concern which has no statutory requirement for offsetting and thus is not required to be considered as part of the final impact assessments and calculations.

Potential impacts were identified as part of the project to include the following:

- Clearing of native vegetation and habitat for threatened and migratory species and threatened ecological communities;
- Introduction and/or spread of weed species;
- Disturbance or displacement to fauna species from foraging or roosting habitat, or breeding places;
- Degradation of threatened species habitats or threatened ecological communities as a result of dust, erosion or accidental release of hazardous materials;
- Habitat fragmentation;
- Inhibiting the ability of ecological communities or species to adapt and survive predicted climate change effects (for example through impeding migration pathways or inhibiting access to refuge areas; and
- Fauna injury during construction activities and movement of machinery/vehicles.

Senex has committed to not clearing any areas confirmed as MNES TECs or areas confirmed as Habitat for MNES and MSES threatened species, with the exception of Koala dispersal habitat and Short-beaked Echidna habitat. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm on-ground biodiversity values will be undertaken by a suitably qualified person. There will be up to 137 ha of disturbance within Koala dispersal habitat and Short-beaked Echidna habitat.

Further mitigation measures that will, or have already been implemented as a part of the project to mitigate any direct or indirect impacts will include:

- Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-EN-PLN-001];
- Atlas Stage 3 Gas Project Significant Species Management Plan;
- Implementing the Senex Queensland Fauna and Stock Management Procedure (SENEX-CORP-EN-PRC-021);
- Weed and pest management measures through the implementation of the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023);
- Environmental Management Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-015];
- Rehabilitation Plan Atlas Stage 3 Gas Project [SENEX-ATLS-EN-PLN-018];
- ATP 2059 Coal Seam Gas Water Management Plan [SENEX-ATLS-EN-PLN-013];
- Atlas Stage 3 Water Monitoring and Management Plan [SENEX-ATLS-EN-PLN-017];
- Delineation of ‘no-go’ areas clearly indicated for avoidance;
- Restricting access tracks to only low-level traffic with restricted speed;
- Erosion and sediment control measures;
- Dust management; and
- Appropriate storage and handling of fuel, oil and chemicals and appropriate spill response equipment.

The significant impact assessments undertaken against the relevant guidelines (SIG 1.1 and SRI Guidelines), assessed the potential impacts as well as the implemented mitigation and management measures, to determine whether the project would result in any significant residual impacts to likely or known MSES and MNES.

MNES Significant Impact Assessment Outcomes:

The follow details the significant impact assessment outcomes for MNES against the SIG 1.1. The outcomes for TECs in the Project Area are as follows:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) is present as nine patches totalling 22.3 ha (<1.2%) of the Project Area (as shown in Figure 4-2), all of which will be avoided by the project; and
- Poplar Box Grassy Woodland on Alluvial Plains is present as four patches totalling 20.7 ha (<1.1%) of the Project Area (as shown Figure 4-2), all of which will be avoided by the project.

The follow details the significant impact assessment outcomes for listed threatened and/or migratory MNES:

- Dulacca Woodland Snail (52.6 ha of habitat). Habitat within the Project Area (as shown in Figure 4-8), will be avoided through careful design of the project such that any disturbance to habitat for the species will not occur;
- Glossy Black-cockatoo (south-eastern subspecies) (236.2 ha of habitat). Habitat within the Project Area (as shown in Figure 4-7), will be avoided through careful design of the project such that any disturbance to habitat for the species will not occur;
- Greater Glider (174.5 ha of habitat). Habitat within the Project Area (as shown in Figure 4-6), will be avoided through careful design of the project such that any disturbance to habitat for the species will not occur; and
- Koala (245.4 ha of foraging and breeding habitat). Habitat within the Project Area (as shown in Figure 4-5), will be avoided through careful design of the project such that any disturbance to foraging and breeding habitat for the species will not occur. A total of 1,607.2 ha of Koala dispersal habitat occurs within the Project Area and impact upon this habitat will be minimised through careful design of the project such that any direct disturbance to habitat for the species will not exceed 137 ha in total for this species and dispersal opportunities will be maintained.

It is noted that the White-throated Needletail (*Hirundapus caudacutus*) was also concluded as known to occur within the Project Area, however it is likely only to be an aerial flyover visitor due to the lack of suitable roosting areas in the Project Area. Therefore, no habitat will be directly or indirectly impacted for this species. Further, the White-throated Needletail along with the Fork-tailed Swift were identified as listed migratory species likely to occur. As with the White-throated Needletail, the Fork-tailed Swift was concluded to be an aerial flyover visitor only and so both migratory species were concluded to not be at risk of being significantly impacted by the project.

With the implementation of the proposed controls and mitigation measures, the project is unlikely to result in any significant indirect impacts to any MNES.

MSES Significant Impact Assessment Outcomes:

Based on the assessment conducted in this EAR, there was concluded to be no Significant Residual Impact (SRI) to these MSES, based on an assessment against the SRI Guidelines, for the following reasons:

- Regulated Vegetation that is Category B – Regulated Vegetation that is Category B is present as four patches totalling 199.5 ha (<10.8%) of the Project Area, all of which will be avoided. The proposed development avoids clearing in remnant vegetation and so in accordance with criteria in the SRI Guideline, no SRI will result;
- Regulated Vegetation that is within the defined disturbance of a watercourse - all Category B REs (11.3.25, 11.3.19, 11.3.2 and 11.9.5) within the defined distance of a watercourse are avoided. Thus, no SRI will result;
- Protected wildlife habitat for listed fauna – for species known or likely to occur, there will be no SRI because there will be no clearing of habitat (with the exception of up to 137 ha of Koala dispersal habitat and Short-beaked Echidna habitat). Direct habitat disturbance for EPBC Act known and likely threatened and NC Act special least concern fauna species as a result of the Project will be avoided for all areas not previously cleared, and are as follows:
  - Dulacca Woodland Snail (52.6 ha total habitat which will be avoided by the Project);
  - Glossy Black-cockatoo (236.2 ha total habitat which will be avoided by the Project);
  - Greater Glider (174.5 ha total habitat which will be avoided by the Project);
  - Koala (245.4 ha total preferred breeding and foraging habitat which will be avoided by the Project and 1,602.5 ha total general (previously cleared) dispersal habitat of which up to 137 ha or 8.5% of total general dispersal habitat will be disturbed);
  - Pale Imperial Hairstreak (48.1 ha total habitat which will be avoided by the Project);
  - Golden-tailed Gecko (308 ha of total habitat which will be avoided by the Project);
  - Short-beaked Echidna (up to 137 ha (all previously cleared) or 7.4% of total habitat will be disturbed); and
  - White-throated Needletail (no habitat mapped as aerial flyover visitor only to the Project Area).

With the implementation of the proposed controls and mitigation measures, the project is unlikely to result in any significant indirect impacts to any MSES.

Environmentally Sensitive Areas

There are no Category A ESA within the Project Area. Category B ESA within the Project Area are ground-truthed endangered RE (Biodiversity Status), which consists of patches of the following RE: 11.3.17, 11.9.5, 11.9.5a and 11.9.10. Category C ESA within the Project Area include ground-truthed habitat for EVNT species listed under the NC Act (Stevens, 2023) and ground-truthed remnant and regrowth vegetation within government mapped areas of ‘essential habitat’ or ‘essential regrowth habitat’, and Of Concern RE (Biodiversity Status), which comprises the following REs: 11.3.2, 11.3.4, 11.3.25, 11.3.27f and 11.9.7. It is noted that the Project has committed to avoiding clearing within all ESAs.

Biosecurity Issues

Eight introduced flora and three fauna species signs were recorded during field surveys. The three fauna species are listed as Restricted Invasive animals under the *Biosecurity Act 2014* including Dingo/Wild Dog (*Canis familiaris*), Rabbit (*Oryctolagus cuniculus*) and Pig (*Sus scrofa*). Five flora, Common Pest Pear (*Opuntia stricta*), Tiger Pear (*Opuntia aurantiaca*), Harrisia Cactus (*Harrisia martini*), Mother-Of-Millions (*Kalanchoe delagoensis*) and Velvety Tree Pear (*Opuntia tomentosa*) are listed as Restricted Matter under the under the *Biosecurity Act 2014*.

Opuntia species recorded are classified also classified as Weeds of National Significance. As mentioned above, appropriate biosecurity measures will be implemented to ensure that any biosecurity risks are minimised and will not impact MSES and MNES.

Concluding Remark

As most of the Project Area is cleared, the Project will be able to avoid direct impacts to habitat for MNES and MSES species and naturally vegetated habitat areas with the exception of previously cleared areas that still potentially function as Koala dispersal habitat / habitat for the NC Act special least concern Short-beaked Echidna. The project's mitigation measures, including Senex's Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [SENEX-ATLAS-ENPLN-001] will be used to guide infrastructure siting, minimise direct and indirect disturbances and ensure the Project's total direct disturbance footprint avoids MNES and MSES habitats that are not already cleared.

As detailed in the MNES and MSES impact assessments provided in Appendix E and Appendix F respectively, the project has been assessed against the relevant Commonwealth and State guidelines and it has been determined that, with the implementation of the proposed controls and mitigation measures, the project is unlikely to result in any significant direct or indirect impacts to any MNES or MSES.

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APPENDIX A DESKTOP RESULTS

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: 21-Jul-2023

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	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	38
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	25
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	1200 - 1300km upstream from Ramsar site	In buffer area only
Narran lake nature reserve	400 - 500km upstream from Ramsar site	In buffer area only
Riverland	1100 - 1200km upstream from Ramsar site	In buffer area only
The coorong, and lakes alexandrina and albert wetland	1400 - 1500km upstream from Ramsar site	In buffer area only

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
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may 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 buffer area only
Weeping Myall Woodlands	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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
[Aphelocephala leucopsis](#) Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Calyptorhynchus lathami lathami](#) South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Climacteris picumnus victoriae](#) Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area	In feature area
[Erythrotriorchis radiatus](#) Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
[Falco hypoleucos](#) Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Geophaps scripta scripta](#) Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Grantiella picta](#) Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area	In feature area
FISH			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area	In feature area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area	In feature area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In feature area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely 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 likely to occur within area	In feature area
PLANT			
Acacia curranii Curly-bark Wattle [3908]	Vulnerable	Species or species habitat known to occur within area	In feature area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Cadellia pentastylis](#) Ooline [9828]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calytrix gurulmundensis](#) [24241]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Dichanthium setosum](#) bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Homopholis belsonii](#) Belson's Panic [2406]	Vulnerable	Species or species habitat may occur within area	In feature area
[Lepidium monoplocoides](#) Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area	In feature area
[Thesium australe](#) Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
[Vincetoxicum forsteri listed as Tylophora linearis](#) [92384]	Endangered	Species or species habitat may occur within area	In feature area
[Xerothamnella herbacea](#) [4146]	Endangered	Species or species habitat may occur within area	In feature area
REPTILE			
[Anomalopus mackayi](#) Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat may occur within area	In feature area
[Delma torquata](#) Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area	In feature area
[Egernia rugosa](#) Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Elseya albagula			
Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area	In feature area
Furina dunmalli			
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area	In feature area
Hemiaspis damelii			
Grey Snake [1179]	Endangered	Species or species habitat likely to occur within area	In feature area
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
SNAIL			
Adclarkia cameroni			
Brigalow Woodland Snail [83886]	Endangered	Species or species habitat likely to occur within area	In feature area
Adclarkia dulacca			
Dulacca Woodland Snail [83885]	Endangered	Species or species habitat known to 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
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		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

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Anseranas semipalmata			
Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[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
[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 may occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Stones Country	Resources Reserve	QLD	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Atlas Stage 3 Gas Project	2022/09410		Assessment	In feature area
Atlas to Reedy Creek Pipeline	2023/09585		Referral Decision	In feature area
Controlled action				
Coal Seam Gas Field Development for Natural Gas Liquefaction Park, Curtis Island	2008/4059	Controlled Action	Completed	In buffer area only
Construct and operate 447km high pressure gas transmission pipeline	2009/4976	Controlled Action	Post-Approval	In feature area
Construction and operation of Nathan Dam and associated water delivery infrastructure	2008/4313	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Development of Existing Coal Seam Gas Fields	2008/4398	Controlled Action	Post-Approval	In feature area
Development of new natural gas acreage in Surat Basin	2013/7047	Controlled Action	Post-Approval	In buffer area only
Expansion of Coal Seam Gas Fields	2009/4974	Controlled Action	Post-Approval	In feature area
Expansion Of Coal Seam Gas Operations	2010/5344	Controlled Action	Post-Approval	In buffer area only
Future Gas Supply Area Project	2012/6357	Controlled Action	Completed	In buffer area only
North Surat Coal Project-Collingwood	2012/6236	Controlled Action	Completed	In buffer area only
North Surat Coal Project- Taroom	2012/6237	Controlled Action	Completed	In buffer area only
Queensland Curtis LNG Project - Pipeline Network	2008/4399	Controlled Action	Post-Approval	In feature area
Reedy Creek to Glebe Weir Pipeline Project	2011/6181	Controlled Action	Post-Approval	In feature area
Santos GLNG Gas Field Development Project, QLD	2012/6615	Controlled Action	Post-Approval	In feature area
Surat North CSG Project, Qld	2018/8276	Controlled Action	Post-Approval	In buffer area only
Wandoan Coal Mine and Infrastructure Project	2008/4284	Controlled Action	Post-Approval	In feature area
Wandoan Coal Project - Coal Seam Methane Water Supply South	2008/4287	Controlled Action	Post-Approval	In feature area
Wandoan Coal Project Coal Seam Methane Water Supply West	2008/4283	Controlled Action	Completed	In buffer area only
Not controlled action				
Delga Solar Farm, 1039 Gadsbys Road, Woleebee, Qld	2019/8411	Not Controlled Action	Completed	In buffer area only
High Voltage Transmission line Development	2007/3230	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Project Atlas CSG Project, between Wollumbilla and Wandoan, Qld	2018/8329	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Surat Basin Railway	2008/3944	Not Controlled Action	Completed	In buffer area only
Referral decision				
Development of an underground longwall coal mine	2011/6129	Referral Decision	Completed	In feature area

Bioregional Assessments

SubRegion	BioRegion	Website	Buffer Status
Maranoa-Balonne-Condamine	Northern Inland Catchments	BA website	In buffer area only

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
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-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Queensland status: All
Records: All
Date: All
Latitude: -26.2765
Longitude: 149.8568
Distance: 20
Email: tim@freshwaterecology.com.au
Date submitted: Monday 15 Aug 2022 15:46:40
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The number of records retrieved = 844

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			20
animals	amphibians	Hylidae	*Cyclorana alboguttata*	greenstripe frog		C		8
animals	amphibians	Hylidae	*Cyclorana brevipes*	superb collared frog		C		3
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		4
animals	amphibians	Hylidae	*Cyclorana sp.*			C		1
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		22
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		2
animals	amphibians	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog		C		11
animals	amphibians	Hylidae	*Litoria peronii*	emerald spotted treefrog		C		9
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		5
animals	amphibians	Limnodynastidae	*Limnodynastes fletcheri*	barking frog		C		2
animals	amphibians	Limnodynastidae	*Limnodynastes salmini*	salmon striped frog		C		9
animals	amphibians	Limnodynastidae	*Limnodynastes sp.*			C		1
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		21
animals	amphibians	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk		C		4
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		14
animals	amphibians	Myobatrachidae	*Uperoleia rugosa*	chubby gungan		C		4
animals	birds	Acanthizidae	*Acanthiza apicalis*	inland thornbill		C		10
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		8
animals	birds	Acanthizidae	*Acanthiza lineata*	striated thornbill		C		2
animals	birds	Acanthizidae	*Acanthiza nana*	yellow thornbill		C		12
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		3
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		7
animals	birds	Acanthizidae	*Acanthiza uropygialis*	chestnut-rumped thornbill		C		2
animals	birds	Acanthizidae	*Gerygone fusca*	western gerygone		C		3
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		20
animals	birds	Acanthizidae	*Pyrrholaemus sagittatus*	speckled warbler		C		3
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		49
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		19
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		1
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		1/1
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		2
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		2
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		1
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		C		4
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		14
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		8
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		11
animals	birds	Anatidae	*Aythya australis*	hardhead		C		5
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		6
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		2
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		1
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		2
animals	birds	Anatidae	*Malacorhynchus membranaceus*	pink-eared duck		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		9
animals	birds	Apodidae	*Apus pacificus*	fork-tailed swift		SL		4
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		V	V	2
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		4
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		2
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		5
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		4
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		2
animals	birds	Artamidae	*Artamus cyanopterus*	dusky woodswallow		C		2
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		11
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		3
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		3
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		40
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		65
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		46
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		40
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		47/1
animals	birds	Cacatuidae	*Calyptorhynchus funereus*	yellow-tailed black-cockatoo		C		1
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	3
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		52
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		21
animals	birds	Campephagidae	*Coracina maxima*	ground cuckoo-shrike		C		3
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		23
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		2
animals	birds	Campephagidae	*Edolisoma tenuirostre*	common cicadabird		C		2
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		1
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		1
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		4
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		4
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		3
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		4
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		5
animals	birds	Columbidae	*Columba livia*	rock dove	Y			1
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		16
animals	birds	Columbidae	*Geopelia placida*	peaceful dove		C		8
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	1
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		23
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		7
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		6
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		6
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		33
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		23
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		64
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		8
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cuculidae	*Chalcites osculans*	black-eared cuckoo		C		1
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		2
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		1
animals	birds	Estrildidae	*Neochmia modesta*	plum-headed finch		C		5
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		16
animals	birds	Eurostopodidae	*Eurostopodus mystacalis*	white-throated nightjar		C		5
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		6
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		11
animals	birds	Falconidae	*Falco peregrinus*	peregrine falcon		C		1
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		36
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		1
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		2
animals	birds	Hirundinidae	*Cheramoeca leucosterna*	white-backed swallow		C		1
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		4
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		5
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		1
animals	birds	Maluridae	*Malurus cyaneus*	superb fairy-wren		C		13
animals	birds	Maluridae	*Malurus lamberti sensu lato*	variegated fairy-wren		C		3
animals	birds	Maluridae	*Malurus leucopterus*	white-winged fairy-wren		C		1
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		11
animals	birds	Megaluridae	*Cincloramphus timoriensis*	tawny grassbird		C		1
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		7
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		9
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		12
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		14
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		11
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		7
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		90
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		8
animals	birds	Meliphagidae	*Melithreptus brevirostris*	brown-headed honeyeater		C		4
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		1
animals	birds	Meliphagidae	*Nesoptilotis leucotis*	white-eared honeyeater		C		18
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		18
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		27
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		36
animals	birds	Meliphagidae	*Ptilotula penicillata*	white-plumed honeyeater		C		1
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		10
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		36
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		5
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		8
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		2
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		28
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		2
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		11
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		2
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		6

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		14
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		2
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		26
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		9
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		56
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			3
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		10
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		5
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		1
animals	birds	Petroicidae	*Petroica rosea*	rose robin		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		3
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		4
animals	birds	Phasianidae	*Synoicus ypsilophorus*	brown quail		C		1
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		5
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		6
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		21
animals	birds	Psittacidae	*Alisterus scapularis*	Australian king-parrot		C		12
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		16
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		3
animals	birds	Psittacidae	*Northiella haematogaster*	blue bonnet		C		2
animals	birds	Psittacidae	*Parvipsitta pusilla*	little lorikeet		C		1
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		42
animals	birds	Psittacidae	*Psephotus haematonotus*	red-rumped parrot		C		10
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		22
animals	birds	Psittacidae	*Trichoglossus moluccanus*	rainbow lorikeet		C		22
animals	birds	Psophodidae	*Psophodes olivaceus*	eastern whipbird		C		1
animals	birds	Ptilonorhynchidae	*Chlamydera maculata*	spotted bowerbird		C		8
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		3
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		5
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		26
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		29
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		4
animals	birds	Strigidae	*Ninox connivens*	barking owl		C		1
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		1
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		3
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		1
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		5
animals	birds	Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail		C		1
animals	birds	Turnicidae	*Turnix sp.*			C		2
animals	birds	Turnicidae	*Turnix varius*	painted button-quail		C		2
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		5
animals	insects	Aeshnidae	*Anax papuensis*	Australian Emperor				4
animals	insects	Coenagrionidae	*Ischnura aurora*	aurora bluetail				1
animals	insects	Corduliidae	*Hemicordulia tau*	tau emerald				1
animals	insects	Hesperiidae	*Ocybadistes walkeri sothis*	green grass-dart				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	insects	Libellulidae	*Crocothemis nigrifrons*	black-headed skimmer				1
animals	insects	Libellulidae	*Diplacodes bipunctata*	wandering percher				3
animals	insects	Libellulidae	*Diplacodes haematodes*	scarlet percher				1
animals	insects	Libellulidae	*Orthetrum caledonicum*	blue skimmer				6
animals	insects	Libellulidae	*Pantala flavescens*	wandering glider				1
animals	insects	Libellulidae	*Rhyothemis graphiptera*	graphic flutterer				1
animals	insects	Libellulidae	*Tramea loewii*	common glider				1
animals	insects	Lindeniidae	*Ictinogomphus australis*	Australian tiger				1
animals	insects	Lycaenidae	*Nacaduba berenice berenice*	large purple line-blue				1
animals	insects	Lycaenidae	*Psychonotis caelius taygetus*	small green-banded blue				1
animals	insects	Lycaenidae	*Zizina otis labradus*	common grass-blue (Australian subspecies)				2
animals	insects	Nymphalidae	*Acraea andromacha andromacha*	glasswing				2
animals	insects	Nymphalidae	*Charaxes sempronius sempronius*	tailed emperor				2
animals	insects	Nymphalidae	*Danaus petilia*	lesser wanderer				5
animals	insects	Nymphalidae	*Danaus plexippus*	monarch	Y			1
animals	insects	Nymphalidae	*Euploea corinna*	common crow				8
animals	insects	Nymphalidae	*Hypocysta pseudirius*	grey ringlet				1
animals	insects	Nymphalidae	*Hypolimnas bolina nerina*	varied eggfly				3
animals	insects	Nymphalidae	*Junonia orithya albicincta*	blue argus				1
animals	insects	Nymphalidae	*Junonia villida villida*	meadow argus				5
animals	insects	Nymphalidae	*Melanitis leda bankia*	evening brown				1
animals	insects	Nymphalidae	*Tirumala hamata hamata*	blue tiger				4
animals	insects	Papilionidae	*Cressida cressida cressida*	clearwing swallowtail				1
animals	insects	Papilionidae	*Papilio aegeus*					5
animals	insects	Papilionidae	*Papilio aegeus aegeus*	orchard swallowtail (Australian subspecies)				3
animals	insects	Papilionidae	*Papilio anactus*	dainty swallowtail				2
animals	insects	Papilionidae	*Papilio demoleus sthenelus*	chequered swallowtail				4
animals	insects	Pieridae	*Belenois java teutonia*	caper white				5
animals	insects	Pieridae	*Catopsilia gorgophone gorgophone*	yellow migrant				1
animals	insects	Pieridae	*Catopsilia pomona*	lemon migrant				2
animals	insects	Pieridae	*Catopsilia pyranthe crokera*	white migrant				2
animals	insects	Pieridae	*Cepora perimale*					1
animals	insects	Pieridae	*Delias argenthona argenthona*	scarlet jezebel				1
animals	insects	Pieridae	*Delias nysa nysa*	yellow-spotted jezebel (Australian subspecies)				1
animals	insects	Pieridae	*Elodina parthia*	striated pearl-white				1
animals	insects	Pieridae	*Eurema hecabe*	large grass-yellow				2
animals	insects	Pieridae	*Eurema smilax*	small grass-yellow				3
animals	malacostracans	Parastacidae	*Cherax destructor*	common yabbie				1
animals	mammals	Acrobatidae	*Acrobates pygmaeus*	feathertail glider		C		1
animals	mammals	Bovidae	*Bos taurus*	European cattle	Y			1
animals	mammals	Bovidae	*Capra hircus*	goat	Y			1
animals	mammals	Canidae	*Canis familiaris*	dog	Y			2
animals	mammals	Canidae	*Canis familiaris (dingo)*	dingo				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	mammals	Canidae	*Canis sp.*		Y			2
animals	mammals	Canidae	*Vulpes vulpes*	red fox	Y			1
animals	mammals	Dasyuridae	*Sminthopsis murina*	common dunnart		C		1
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		9
animals	mammals	Equidae	*Equus caballus*	horse	Y			1
animals	mammals	Felidae	*Felis catus*	cat	Y			4
animals	mammals	Leporidae	*Lepus europaeus*	European brown hare	Y			4
animals	mammals	Leporidae	*Oryctolagus cuniculus*	rabbit	Y			6
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		30
animals	mammals	Macropodidae	*Notamacropus dorsalis*	black-striped wallaby		C		3
animals	mammals	Macropodidae	*Notamacropus parryi*	whiptail wallaby		C		2
animals	mammals	Macropodidae	*Notamacropus rufogriseus*	red-necked wallaby		C		16
animals	mammals	Macropodidae	*Osphranter robustus*	common wallaroo		C		7
animals	mammals	Macropodidae	*Wallabia bicolor*	swamp wallaby		C		9
animals	mammals	Molossidae	*Austronomus australis*	white-striped freetail bat		C		4
animals	mammals	Molossidae	*Mormopterus lumsdenae*	northern free-tailed bat		C		2
animals	mammals	Molossidae	*Mormopterus petersi*	inland free-tailed bat		C		8
animals	mammals	Molossidae	*Mormopterus ridei*	eastern free-tailed bat		C		1
animals	mammals	Molossidae	*Mormopterus sp.*			C		3
animals	mammals	Muridae	*Mus musculus*	house mouse	Y			13
animals	mammals	Muridae	*Pseudomys patrius*	eastern pebble-mound mouse		C		1
animals	mammals	Petauridae	*Petaurus australis australis*	yellow-bellied glider (southern subspecies)		V	V	12
animals	mammals	Petauridae	*Petaurus norfolcensis*	squirrel glider		C		3
animals	mammals	Petauridae	*Petaurus notatus*	Krefft's glider		C		3
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		32
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	3
animals	mammals	Potoroidae	*Aepyprymnus rufescens*	rufous bettong		C		7
animals	mammals	Pseudocheiridae	*Petauroides armillatus*	central greater glider		E	E	2
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		1
animals	mammals	Suidae	*Sus scrofa*	pig	Y			8
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		SL		7
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		10
animals	mammals	Vespertilionidae	*Chalinolobus picatus*	little pied bat		C		3
animals	mammals	Vespertilionidae	*Nyctophilus geoffroyi*	lesser long-eared bat		C		1
animals	mammals	Vespertilionidae	*Nyctophilus gouldi*	Gould's long-eared bat		C		6
animals	mammals	Vespertilionidae	*Nyctophilus sp.*			C		2
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		12
animals	mammals	Vespertilionidae	*Scotorepens sp.*			C		1
animals	mammals	Vespertilionidae	*Scotorepens sp. (Parnaby)*	central-eastern broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Vespadelus baverstocki*	inland forest bat		C		1
animals	mammals	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat		C		8
animals	mammals	Vespertilionidae	*Vespadelus vulturnus*	little forest bat		C		5
animals	ray-finned fishes	Ambassidae	*Ambassis agassizii*	Agassiz's glassfish				1
animals	ray-finned fishes	Eleotridae	*Hypseleotris species 1*	Midgley's carp gudgeon				1
animals	ray-finned fishes	Melanotaeniidae	*Melanotaenia splendida splendida*	eastern rainbowfish				1

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animals	ray-finned fishes	Plotosidae	*Tandanus tandanus*	freshwater catfish				1
animals	ray-finned fishes	Terapontidae	*Leiopotherapon unicolor*	spangled perch				1
animals	reptiles	Agamidae	*Amphibolurus muricatus*	jacky lizard		C		2
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		6
animals	reptiles	Boidae	*Antaresia maculosa*	spotted python		C		3
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		3
animals	reptiles	Carphodactylidae	*Underwoodisaurus milii*	thick-tailed gecko		C		3
animals	reptiles	Chelidae	*Chelodina longicollis*	eastern snake-necked turtle		C		2
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		3
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		2/1
animals	reptiles	Diplodactylidae	*Diplodactylus vittatus*	wood gecko		C		1
animals	reptiles	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko		C		4
animals	reptiles	Diplodactylidae	*Nebulifera robusta*	robust velvet gecko		C		4
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		13
animals	reptiles	Elapidae	*Brachyurophis australis*	coral snake		C		2/1
animals	reptiles	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake		C		4
animals	reptiles	Elapidae	*Cryptophis nigrescens*	eastern small-eyed snake		C		4
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whipsnake		C		5
animals	reptiles	Elapidae	*Furina diadema*	red-naped snake		C		1/1
animals	reptiles	Elapidae	*Hoplocephalus bitorquatus*	pale-headed snake		C		2/2
animals	reptiles	Elapidae	*Pseudechis australis*	king brown snake		C		1
animals	reptiles	Elapidae	*Pseudonaja textilis*	eastern brown snake		C		3
animals	reptiles	Elapidae	*Suta suta*	myall snake		C		1
animals	reptiles	Elapidae	*Vermicella annulata*	bandy-bandy		C		1
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		95/1
animals	reptiles	Gekkonidae	*Gehyra sp.*			C		1
animals	reptiles	Gekkonidae	*Gehyra versicolor*			C		9
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		47/2
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		1
animals	reptiles	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot		C		9
animals	reptiles	Scincidae	*Anomalopus leuckartii*	two-clawed worm-skink		C		1/1
animals	reptiles	Scincidae	*Carlia munda*	shaded-litter rainbow-skink		C		3
animals	reptiles	Scincidae	*Carlia pectoralis*	open-litter rainbow skink		C		6/1
animals	reptiles	Scincidae	*Carlia pectoralis sensu lato*			C		17
animals	reptiles	Scincidae	*Carlia schmeltzii*	robust rainbow-skink		C		2
animals	reptiles	Scincidae	*Carlia sp.*			C		3
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		4
animals	reptiles	Scincidae	*Cryptoblepharus australis*	inland snake-eyed skink		C		2
animals	reptiles	Scincidae	*Cryptoblepharus metallicus*	metallic snake-eyed skink		C		1
animals	reptiles	Scincidae	*Cryptoblepharus plagiocephalus sensu lato*			C		4
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		41
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		6
animals	reptiles	Scincidae	*Eremiascincus fasciolatus*	narrow-banded sand swimmer		C		1
animals	reptiles	Scincidae	*Lerista fragilis*	eastern mulch slider		C		27/1
animals	reptiles	Scincidae	*Lerista punctatovittata*	eastern robust slider		C		6

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animals	reptiles	Scincidae	*Lerista sp.*			C		2
animals	reptiles	Scincidae	*Lerista timida*	timid slider		C		3
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		23/2
animals	reptiles	Scincidae	*Menetia greyii*	common dwarf skink		C		3
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		2
animals	reptiles	Scincidae	*Pygmaeascincus timlowi*	dwarf litter-skink		C		3
animals	reptiles	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard		C		1
animals	reptiles	Typhlopidae	*Anilios proximus*	proximus blind snake		C		2/2
animals	reptiles	Varanidae	*Varanus gouldii*	sand monitor		C		6
animals	reptiles	Varanidae	*Varanus panoptes*	yellow-spotted monitor		C		2
animals	reptiles	Varanidae	*Varanus tristis*	black-tailed monitor		C		7
animals	reptiles	Varanidae	*Varanus varius*	lace monitor		C		9
animals	snails	Camaenidae	*Adclarkia cameroni*			V	E	1
animals	snails	Camaenidae	*Lynfergusonia mundubbera*					1
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending				50
fungi	lecanoromycetes	Caliciaceae	*Dirinaria batavica*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine berteriana*			C		2/2
fungi	lecanoromycetes	Caliciaceae	*Pyxine petricola*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine rugulosa*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine subcinerea*			C		2/2
fungi	lecanoromycetes	Collemataceae	*Collema rugosum*			C		1/1
fungi	lecanoromycetes	Lecanoraceae	*Lecanora helva*			C		2/2
fungi	lecanoromycetes	Lecanoraceae	*Lecanora novaehollandiae*			C		2/2
fungi	lecanoromycetes	Ochrolechiaceae	*Ochrolechia africana*			C		1/1
fungi	lecanoromycetes	Ochrolechiaceae	*Ochrolechia hawaiensis*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema subsumptum*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Punctelia subflava*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria pertusella*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria planaica*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria ternata*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Physcia nubila*			C		2/2
fungi	lecanoromycetes	Physciaceae	*Physcia undulata*			C		1/1
fungi	lecanoromycetes	Stereocaulaceae	*Lepraria*					1/1
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca flavorubescens*			C		2/2
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca fraserensis*			C		1/1
plants	land plants	Acanthaceae	*Brunoniella australis*	blue trumpet		C		2
plants	land plants	Acanthaceae	*Dipteracanthus australasicus subsp. corynothecus*			C		1/1
plants	land plants	Acanthaceae	*Hypoestes floribunda var. floribunda*			C		1/1
plants	land plants	Acanthaceae	*Pseuderanthemum variabile*	pastel flower		C		1
plants	land plants	Acanthaceae	*Rostellularia adscendens*			C		1/1
plants	land plants	Alismataceae	*Echinodorus cordifolius*		Y			1/1
plants	land plants	Amaranthaceae	*Achyranthes aspera*			C		1/1
plants	land plants	Amaranthaceae	*Alternanthera denticulata var. denticulata*			C		1/1
plants	land plants	Amaranthaceae	*Alternanthera nana*	hairy joyweed		C		2
plants	land plants	Amaranthaceae	*Alternanthera pungens*	khaki weed	Y			2/1
plants	land plants	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		1

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plants	land plants	Amaranthaceae	*Gomphrena celosioides*	gomphrena weed	Y			1
plants	land plants	Amaranthaceae	*Nyssanthes erecta*			C		3/2
plants	land plants	Amaranthaceae	*Ptilotus semilanatus*			C		2/1
plants	land plants	Anacardiaceae	*Schinus terebinthifolius*		Y			1/1
plants	land plants	Apocynaceae	*Alstonia constricta*	bitterbark		C		8
plants	land plants	Apocynaceae	*Carissa ovata*	currantbush		C		6
plants	land plants	Apocynaceae	*Gomphocarpus*			C		1
plants	land plants	Apocynaceae	*Gomphocarpus physocarpus*	balloon cottonbush	Y			1
plants	land plants	Apocynaceae	*Leichhardtia micradenia*			C		3
plants	land plants	Apocynaceae	*Leichhardtia viridiflora subsp. viridiflora*			C		1
plants	land plants	Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo		C		3/1
plants	land plants	Apocynaceae	*Parsonsia rotata*	veinless silkpod		C		4/2
plants	land plants	Araliaceae	*Astrotricha longifolia*	star hair bush		C		1
plants	land plants	Araliaceae	*Hydrocotyle acutiloba*			C		3/3
plants	land plants	Asteraceae	*Apowollastonia spilanthoides*			C		1/1
plants	land plants	Asteraceae	*Bidens biternata*		Y			1/1
plants	land plants	Asteraceae	*Brachyscome dalbyensis*			C		1/1
plants	land plants	Asteraceae	*Brachyscome microcarpa subsp. darlingensis*			C		2/2
plants	land plants	Asteraceae	*Brachyscome multifida*			C		1/1
plants	land plants	Asteraceae	*Calyptocarpus vialis*	creeping cinderella weed	Y			1
plants	land plants	Asteraceae	*Camptacra barbata*			C		1/1
plants	land plants	Asteraceae	*Cassinia laevis*			C		1
plants	land plants	Asteraceae	*Centaurea solstitialis*	St. Barnaby's thistle	Y			1/1
plants	land plants	Asteraceae	*Chrysocephalum apiculatum*	yellow buttons		C		2
plants	land plants	Asteraceae	*Cirsium vulgare*	spear thistle	Y			2
plants	land plants	Asteraceae	*Cyanthillium cinereum*			C		1
plants	land plants	Asteraceae	*Eclipta prostrata*	white eclipta	Y			1/1
plants	land plants	Asteraceae	*Flaveria trinervia*		Y			1/1
plants	land plants	Asteraceae	*Olearia*					1
plants	land plants	Asteraceae	*Olearia canescens*			C		1
plants	land plants	Asteraceae	*Olearia canescens subsp. discolor*			C		1/1
plants	land plants	Asteraceae	*Parthenium hysterophorus*	parthenium weed	Y			1/1
plants	land plants	Asteraceae	*Pluchea dentex*	bowl daisy		C		1/1
plants	land plants	Asteraceae	*Podolepis longipedata*	tall copper-wire daisy		C		1/1
plants	land plants	Asteraceae	*Pterocaulon sphacelatum*	applebush		C		1
plants	land plants	Asteraceae	*Pycnosorus globosus*			C		1
plants	land plants	Asteraceae	*Rutidosis murchisonii*			C		3/3
plants	land plants	Asteraceae	*Senecio brigalowensis*			C		1/1
plants	land plants	Asteraceae	*Senecio madagascariensis*	fireweed	Y			1
plants	land plants	Asteraceae	*Sigesbeckia orientalis*	Indian weed		C		1
plants	land plants	Asteraceae	*Sonchus oleraceus*	common sowthistle	Y			1
plants	land plants	Asteraceae	*Vittadinia sulcata*	native daisy		C		3/1
plants	land plants	Asteraceae	*Xanthium occidentale*		Y			1
plants	land plants	Asteraceae	*Xanthium spinosum*	Bathurst burr	Y			1
plants	land plants	Asteraceae	*Zinnia peruviana*	wild zinnia	Y			1/1
plants	land plants	Basellaceae	*Anredera cordifolia*	Madeira vine	Y			1

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plants	land plants	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		5
plants	land plants	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		1
plants	land plants	Brassicaceae	*Lepidium bonariense*	Argentine peppercress	Y			1
plants	land plants	Brassicaceae	*Rorippa laciniata*			C		1/1
plants	land plants	Brassicaceae	*Sisymbrium*					1
plants	land plants	Brassicaceae	*Sisymbrium thellungii*	African turnip-weed	Y			1/1
plants	land plants	Byttneriaceae	*Commersonia pedleyi*			C		7/7
plants	land plants	Cactaceae	*Opuntia tomentosa*	velvety tree pear	Y			19
plants	land plants	Campanulaceae	*Wahlenbergia capillaris*			SL		1
plants	land plants	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell		SL		1
plants	land plants	Campanulaceae	*Wahlenbergia graniticola*	granite bluebell		SL		1/1
plants	land plants	Capparaceae	*Capparis anomala*			C		6
plants	land plants	Capparaceae	*Capparis arborea*	brush caper berry		C		6
plants	land plants	Capparaceae	*Capparis canescens*			C		4
plants	land plants	Capparaceae	*Capparis lasiantha*	nipan		C		8
plants	land plants	Capparaceae	*Capparis loranthifolia var. loranthifolia*			C		1
plants	land plants	Capparaceae	*Capparis mitchellii*			C		1/1
plants	land plants	Casuarinaceae	*Allocasuarina inophloia*			C		25/1
plants	land plants	Casuarinaceae	*Allocasuarina luehmannii*	bull oak		C		6
plants	land plants	Casuarinaceae	*Casuarina cristata*	belah		C		7
plants	land plants	Casuarinaceae	*Casuarina cunninghamiana subsp. cunninghamiana*			C		1
plants	land plants	Celastraceae	*Denhamia cunninghamii*			C		5/1
plants	land plants	Celastraceae	*Denhamia disperma*			C		2
plants	land plants	Celastraceae	*Denhamia silvestris*			C		3
plants	land plants	Celastraceae	*Elaeodendron australe*			C		2
plants	land plants	Celastraceae	*Elaeodendron australe var. integrifolium*			C		1
plants	land plants	Celastraceae	*Siphonodon australis*	ivorywood		C		1
plants	land plants	Chenopodiaceae	*Atriplex muelleri*	lagoon saltbush		C		2/1
plants	land plants	Chenopodiaceae	*Atriplex semibaccata*	creeping saltbush		C		1/1
plants	land plants	Chenopodiaceae	*Chenopodium desertorum*			C		1
plants	land plants	Chenopodiaceae	*Dysphania carinata*			C		1
plants	land plants	Chenopodiaceae	*Einadia hastata*			C		2
plants	land plants	Chenopodiaceae	*Einadia nutans subsp. nutans*			C		1
plants	land plants	Chenopodiaceae	*Enchylaena tomentosa*			C		3
plants	land plants	Chenopodiaceae	*Maireana microphylla*			C		5
plants	land plants	Chenopodiaceae	*Salsola australis*			C		2
plants	land plants	Chenopodiaceae	*Sclerolaena bicornis var. horrida*			C		1
plants	land plants	Chenopodiaceae	*Sclerolaena birchii*	galvanised burr		C		2
plants	land plants	Chenopodiaceae	*Sclerolaena lanicuspis*			C		1
plants	land plants	Chenopodiaceae	*Sclerolaena muricata var. muricata*			C		1/1
plants	land plants	Commelinaceae	*Commelina diffusa*	wandering jew		C		1
plants	land plants	Commelinaceae	*Commelina ensifolia*	scurvy grass		C		1
plants	land plants	Convolvulaceae	*Convolvulus arvensis*		Y			2/1
plants	land plants	Convolvulaceae	*Convolvulus graminetinus*			C		1/1
plants	land plants	Convolvulaceae	*Evolvulus alsinoides var. decumbens*			C		1
plants	land plants	Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*			C		1

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plants	land plants	Crassulaceae	*Bryophyllum delagoense*		Y			6
plants	land plants	Crassulaceae	*Bryophyllum x houghtonii*		Y			3
plants	land plants	Cucurbitaceae	*Citrullus amarus*		Y			1/1
plants	land plants	Cupressaceae	*Callitris endlicheri*	black cypress pine		C		9
plants	land plants	Cupressaceae	*Callitris glaucophylla*	white cypress pine		C		8
plants	land plants	Cyperaceae	*Abildgaardia ovata*			C		1/1
plants	land plants	Cyperaceae	*Bulbostylis barbata*			C		2
plants	land plants	Cyperaceae	*Bulbostylis pyriformis*			C		1/1
plants	land plants	Cyperaceae	*Carex appressa*			C		1
plants	land plants	Cyperaceae	*Carex inversa*	knob sedge		C		1/1
plants	land plants	Cyperaceae	*Cyperus*					1
plants	land plants	Cyperaceae	*Cyperus betchei subsp. betchei*			C		1/1
plants	land plants	Cyperaceae	*Cyperus bowmanni*			C		1/1
plants	land plants	Cyperaceae	*Cyperus flaccidus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus fulvus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus gracilis*			C		2/1
plants	land plants	Cyperaceae	*Cyperus leptocarpus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus squarrosus*	bearded flatsedge		C		1/1
plants	land plants	Cyperaceae	*Eleocharis cylindrostachys*			C		3/3
plants	land plants	Cyperaceae	*Eleocharis pallens*	pale spikerush		C		1
plants	land plants	Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush		C		1
plants	land plants	Cyperaceae	*Gahnia aspera*			C		12/1
plants	land plants	Cyperaceae	*Schoenus kennyi*			C		4
plants	land plants	Cyperaceae	*Scleria mackaviensis*			C		4/1
plants	land plants	Cyperaceae	*Scleria sphacelata*			C		6/1
plants	land plants	Dicranaceae	*Sclerodontium clavinerve*			C		1/1
plants	land plants	Dilleniaceae	*Hibbertia cistoidea*			C		3/3
plants	land plants	Dilleniaceae	*Hibbertia stricta var. stricta*			C		1
plants	land plants	Droseraceae	*Drosera hookeri*			SL		2/2
plants	land plants	Droseraceae	*Drosera lunata*			SL		1/1
plants	land plants	Ebenaceae	*Diospyros humilis*	small-leaved ebony		C		2
plants	land plants	Elatinaceae	*Elatine gratioloides*	waterwort		C		1/1
plants	land plants	Ericaceae	*Agiortia pleiosperma*			C		3/3
plants	land plants	Ericaceae	*Lissanthe pluriloculata*			C		6/5
plants	land plants	Ericaceae	*Melichrus adpressus*			C		1/1
plants	land plants	Ericaceae	*Melichrus sp. (Isla Gorge P.Sharpe+ 601)*			C		4/2
plants	land plants	Ericaceae	*Melichrus urceolatus*	honey gorse		C		6/4
plants	land plants	Ericaceae	*Styphelia blakei*			C		2/2
plants	land plants	Ericaceae	*Styphelia mitchellii*			C		5/3
plants	land plants	Ericaceae	*Styphelia mutica*			C		1
plants	land plants	Euphorbiaceae	*Acalypha capillipes*	small-leaved acalypha		C		3
plants	land plants	Euphorbiaceae	*Acalypha eremorum*	soft acalypha		C		2/1
plants	land plants	Euphorbiaceae	*Bertya oleifolia*			C		1/1
plants	land plants	Euphorbiaceae	*Croton insularis*	Queensland cascarilla		C		10
plants	land plants	Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton		C		2
plants	land plants	Euphorbiaceae	*Euphorbia dallachyana*			C		1/1

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plants	land plants	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		1/1
plants	land plants	Goodeniaceae	*Brunonia australis*	blue pincushion		SL		1/1
plants	land plants	Goodeniaceae	*Dampiera adpressa*			C		6/4
plants	land plants	Goodeniaceae	*Dampiera discolor*			C		5/1
plants	land plants	Goodeniaceae	*Goodenia bellidifolia subsp. argentea*			C		1
plants	land plants	Goodeniaceae	*Goodenia caroliniana*			C		2/2
plants	land plants	Goodeniaceae	*Goodenia glabra*			C		3
plants	land plants	Goodeniaceae	*Scaevola spinescens*	prickly fan flower		C		1/1
plants	land plants	Haloragaceae	*Gonocarpus urceolatus*			C		2/2
plants	land plants	Haloragaceae	*Myriophyllum verrucosum*	water milfoil		C		1/1
plants	land plants	Hemerocallidaceae	*Dianella caerulea*			C		2/1
plants	land plants	Hemerocallidaceae	*Dianella caerulea var. protensa*			C		1
plants	land plants	Hemerocallidaceae	*Dianella longifolia*			C		2
plants	land plants	Hemerocallidaceae	*Dianella longifolia var. longifolia*			C		2
plants	land plants	Hemerocallidaceae	*Dianella rara*			C		6/1
plants	land plants	Hemerocallidaceae	*Dianella revoluta var. revoluta*			C		5
plants	land plants	Hypoxidaceae	*Hypoxis pratensis var. tuberculata*			C		1/1
plants	land plants	Isoetaceae	*Isoetes muelleri*	quillwort		C		1/1
plants	land plants	Johnsoniaceae	*Tricoryne anceps subsp. anceps*			C		3
plants	land plants	Johnsoniaceae	*Tricoryne elatior*	yellow autumn lily		C		1
plants	land plants	Juncaceae	*Juncus aridicola*	tussock rush		C		3
plants	land plants	Juncaceae	*Juncus sp. (Nindigully R.Roe AQ139509)*			C		1
plants	land plants	Lamiaceae	*Coleus australis*			C		2
plants	land plants	Lamiaceae	*Prostanthera cryptandroides subsp. euphrasioides*			C		2/2
plants	land plants	Lamiaceae	*Prostanthera ringens*			C		1
plants	land plants	Lamiaceae	*Teucrium junceum*			C		3/1
plants	land plants	Lamiaceae	*Westringia cheelii*			C		6/6
plants	land plants	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		5
plants	land plants	Laxmanniaceae	*Laxmannia gracilis*	slender wire lily		C		2/2
plants	land plants	Laxmanniaceae	*Lomandra confertifolia subsp. pallida*			C		4/1
plants	land plants	Laxmanniaceae	*Lomandra filiformis subsp. filiformis*			C		10
plants	land plants	Laxmanniaceae	*Lomandra longifolia*			C		5
plants	land plants	Laxmanniaceae	*Lomandra multiflora subsp. multiflora*			C		7
plants	land plants	Leguminosae	*Acacia*					5
plants	land plants	Leguminosae	*Acacia blakei subsp. blakei*			C		1/1
plants	land plants	Leguminosae	*Acacia burbidgeae*			C		2/2
plants	land plants	Leguminosae	*Acacia burrowii*			C		3
plants	land plants	Leguminosae	*Acacia buxifolia subsp. pubiflora*			C		3/3
plants	land plants	Leguminosae	*Acacia caroleae*			C		1/1
plants	land plants	Leguminosae	*Acacia complanata*	flatstem wattle		C		1/1
plants	land plants	Leguminosae	*Acacia conferta*			C		2/1
plants	land plants	Leguminosae	*Acacia crassa*			C		1
plants	land plants	Leguminosae	*Acacia crassa subsp. crassa*			C		4/1
plants	land plants	Leguminosae	*Acacia crassa subsp. longicoma*			C		23/2
plants	land plants	Leguminosae	*Acacia curranii*	curly-bark wattle		V	V	9/9
plants	land plants	Leguminosae	*Acacia deanei*			C		1/1

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plants	land plants	Leguminosae	*Acacia decora*	pretty wattle		C		2
plants	land plants	Leguminosae	*Acacia excelsa*			C		1
plants	land plants	Leguminosae	*Acacia excelsa subsp. excelsa*			C		2
plants	land plants	Leguminosae	*Acacia hakeoides*	hakea wattle		C		2
plants	land plants	Leguminosae	*Acacia harpophylla*	brigalow		C		6
plants	land plants	Leguminosae	*Acacia julifera subsp. julifera*			C		1/1
plants	land plants	Leguminosae	*Acacia juncifolia*			C		3/2
plants	land plants	Leguminosae	*Acacia leiocalyx subsp. leiocalyx*			C		3/1
plants	land plants	Leguminosae	*Acacia longispicata*			C		4/2
plants	land plants	Leguminosae	*Acacia neriifolia*	pechey wattle		C		2/2
plants	land plants	Leguminosae	*Acacia oswaldii*	miljee		C		2/1
plants	land plants	Leguminosae	*Acacia penninervis var. penninervis*			C		1/1
plants	land plants	Leguminosae	*Acacia podalyriifolia*	Queensland silver wattle		C		1
plants	land plants	Leguminosae	*Acacia salicina*	doolan		C		2
plants	land plants	Leguminosae	*Acacia shirleyi*	lancewood		C		85
plants	land plants	Leguminosae	*Acacia sparsiflora*			C		12
plants	land plants	Leguminosae	*Acacia triptera*			C		10/4
plants	land plants	Leguminosae	*Acacia wardellii*			NT		2/2
plants	land plants	Leguminosae	*Chorizema parviflorum*	eastern flame pea		C		1
plants	land plants	Leguminosae	*Daviesia genistifolia*	broom bitter pea		C		1/1
plants	land plants	Leguminosae	*Desmodium brachypodum*	large ticktrefoil		C		1/1
plants	land plants	Leguminosae	*Desmodium varians*	slender tick trefoil		C		2
plants	land plants	Leguminosae	*Glycine clandestina*			C		1
plants	land plants	Leguminosae	*Glycine clandestina var. sericea*			C		1
plants	land plants	Leguminosae	*Glycine tabacina*	glycine pea		C		1
plants	land plants	Leguminosae	*Glycine tomentella*	woolly glycine		C		1
plants	land plants	Leguminosae	*Hovea tholiformis*			C		1/1
plants	land plants	Leguminosae	*Indigofera linnaei*	Birdsville indigo		C		1/1
plants	land plants	Leguminosae	*Jacksonia rhadinoclona*	Miles dogwood		C		5/5
plants	land plants	Leguminosae	*Jacksonia scoparia*			C		1/1
plants	land plants	Leguminosae	*Labichea digitata*			C		3/1
plants	land plants	Leguminosae	*Lotus australis*	Australian trefoil		C		1
plants	land plants	Leguminosae	*Lysiphyllum carronii*	ebony tree		C		1
plants	land plants	Leguminosae	*Macroptilium*					1
plants	land plants	Leguminosae	*Melilotus indicus*	hexham scent	Y			1/1
plants	land plants	Leguminosae	*Neptunia gracilis forma gracilis*			C		3/2
plants	land plants	Leguminosae	*Rhynchosia minima var. australis*			C		2/2
plants	land plants	Leguminosae	*Senna acclinis*			C		1/1
plants	land plants	Leguminosae	*Senna artemisioides*			C		1
plants	land plants	Leguminosae	*Senna artemisioides subsp. coriacea*			C		1
plants	land plants	Leguminosae	*Senna barclayana*			C		6
plants	land plants	Leguminosae	*Sesbania cannabina var. cannabina*			C		1/1
plants	land plants	Leguminosae	*Swainsona galegifolia*	smooth Darling pea		C		1
plants	land plants	Leguminosae	*Vachellia bidwillii*			C		1
plants	land plants	Leguminosae	*Vachellia farnesiana*		Y			12
plants	land plants	Linderniaceae	*Lindernia hyssopoides*			C		1/1

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plants	land plants	Loranthaceae	*Amyema*					1
plants	land plants	Loranthaceae	*Amyema biniflora*			C		1/1
plants	land plants	Loranthaceae	*Amyema quandang var. bancroftii*	broad-leaved grey mistletoe		C		1
plants	land plants	Loranthaceae	*Amyema quandang var. quandang*			C		1/1
plants	land plants	Loranthaceae	*Lysiana subfalcata*			C		1/1
plants	land plants	Lythraceae	*Ammannia multiflora*	jerry-jerry		C		2/2
plants	land plants	Lythraceae	*Rotala mexicana*			C		1/1
plants	land plants	Malvaceae	*Abutilon oxycarpum*			C		4
plants	land plants	Malvaceae	*Abutilon oxycarpum var. incanum*			C		1/1
plants	land plants	Malvaceae	*Abutilon oxycarpum var. oxycarpum*			C		3
plants	land plants	Malvaceae	*Hibiscus brachysiphonius*			C		1
plants	land plants	Malvaceae	*Hibiscus sturtii*			C		1
plants	land plants	Malvaceae	*Hibiscus sturtii var. sturtii*			C		4
plants	land plants	Malvaceae	*Malvastrum americanum var. americanum*		Y			1/1
plants	land plants	Malvaceae	*Sida cordifolia*		Y			4/1
plants	land plants	Malvaceae	*Sida hackettiana*			C		2
plants	land plants	Malvaceae	*Sida trichopoda*			C		3
plants	land plants	Marsileaceae	*Marsilea*					1
plants	land plants	Meliaceae	*Owenia acidula*	emu apple		C		8
plants	land plants	Meliaceae	*Owenia venosa*	crow's apple		C		1
plants	land plants	Menispermaceae	*Tinospora smilacina*	snakevine		C		1
plants	land plants	Meteoriaceae	*Papillaria crocea*			C		1/1
plants	land plants	Moraceae	*Ficus virens var. virens*			C		7
plants	land plants	Moraceae	*Trophis scandens*			C		1
plants	land plants	Moraceae	*Trophis scandens subsp. scandens*			C		1
plants	land plants	Myrtaceae	*Angophora floribunda*	rough-barked apple		C		2
plants	land plants	Myrtaceae	*Angophora leiocarpa*	rusty gum		C		4
plants	land plants	Myrtaceae	*Calytrix gurulmundensis*			V	V	22/21
plants	land plants	Myrtaceae	*Calytrix tetragona*	fringe myrtle		C		7/5
plants	land plants	Myrtaceae	*Corymbia bloxsomei*			C		1
plants	land plants	Myrtaceae	*Corymbia citriodora*	spotted gum		C		1
plants	land plants	Myrtaceae	*Corymbia citriodora subsp. variegata*			C		184
plants	land plants	Myrtaceae	*Corymbia clarksoniana*			C		2
plants	land plants	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		1
plants	land plants	Myrtaceae	*Corymbia trachyphloia*			C		2
plants	land plants	Myrtaceae	*Corymbia trachyphloia subsp. trachyphloia*			C		21/1
plants	land plants	Myrtaceae	*Eucalyptus apothalassica*			C		6/4
plants	land plants	Myrtaceae	*Eucalyptus camaldulensis subsp. acuta*			C		1
plants	land plants	Myrtaceae	*Eucalyptus chloroclada*	Baradine red gum		C		1
plants	land plants	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		77/3
plants	land plants	Myrtaceae	*Eucalyptus curtisii*	Plunkett mallee		NT		3/3
plants	land plants	Myrtaceae	*Eucalyptus elegans*			C		1
plants	land plants	Myrtaceae	*Eucalyptus exserta*	Queensland peppermint		C		25/8
plants	land plants	Myrtaceae	*Eucalyptus fibrosa subsp. fibrosa*			C		5
plants	land plants	Myrtaceae	*Eucalyptus fibrosa subsp. nubilis*			C		36
plants	land plants	Myrtaceae	*Eucalyptus longirostrata*			C		6

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plants	land plants	Myrtaceae	*Eucalyptus melanophloia*			C		2
plants	land plants	Myrtaceae	*Eucalyptus melliodora*	yellow box		C		1/1
plants	land plants	Myrtaceae	*Eucalyptus microcarpa*	inland grey box		C		2
plants	land plants	Myrtaceae	*Eucalyptus orgadophila*	mountain coolibah		C		3/2
plants	land plants	Myrtaceae	*Eucalyptus panda*			C		4/4
plants	land plants	Myrtaceae	*Eucalyptus populnea*	poplar box		C		4/2
plants	land plants	Myrtaceae	*Eucalyptus tenuipes*	narrow-leaved white mahogany		C		34/6
plants	land plants	Myrtaceae	*Eucalyptus tereticornis*			C		1
plants	land plants	Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*			C		3/1
plants	land plants	Myrtaceae	*Eucalyptus thozetiana*			C		1/1
plants	land plants	Myrtaceae	*Eucalyptus woollsiana*			C		1
plants	land plants	Myrtaceae	*Harmogia densifolia*			C		3/3
plants	land plants	Myrtaceae	*Homalocalyx polyandrus*			C		11/10
plants	land plants	Myrtaceae	*Homoranthus melanostictus*			C		1/1
plants	land plants	Myrtaceae	*Kardomia jucunda*			C		2/2
plants	land plants	Myrtaceae	*Kunzea opposita*			C		3
plants	land plants	Myrtaceae	*Kunzea opposita var. opposita*			C		3/3
plants	land plants	Myrtaceae	*Leptospermum polygalifolium*	tantoon		C		2
plants	land plants	Myrtaceae	*Lysicarpus angustifolius*	budgeroo		C		6
plants	land plants	Myrtaceae	*Melaleuca nodosa*			C		1/1
plants	land plants	Myrtaceae	*Melaleuca thymifolia*	thyme honeymyrtle		C		1/1
plants	land plants	Myrtaceae	*Melaleuca uncinata*			C		4/1
plants	land plants	Myrtaceae	*Micromyrtus carinata*	Gurulmundi heath-myrtle		E		31/28
plants	land plants	Myrtaceae	*Micromyrtus sessilis*			C		5/3
plants	land plants	Nyctaginaceae	*Boerhavia dominii*			C		1
plants	land plants	Oleaceae	*Jasminum didymum*			C		1
plants	land plants	Oleaceae	*Jasminum didymum subsp. lineare*			C		2
plants	land plants	Oleaceae	*Jasminum simplicifolium subsp. australiense*			C		3
plants	land plants	Oleaceae	*Notelaea microcarpa*			C		9/1
plants	land plants	Orchidaceae	*Cyanicula caerulea*			SL		1/1
plants	land plants	Orchidaceae	*Cymbidium canaliculatum*			SL		4
plants	land plants	Orchidaceae	*Dipodium hamiltonianum*	yellow hyacinth orchid		SL		1/1
plants	land plants	Orchidaceae	*Diuris tricolor*			SL		2/2
plants	land plants	Oxalidaceae	*Oxalis corniculata*		Y			2
plants	land plants	Papaveraceae	*Argemone mexicana*	prickly poppy	Y			1
plants	land plants	Pentapetaceae	*Melhania oblongifolia*			C		1
plants	land plants	Phyllanthaceae	*Breynia oblongifolia*			C		1
plants	land plants	Phyllanthaceae	*Phyllanthus occidentalis*			C		1
plants	land plants	Picrodendraceae	*Petalostigma pachyphyllum*			C		1
plants	land plants	Picrodendraceae	*Petalostigma pubescens*	quinine tree		C		10/1
plants	land plants	Pittosporaceae	*Auranticarpa rhombifolia*			C		2
plants	land plants	Pittosporaceae	*Bursaria spinosa subsp. spinosa*			C		6
plants	land plants	Pittosporaceae	*Pittosporum angustifolium*			C		4/3
plants	land plants	Pittosporaceae	*Pittosporum lancifolium*			C		3
plants	land plants	Pittosporaceae	*Pittosporum spinescens*			C		4
plants	land plants	Plantaginaceae	*Gratiola pedunculata*			C		1/1

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plants	land plants	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		8/2
plants	land plants	Poaceae	*Aristida blakei*			C		1
plants	land plants	Poaceae	*Aristida calycina*			C		1
plants	land plants	Poaceae	*Aristida calycina var. calycina*			C		1/1
plants	land plants	Poaceae	*Aristida caput-medusae*			C		10
plants	land plants	Poaceae	*Aristida holathera var. holathera*			C		1
plants	land plants	Poaceae	*Aristida jerichoensis*			C		1
plants	land plants	Poaceae	*Aristida jerichoensis var. jerichoensis*			C		2/2
plants	land plants	Poaceae	*Aristida jerichoensis var. subspinulifera*			C		3
plants	land plants	Poaceae	*Aristida leichhardtiana*			C		4
plants	land plants	Poaceae	*Aristida personata*			C		6/1
plants	land plants	Poaceae	*Aristida queenslandica var. dissimilis*			C		1
plants	land plants	Poaceae	*Aristida queenslandica var. queenslandica*			C		1
plants	land plants	Poaceae	*Aristida ramosa*	purple wiregrass		C		2
plants	land plants	Poaceae	*Aristida vagans*			C		2
plants	land plants	Poaceae	*Arundinella nepalensis*	reedgrass		C		3
plants	land plants	Poaceae	*Austrostipa ramosissima*	bamboo grass		C		5/1
plants	land plants	Poaceae	*Bothriochloa pertusa*		Y			1
plants	land plants	Poaceae	*Brachyachne convergens*	common native couch		C		1/1
plants	land plants	Poaceae	*Cenchrus ciliaris*		Y			3
plants	land plants	Poaceae	*Cenchrus spinifex*		Y			1/1
plants	land plants	Poaceae	*Chloris divaricata*			C		1
plants	land plants	Poaceae	*Chloris gayana*	rhodes grass	Y			1
plants	land plants	Poaceae	*Chloris ventricosa*	tall chloris		C		3
plants	land plants	Poaceae	*Chloris virgata*	feathertop rhodes grass	Y			1
plants	land plants	Poaceae	*Cymbopogon bombycinus*	silky oilgrass		C		1
plants	land plants	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		5
plants	land plants	Poaceae	*Cynodon dactylon*		Y			1
plants	land plants	Poaceae	*Dactyloctenium radulans*	button grass		C		1
plants	land plants	Poaceae	*Dichanthium sericeum subsp. sericeum*			C		3/1
plants	land plants	Poaceae	*Digitaria breviglumis*			C		1
plants	land plants	Poaceae	*Digitaria didactyla*	Queensland blue couch	Y			1
plants	land plants	Poaceae	*Digitaria divaricatissima*	spreading umbrella grass		C		1/1
plants	land plants	Poaceae	*Digitaria parviflora*			C		2
plants	land plants	Poaceae	*Dimorphochloa rigida*			C		2/2
plants	land plants	Poaceae	*Dinebra decipiens var. asthenes*			C		1/1
plants	land plants	Poaceae	*Dinebra decipiens var. peacockii*			C		2/1
plants	land plants	Poaceae	*Enneapogon*					1
plants	land plants	Poaceae	*Enneapogon lindleyanus*			C		5/1
plants	land plants	Poaceae	*Enneapogon nigricans*	niggerheads		C		1
plants	land plants	Poaceae	*Enteropogon acicularis*	curly windmill grass		C		1
plants	land plants	Poaceae	*Enteropogon unispiceus*			C		2/2
plants	land plants	Poaceae	*Entolasia stricta*	wiry panic		C		5
plants	land plants	Poaceae	*Eragrostis*					3/1
plants	land plants	Poaceae	*Eragrostis curvula*		Y			2/1
plants	land plants	Poaceae	*Eragrostis lacunaria*	purple lovegrass		C		3

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plants	land plants	Poaceae	*Eragrostis megalosperma*			C		1/1
plants	land plants	Poaceae	*Eragrostis sororia*			C		4
plants	land plants	Poaceae	*Eragrostis speciosa*			C		1/1
plants	land plants	Poaceae	*Eriachne mucronata forma (Alpha C.E.Hubbard 7882)*			C		3/2
plants	land plants	Poaceae	*Eriachne pallescens*			C		1
plants	land plants	Poaceae	*Eriochloa pseudoacrotricha*			C		1/1
plants	land plants	Poaceae	*Eulalia aurea*	silky browntop		C		1/1
plants	land plants	Poaceae	*Heteropogon contortus*	black speargrass		C		2
plants	land plants	Poaceae	*Homopholis belsonii*	Belson's panic		E	V	1/1
plants	land plants	Poaceae	*Imperata cylindrica*	blady grass		C		1
plants	land plants	Poaceae	*Iseilema macratherum*			C		3
plants	land plants	Poaceae	*Leptochloa digitata*			C		1
plants	land plants	Poaceae	*Megathyrsus maximus*		Y			1
plants	land plants	Poaceae	*Megathyrsus maximus var. pubiglumis*		Y			1
plants	land plants	Poaceae	*Melinis repens*	red natal grass	Y			3
plants	land plants	Poaceae	*Panicum buncei*			C		2/2
plants	land plants	Poaceae	*Panicum decompositum*			C		2
plants	land plants	Poaceae	*Panicum effusum*			C		4
plants	land plants	Poaceae	*Paspalidium caespitosum*	brigalow grass		C		2/1
plants	land plants	Poaceae	*Perotis rara*	comet grass		C		1/1
plants	land plants	Poaceae	*Rytidosperma indutum*			C		1
plants	land plants	Poaceae	*Sarga leiocladum*			C		2
plants	land plants	Poaceae	*Setaria paspalidioides*			C		1/1
plants	land plants	Poaceae	*Setaria surgens*			C		3/2
plants	land plants	Poaceae	*Sorghum arundinaceum*	Rhodesian Sudan grass	Y			1
plants	land plants	Poaceae	*Sporobolus caroli*	fairy grass		C		3/1
plants	land plants	Poaceae	*Sporobolus coromandelianus*		Y			1/1
plants	land plants	Poaceae	*Sporobolus elongatus*			C		3
plants	land plants	Poaceae	*Thellungia advena*	coolibah grass		C		2
plants	land plants	Poaceae	*Themeda intermedia*		Y			1
plants	land plants	Poaceae	*Themeda quadrivalvis*	grader grass	Y			1
plants	land plants	Poaceae	*Themeda triandra*	kangaroo grass		C		3
plants	land plants	Poaceae	*Triodia scariosa*			C		5/3
plants	land plants	Poaceae	*Urochloa mosambicensis*	sabi grass	Y			1
plants	land plants	Portulacaceae	*Calandrinia pickeringii*			C		1/1
plants	land plants	Portulacaceae	*Portulaca oleracea*	pigweed	Y			2
plants	land plants	Proteaceae	*Grevillea floribunda subsp. floribunda*			C		1/1
plants	land plants	Proteaceae	*Grevillea longistyla*			C		2/2
plants	land plants	Proteaceae	*Grevillea striata*	beefwood		C		2
plants	land plants	Proteaceae	*Hakea lorea subsp. lorea*			C		3
plants	land plants	Proteaceae	*Hakea purpurea*			C		3/3
plants	land plants	Proteaceae	*Persoonia sericea*	silky geebung		C		1/1
plants	land plants	Pteridaceae	*Cheilanthes distans*	bristly cloak fern		C		4/1
plants	land plants	Pteridaceae	*Cheilanthes sieberi subsp. sieberi*			C		3
plants	land plants	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		9
plants	land plants	Rhamnaceae	*Cryptandra*					1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Rubiaceae	*Cyclophyllum coprosmoides*			C		1
plants	land plants	Rubiaceae	*Cyclophyllum coprosmoides var. coprosmoides*			C		1
plants	land plants	Rubiaceae	*Pomax umbellata*			C		1
plants	land plants	Rubiaceae	*Psydrax odorata*			C		5
plants	land plants	Rubiaceae	*Psydrax odorata forma buxifolia*			C		2
plants	land plants	Rubiaceae	*Psydrax odorata forma subnitida*			C		1/1
plants	land plants	Rubiaceae	*Psydrax oleifolia*			C		4
plants	land plants	Rubiaceae	*Richardia brasiliensis*	white eye	Y			1
plants	land plants	Rubiaceae	*Scleromitrion galioides*			C		1/1
plants	land plants	Rutaceae	*Acronychia pauciflora*	soft acronychia		C		1
plants	land plants	Rutaceae	*Boronia glabra*			C		5/3
plants	land plants	Rutaceae	*Citrus glauca*			C		4
plants	land plants	Rutaceae	*Cyanothamnus bipinnatus*			C		1
plants	land plants	Rutaceae	*Cyanothamnus occidentalis*			C		5/5
plants	land plants	Rutaceae	*Flindersia australis*	crow's ash		C		3
plants	land plants	Rutaceae	*Geijera parviflora*	wilga		C		11
plants	land plants	Rutaceae	*Geijera salicifolia*	brush wilga		C		2
plants	land plants	Rutaceae	*Phebalium squamulosum subsp. gracile*			C		5/3
plants	land plants	Rutaceae	*Zieria aspalathoides subsp. aspalathoides*			C		1/1
plants	land plants	Santalaceae	*Anthobolus leptomerioides*			C		2/2
plants	land plants	Santalaceae	*Exocarpos cupressiformis*	native cherry		C		1
plants	land plants	Santalaceae	*Exocarpos latifolius*			C		1/1
plants	land plants	Santalaceae	*Santalum lanceolatum*			SL		4
plants	land plants	Sapindaceae	*Alectryon connatus*	grey birds-eye		C		3/1
plants	land plants	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		8/1
plants	land plants	Sapindaceae	*Alectryon oleifolius subsp. elongatus*			C		1
plants	land plants	Sapindaceae	*Atalaya hemiglauca*			C		4
plants	land plants	Sapindaceae	*Dodonaea*					4/4
plants	land plants	Sapindaceae	*Dodonaea filifolia*			C		2/2
plants	land plants	Sapindaceae	*Dodonaea triangularis*			C		6/1
plants	land plants	Sapindaceae	*Dodonaea viscosa*			C		2
plants	land plants	Sapotaceae	*Planchonella cotinifolia*			C		4
plants	land plants	Scrophulariaceae	*Eremophila debilis*	winter apple		C		1
plants	land plants	Scrophulariaceae	*Eremophila deserti*			C		4/2
plants	land plants	Scrophulariaceae	*Eremophila longifolia*	berrigan		C		1
plants	land plants	Scrophulariaceae	*Eremophila mitchellii*			C		4/1
plants	land plants	Solanaceae	*Nicotiana forsteri*			C		1/1
plants	land plants	Solanaceae	*Nicotiana megalosiphon*			C		1/1
plants	land plants	Solanaceae	*Physalis lanceifolia*		Y			1/1
plants	land plants	Solanaceae	*Solanum*					2
plants	land plants	Solanaceae	*Solanum aviculare*	kangaroo apple		C		1
plants	land plants	Solanaceae	*Solanum coracinum*			C		3/3
plants	land plants	Solanaceae	*Solanum ellipticum*	potato bush		C		3/2
plants	land plants	Solanaceae	*Solanum jucundum*			C		3/3
plants	land plants	Solanaceae	*Solanum mitchellianum*			C		4/2
plants	land plants	Solanaceae	*Solanum nemophilum*			C		12/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Solanaceae	*Solanum parvifolium*			C		2
plants	land plants	Solanaceae	*Solanum parvifolium subsp. parvifolium*			C		1/1
plants	land plants	Solanaceae	*Solanum semiarmatum*	prickly nightshade		C		5
plants	land plants	Solanaceae	*Solanum stenopterum*			V		1/1
plants	land plants	Sparrmanniaceae	*Grewia latifolia*	dysentery plant		C		4/1
plants	land plants	Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree		SL		2
plants	land plants	Sterculiaceae	*Brachychiton populneus*			C		2
plants	land plants	Sterculiaceae	*Brachychiton populneus subsp. populneus*			SL		2
plants	land plants	Sterculiaceae	*Brachychiton populneus subsp. trilobus*			SL		3
plants	land plants	Sterculiaceae	*Brachychiton rupestris*			SL		14
plants	land plants	Stylidiaceae	*Stylidium debile*	frail trigger plant		SL		1/1
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	37/10
plants	land plants	Thymelaeaceae	*Pimelea*					1/1
plants	land plants	Verbenaceae	*Glandularia aristigera*		Y			5
plants	land plants	Verbenaceae	*Phyla nodiflora*	carpetweed		C		1
plants	land plants	Verbenaceae	*Verbena halei*		Y			1/1
plants	land plants	Viscaceae	*Viscum articulatum*	flat mistletoe		C		1/1
plants	land plants	Vitaceae	*Causonis clematidea*			C		1
plants	land plants	Xanthorrhoeaceae	*Xanthorrhoea johnsonii*			SL		14
plants	land plants	Zygophyllaceae	*Roepera glauca*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

APPENDIX B LIKELIHOOD OF OCCURRENCE

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Listed Threatened Birds						
Australian Painted Snipe (*Rostratula australis*)	EN	EN	The Australian painted snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. Marchant & Higgins (1993) stated that the Australian painted snipe can use modified habitats, such as low-lying woodlands converted to grazing pasture, sewage farms, dams, bores and irrigation schemes, however they do not necessarily breed in such habitats (as cited in DoE, 2019d). **Breeding habitat**: requirements specific for this species include shallow wetlands with bare mud and both upper and canopy cover nearby. Nest records are all, or nearly all, from or near small islands in freshwater wetlands. **Foraging habitat**: Terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They have also been observed in inundated grasslands as well as dams and bore drains.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Small areas of foraging habitat present within small ephemeral wetlands on drainage lines, which may provide temporary refuge for the species and support occasional transient visitors to the Project Area. ■ No records within the Project Area or adjoining areas.
Brown Tree-creeper (*Climacteris picumnus victoriae*)	VU	VU	Brown Treecreepers (south-eastern) inhabit open dry eucalypt forest and woodlands, mainly areas that are dominated by stringybarks or other rough-barked eucalypt species. The understorey is usually open and grassy, sometimes with few shrubs. They can also occur in open forest, woodlands and mallee that is subject to periodic inundation. This species is usually absent from areas with a dense shrubby understorey and heavily degraded woodland areas. **Breeding and roosting habitat:** This species nests and roosts in hollows, in either live trees, dead standing trees or tree stumps. **Foraging habitat:** An open understorey is preferable to enable individuals to forage on or near the ground while maintaining vigilance for predators. Areas with fallen timber provide greater foraging opportunities.	Partially	No	**Potential to occur.** ■ Project Area is marginally within the distribution for this species. ■ Suitable habitat is present within the Project Area. ■ No records exist for this species within the Project Area or adjoining areas. ■ Small patches of suitable dry Eucalyptus woodland/ forest habitat occurs across the Project Area.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Curlew Sandpiper (*Calidris ferruginea*)	CE and Mi	CE	This species is recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters. **Breeding habitat**: This species does not breed in Australia. **Foraging habitat**: potential foraging habitat exists in the Project Area in the form of dams. **Roosting habitat**: this species roost in open situations with damp substrate, especially on bare shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution of the species. ■ Wetland habitat within the Project Area comprises small ephemeral vegetated swamps and billabongs associated with meandering drainage lines which are unlikely to attract this species. ■ No records for the species occur within the Project Area/adjoining area and no observations were made during field surveys.
Diamond Firetail (*Stagonopleura guttata*)	VU	VU	Found in grassy eucalypt, acacia or casuarina woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. **Breeding habitat:** Nests are globular structures built either in the shrubby understorey, or higher up associated in woodland areas, especially 'under hawk'' or raven's nests. **Roosting habitat:** Birds roost in dense shrubs of woodlands or in smaller nests built especially for roosting. **Foraging habitat:** Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for this species. ■ Suitable habitat is present within the Project Area. ■ No records exist for this species within the Project Area or within adjoining areas. ■ Suitable habitat includes any Eucalyptus woodlands/ forests throughout the Project Area. Species also occurs in Acacia dominant areas.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Glossy Black-cockatoo (*Calyptorhynchus lathami*)	VU	VU	The Glossy Black-cockatoo are uncommon but widespread. They can be found from Mitchell, Queensland, through eastern New South Wales to East Gippsland, Victoria. **Foraging habitat**: The glossy black cockatoo feed almost exclusively on the seeds of sheoaks (Allocasuarina spp. and Casuarina spp.), usually relying on one or two species within a region (Higgins 1999). **Breeding habitat:** They are hollow nesters, utilising large hollows in both living and dead Eucalypt trees (Higgins, 1999).	Yes	Yes – within adjoining areas	**Likely to occur.** ■ Project Area is within the distribution for this species. ■ Potential habitat exists in the Project Area, in the form of Eucalypt woodland and Belah (She-oak) woodland. ■ Two records within the adjoining area are present from 2009. No observations were made during field surveys.
Greater Sand Plover (*Charadrius leschenaultii*)	VU, Mi, Ma	VU	This species is found majorly within coastal wetlands occurrence when on migration throughout Australia. Records from inland sites are extremely rare and probably reflect vagrant birds blown off course by storms.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for this species. ■ There is no suitable foraging habitat of coastal wetlands present within the Project Area. ■ No records for the species exist within the Project Area or adjoining areas.
Grey Falcon (*Falco hypoleucos*)	VU	VU	This species prefers arid and semi-arid Australia and frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined watercourses. This species has also been observed in treeless areas, frequenting tussock grassland and open woodland for foraging. **Breeding habitat**: Nests chosen are usually in the tallest trees along watercourses, particularly River Red Gum (*Eucalyptus camaldulensis*) and Coolibah (*E. coolabah*) **Foraging habitat**: timbered lowland plains, acacia shrubland crossed by tree-line watercourses, as well as treeless areas, tussock grasslands and open woodlands. **Roosting habitat**: this species is likely to roost in both its breeding and foraging habitat. This species has also been observed roosting on the ground.	Yes	No	**Unlikely to occur.** ■ Project Area is within the species distribution. ■ The Grey Falcon requires Acacia shrubland habitat as well as lowland plains associated with water, which lacking within the Project Area. ■ No records for the species occur within the Project Area/adjoining area and no observations were made during field surveys.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Painted Honeyeater (*Grantiella picta*)	VU	VU	The Painted Honeyeater lives in dry, open forests and woodlands. The species usually occurs in areas with flowering and fruiting mistletoe and flowering Eucalypts. This species prefers Acacia dominated woodlands, as well Paperbarks, Casuarinas, Callitris and Box-Ironbark-Yellow Gum woodlands with a large number of mature trees as these host more Mistletoe. **Breeding habitat**: breeding habitat is typically mature trees in remnant vegetation with high quantities of mistletoe. **Foraging and roosting habitat**: Associated with woodlands and forests with Mistletoe.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Mistletoe is present sparingly in Eucalypt woodlands across the Project Area that could be utilised as habitat for this species. ■ No records within the Project Area or adjoining areas.
Red Goshawk (*Erythrotriorchis radiatus*)	VU	EN	This species prefers wooded and forested lands of tropical and warm-temperate Australia. Forests of intermediate density, with tall stands or individual trees so that nests are supported, are favoured, or ecotones between habitats of differing densities, e.g., between rainforest and eucalypt forest, between gallery forest and woodland, or on edges of woodland and forest where they meet grassland, cleared land, roads or watercourses. This species avoids very dense and very open habitats. This species has a large home range. **Breeding and roosting habitat**: This species rarely breeds in areas with fragmented vegetation. Breeding habitat is restricted to trees that are taller than 20 m and within 1km of a watercourse or wetland. **Foraging habitat**: Habitat has to be open enough for fast hunting and manoeuvring in flight, but with enough cover for ambushing of prey.	No	No	**Unlikely to occur.** ■ Project Area in the Brigalow Belt Bioregion is now considered to be outside of the disturbance for the species. ■ Dense wooded areas for roosting and breeding habitat lacking in Project Area. ■ No records for the species exist within the immediate Project Area/adjoining area and no observations were made during field surveys

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Southern Squatter Pigeon (*Geophaps scripta scripta*)	VU	VU	Squatter pigeon (southern) habitat is generally defined as open-forests to sparse, open-woodlands and scrub that are mostly dominated by Eucalyptus, Corymbia or Callitris species. Additionally, they also favour remnant regrowth or partly modified vegetation communities that are within 3 km of water bodies. **Breeding habitat**: Breeding habitat occurs on stony rises on sandy, gravelly soils, within 1 km of a suitable, permanent waterbody (including farm dams and watercourses). **Foraging habitat**: Natural foraging habitat for the species is 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, within 3 km of a suitable, permanent or seasonal waterbody. **Dispersal habitat**: Dispersal habitat is any forest or woodland occurring between patches of foraging or breeding habitat, and suitable waterbodies.	Yes	Yes (within adjoining area 2016, but within a large area of suitable habitat)	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is a lack of foraging and breeding habitat in the Project Area due to it being largely cleared with dense pastoral grasses. ■ No records within the Project Area and the closest record is from 2016 near Cherwondah SF (ALA, 2022), which is a large area of suitable habitat approximately 20 km east of the Project Area.
Southern Whiteface (*Aphelocephala leucopsis*)	VU	VU	This species has a wide distribution across much of Australia, including southern Queensland west of the Great Dividing Range. It inhabits a variety of open woodlands and shrublands that have a grassy and/or shrubby understorey and are dominated by acacia and eucalypt species. **Breeding habitat:** This species nests and roosts in tree hollows, in either live or dead standing trees within habitats dominated by Eucalypt and Acacia species. **Foraging habitat:** This species forages almost exclusively on the ground, with preference for areas with low tree densities and an understorey consisting of herbs and leaf litter in habitats dominated by Eucalypt or Acacia species.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for this species. ■ No records exist for this species within the Project Area or adjoining areas and no observations were made in the field. ■ Species has the potential to utilise almost all habitats present within the Project Area, excluding any cleared grazed land.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
White-throated Needletail (*Hirundapus caudacutus*)	VU and Mi	VU	According to Higgins (1999), this species occurs over most types of habitat, but are recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (as cited in DSEWPC, 2019b). Whilst rare, they have been recorded on wooded ends of ridges, roosting after dark high in the eucalypt tree canopies (Tarburton, 1993). **Breeding habitat**: this species does not breed in Australia. **Roosting habitat**: the species is noted to roost in tall mature forests and woodlands amongst dense foliage and in hollows often associated with ridgelines. **Foraging habitat**: the species almost always will fly aerially at 'cloud level' and forage over farmland, heathland and mudflats.	Yes	No	**Known to occur.** ■ Project Area is within the distribution for the species. ■ Species likely only to fly aerially over the Project Area (through September to April on its migration), which contains no rainforest vegetation. The Project Area does not contain habitat in the form of elevated Eucalypt forests or wooded ridges to act as foraging and roosting habitat for the species. ■ Species was recorded during subsequent field surveys for Senex on 24 November 2022.
Bird Species listed as Migratory Only under the EPBC Act						
Common Sandpiper (*Actitis hypoleucos*)	Mi	SLC	The species utilise a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The common sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. **Breeding habitat**: Does not breed in Australia. **Foraging habitat**: this species forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. Birds sometimes venture into grassy areas adjoining wetlands. It has been observed foraging in billabongs, lakes and dams. **Roosting habitat**: Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks. Small areas of foraging habitat present within small ephemeral wetlands, which may provide temporary refuge for the species, within the Project Area.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Small areas of foraging habitat present within small ephemeral wetlands on drainage lines, which may provide temporary refuge for the species and support occasional transient visitors to the Project Area. ■ No records within the Project Area or adjoining areas.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Fork-tailed Swift (*Apus pacificus*)	Mi	SLC	In Australia, they occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. **Breeding habitat**: Does not breed in Australia. **Foraging habitat**: exclusively aerial and found across a range of habitats.	Yes	No	**Likely to occur.** ■ Project Area is within the distribution for the species. ■ Potential foraging habitat over dry open habitats present, where it would be only like to fly aerially over. ■ No records within the Project Area or adjoining areas and the closest record is from 2002 near Cherwondah SF (ALA, 2023), which is a large area of suitable habitat approximately 20 km south-east of the Project Area.
Latham's Snipe (*Gallinago hardwickii*)	Mi	SLC	They usually occur in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby. They generally occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains. This species has been said to occur very rarely in small patches of habitat such as roadside ditches and alpine bogs (Higgins & Davies, 1996). They can also be found around irrigation channels and modified habitats at farms. **Breeding habitat**: Does not breed in Australia. **Foraging habitat**: characterized by areas of mud (either exposed or beneath a very shallow covering of water) and some form of cover (e.g., low, dense vegetation) **Roosting habitat**: on the ground near (or sometimes in) their foraging areas, usually in sites that provide some degree of shelter, e.g., beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable. Small areas of foraging habitat present within small ephemeral wetlands, which may provide temporary refuge for the species, within the Project Area.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Small areas of foraging habitat present within small ephemeral wetlands on drainage lines, which may provide temporary refuge for the species and support occasional transient visitors to the Project Area. ■ No records within the Project Area or adjoining areas.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Oriental Cuckoo (*Cuculus optatus*)	Mi	SLC	The species is found in forest canopy, open wooded areas and orchards, often in hill country, also in coniferous forest and in birch (Betula) above the tree line. The species may occur in association with remnant and regrowth RE types 11.3.2, 11.3.25, 11.9.4, 11.9.5, 11.9.5a, 11.9.10, 11.3.19, 11.5.1 within a project area. The species winters in many different countries, including the coastal parts of northern and eastern Australia (BirdLife International, 2015). **Breeding habitat**: Does not breed in Australia. **Foraging and roosting habitat**: Monsoonal rainforest, vine thickets, wet sclerophyll forest or open *Casuarina, Acacia,* or *Eucalyptus* woodlands. Frequently at the edges or ecotones between habitat types.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ There is limited areas of potential suitable remnant woodlands and non-remnant patches of native vegetation habitat, within the Project Area. ■ No records within the Project Area or adjoining areas.
Pectoral Sandpiper (*Calidris melanotos*)	Mi	SLC	In Australasia, the pectoral sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. **Breeding habitat:** Does not breed in Australia. **Foraging habitat**: forages in shallow water or soft mud at the edge of wetlands, **Roosting habitat**: prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. Wetland habitat within the Project Area comprises small ephemeral vegetated swamps and billabongs associated with meandering drainage lines which are unlikely to attract this species.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for this species but occurs predominantly in coastal areas. ■ Wetland habitat within the Project Area comprises small ephemeral vegetated swamps and billabongs associated with meandering drainage lines which are unlikely to attract this species. ■ No records for the species exist within the Project Area/adjoining area and no observations were made during field surveys.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Rufous Fantail (*Rhipidura rufifrons*)	Mi	SLC	In east and south-east Australia, the rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as tallowwood (*Eucalyptus microcorys*) and mountain grey gum (*E. cypellocarpa*). When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including spotted gum (*E. maculata*), yellow box (*E. melliodora*), ironbarks or stringybarks, often with a shrubby or heath understorey. **Breeding habitat**: breeding occurs in south-east Australia, but no other information is provided on the specifics of such locations. **Foraging and roosting habitat**: There is no information concerning feeding or roosting sites during species migration.	Yes	Yes (within adjoining area, 2020)	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ There is some limited potential habitat present in the form of remnant and non-remnant woodlands within the Project Area. ■ No records within the Project Area, but there is a record from the adjoining area, from Nov 2020 record in non-remnant riparian woodland near Sundown Rd, 8 km north of the Project Area (BOOBOOK unpubl data).
Sharp-tailed Sandpiper (*Calidris acuminata*)	Mi	SLC	Prefers habitat on muddy edges of freshwater wetlands or brackish wetlands. Can be found at dam inland. Will often occupy coastal mudflats when ephemeral terrestrial wetlands have dried out. Breeding habitat: Does not breed in Australia. Foraging habitat: foraging habitat is at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. Also, among inundated vegetation of saltmarsh, grass or sedges. They forage in sewage ponds, and often in hypersaline environments. After rain, they may forage in paddocks of short grass, well away from water. They may forage on coastal mudflats at low tide and move to freshwater wetlands near the coast to feed at high tide. Roosting habitat: Roosting occurs at the edges of wetlands, on wet open mud or sand, in shallow water, or in short sparse vegetation, such as grass or saltmarsh. Occasionally, they roost on sandy beaches, stony shores or on rocks in water.	Yes	No	■ Potential to occur. ■ Project Area is within the distribution for the species. ■ Small areas of foraging habitat present within small ephemeral wetlands on drainage lines, which may provide temporary refuge for the species and support occasional transient visitors to the Project Area. ■ No records within the Project Area or adjoining areas.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Satin Flycatcher (*Myiagra cyanoleuca*)	Mi	SLC	Satin Flycatchers inhabit heavily vegetated gullies in Eucalypt-dominated forests and taller woodlands, and on migration, occur in drier woodlands and open forests. Roosting habitat: there is no information on the roosting behaviour of the species. Foraging habitat: the species is known to forage in the canopy and subcanopy of trees. Breeding habitat: breeding occurs in south-east Australia, but no other information is provided on the specifics of such locations.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ There is some limited potential habitats present in the form of remnant and non-remnant woodlands within the Project Area. ■ No records within the Project Area or adjoining area.
Yellow Wagtail (*Motacilla flava*)	Mi	SLC	Habitat requirements for the yellow wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves. This species may occur in association with non-remnant vegetation. **Breeding habitat**: Does not breed in Australia. **Foraging and roosting habitat**: Has a strong association with water, particularly rock substrates along watercourses, but also lakes and marshes.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for this species. ■ Potential foraging habitat of waterbodies (predominately farm dams) present within the Project Area. ■ No records for the species exist within the Project Area/adjoining area and no observations were made during field surveys. There are also no records for this species from southern inland Queensland and so it is unlikely to occur within the limited habitat present in the Project Area.
Mammals						
Corben's Long-eared Bat (*Nyctophilus corbeni*)	VU	VU	This microbat species has a scattered distribution mostly within the Murray-Darling Basin, but with some records outside of this area. It is more common in box, ironbark and cypress pine woodland on the western slopes and plains. Its stronghold seems to be the Pilliga scrub. It roosts in tree hollows, crevices and under loose bark.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ Lack of potential foraging habitat present in the Project Area

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			Foraging habitat: Foraging tends to be located around patches of trees in the landscape. **Breeding habitat**: little information is available on the breeding behaviour for the species. **Roosting habitat**: Roosting behaviour is located within dead trees including ironbark's, cypress and Bulloak. ■ Lack of potential foraging habitat present in the Project Area			■ No records within the Project Area or adjoining area.
Ghost Bat (*Macroderma gigas*)	VU	EN	In Queensland the species occurs in 4-5 disjunct populations, north from Rockhampton (TSSC, 2016c). Populations are centered around maternity roosts in deep caves. Pairs and small groups disperse widely during the winter non-breeding season, using temporary daytime roosts in caves and rocky overhangs (TSSC, 2016c)	No	No	**Unlikely to occur.** ■ The Project Area is outside the known distribution of this species, with the closest record over 200 km further north (ALA 2022).
Greater Glider (central and southern) (*Petauroides volans*)	EN	EN	The Greater Glider is an arboreal nocturnal marsupial, largely restricted to Eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is more common in taller, montane older forests which have an abundance of hollows. There is no information available that differentiates foraging, breeding and roosting habitat for the species however, for roosting it prefers tall mature forests with hollow bearing trees.	Yes	Yes (confirmed in Project Area during field surveys)	**Known to occur.** ■ Project Area is within the distribution for the species. ■ Potential foraging and denning habitat of tall, mature eucalypt forests present within the Project Area, specifically along the riparian areas. ■ The species was detected in Queensland Blue Gum (Eucalyptus tereticornis) woodland in the north of the Project Area, in the remnant riparian corridors along Wandoan Creek. The species is likely to occur wherever large trees with hollows occur in woodland connected with these corridors and also in the extensively wooded in the south of the Project Area.

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Koala (*Phascolarctos cinereus*)	EN	EN	Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species as explained by Martin & Handasyde 1999 (as cited in, DoE, 2019h). **Breeding and foraging habitat**: Koala habitat can be broadly defined as any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees. **Dispersal behaviour:** the species is known to traverse a matrix of landscape features from remnant and regrowth vegetation to paddock trees and grasslands.	Yes	Yes (within adjoining area, several records within 10 km of Project Area)	**Likely to occur.** ■ Project Area is within the distribution for the species. ■ There is foraging and breeding habitat present in the form of Eucalypt dominated woodlands and open forests in the Project Area, particularly along riparian areas. There is also dispersal habitat present within the Project Area. ■ Evidence of occurrence within the adjoining areas (characteristic scratches) were detected during field surveys.
Large-eared Pied Bat (*Chalinolobus dwyeri*)	VU	VU	Sandstone cliffs and fertile wooded valley habitat within close proximity of each other are considered as habitat critical to the survival of the Large-eared Pied Bat (DECC, 2007). Rainforest and moist Eucalypt forest habitats on other geological substrates (viz. rhyolite, trachyte and basalt) at high elevation are also considered to be important for this species (DERM, 2011c). Some populations of the Large-eared Pied Bat would rely in part on the TEC of Brigalow (*Acacia harpophylla* dominant and co-dominant). **Foraging and roosting habitat:** The species requires a combination of sandstone cliffs to provide roosting sites, especially Box Gum woodlands and river corridors used for foraging. The large-eared pied bat requires the presence of diurnal roosts in order to shelter. Roosts are utilised during the day and also at night. **Breeding habitat**: the species is known to breed in two known locations, which are not in the vicinity of the Project Area.	Yes	No	**Unlikely to occur.** ■ The Project Area occurs within the distribution for this species. ■ Potential habitat of Brigalow present but a lack of sandstone cliffs, and woodland valley areas for roosting. ■ No records occur within the Project Area/adjoining and no observations were made during field surveys. Closest records are from over 100km to the northwest of the Project Area.

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Northern Quoll (*Dasyurus hallucatus*)	EN	LC	The northern quoll occurs in a range of habitats, including open dry sclerophyll forest and woodland, riparian woodland, low dry vine thicket, the margins of notophyll vine forest, sugarcane farms and in urban areas. They are most abundant in hilly or rocky areas close to permanent water. The preferred habitat of rocky areas close to permanent water are very scarce across the Project Area, however, dry sclerophyll forests associated with remnant Eucalypt woodlands are present. Frequent cool burns and the absence of old growth forests (with hollows) or high elevation rugged terrain or rock falls limits the potential habitat available for the species. **Breeding habitat:** generally requires habitat encompassing some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal, as well as connection to permanent water. Dens are made in rock crevices, tree holes or occasionally termite mounds. **Foraging and dispersal habitat**: this species more likely to be present in Queensland where there are high relief areas that have shallower soils, greater cover of boulders, less fire impact and closer to permanent water.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is a lack of rocky areas for breeding, denning and foraging habitat are not present within the Project Area. ■ No records within the Project Area or broader adjoining areas.
Short-beaked Echidna (*Tachyglossus aculeatus*)	-	SLC	This species can be found across a wide range of habitats, including open woodland, semi-arid and arid areas as well as in agricultural areas (Aplin et al., 2016). Their foraging requirements include ant nests and termite mounds (Nicol et al., 2011).	Yes	Yes	**Likely to occur.** ■ Project Area is within the distribution for the species. ■ The species is a generalist and occurs across a variety of habitats throughout the Project Area, which includes open woodland, semi-arid and arid areas. ■ Recent records present within the adjoining area from 2014, and there are various recent records within the locality for this species.

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Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)	VU	VU	This species is found in Eucalypt dominated woodlands and forests, including both wet and dry sclerophyll forests (Kavanagh et al. 1995; Rees et al. 2007). **Breeding habitat**: no specific information is available on breeding habitat for the species. **Foraging and roosting habitat**: The species shows a preference for larger patches of mature growth forests that contain suitable trees that they require for foraging and roosting.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is a lack of potential foraging and roosting habitat of cypress pine and ironbark woodland within the Project Area. There is more favourable habitat south, and within the Gurulmundi SF. ■ No records within the Project Area or adjoining area.
Listed Threatened Reptiles						
Collared Delma (*Delma torquata*)	VU	VU	This species normally inhabits eucalypt-dominated woodlands and open-forests in Queensland RE Land Zones. The RE it prefers are ones dominated by Poplar Box (*Eucalyptus populnea*) on alluvial plains, Lemon-scented Gum (*Corymbia citriodora*) open forest on coarse-grained sedimentary rocks and Poplar Box/Brigalow (*Acacia harpophylla*) open forests on fine-grained sedimentary rocks. There is no delineation between breeding, dispersal and foraging habitat for this species. However, microhabitat requirements include presence of rocks, logs and specific mats of leaf litter typically 30-100 mm thick.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ The species is unlikely to occur in the Project Area, where woodland fragments are small, narrow and disturbed, with few suitable habitats features for this species. ■ No records within the Project Area or adjoining areas.

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Common Death Adder (*Acanthophis antarcticus*)	-	VU	This species lives in woodlands, open forests and heathlands; requires abundant shelter/ambush predation cover e.g., low shrubs, rocks, logs and dense leaf litter (Wilson, 2022).	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ The species is unlikely to occur in the Project Area, where woodland fragments are small, narrow and disturbed, with few suitable habitat features for this species. ■ No records within the Project Area or adjoining areas.
Dunmall's Snake (*Furina dunmalli*)	VU	VU	This species is found in forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (*Acacia harpophylla*), other Wattles (*A. burowii, A. deanii, A. leioclyx*), native Cypress (Callitris spp.) or Bull-oak (*Allocasuarina luehmannii)*. There is no delineation between breeding, dispersal and foraging habitat for this species. Microhabitat features preferred includes fallen timber and ground litter.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is lack of the black cracking clay necessary for this species across the Project Area, and it is more likely to be located in remnant State Forests in the adjoining areas which have this microhabitat feature. ■ No records within the Project Area or adjoining areas.

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Five-clawed worm-skink (*Anomalopus mackayi*)	VU	EN	This species is associated with deep cracking clays that provide individuals with shelter. Habitat areas include Bluegrass and/or Mitchell Grass dominated grassland and other grasslands categorised as RE 11.3.21; Rive– Red Gum - Coolibah-Bimble/Poplar Box and Weeping Myall grassy woodlands; White Box grassy woodland; Myall woodland, and Brigalow (*Acacia harpophylla* dominant and co-dominant).	Yes	No	**Potential to occur**. ■ Project Area is within the distribution for this species. ■ Areas of potential habitat are limited on the site, with an absence of native grasslands with deep, cracking clays. Potential habitat includes area of Brigalow woodlands, with coarse woody debris and deep leaf litter cover. ■ Ephemeral wetlands and creek lines are also present along with cracking clay soils in some areas. ■ No records exist for this species within the Project Area or adjoining areas.
Golden-tailed Gecko (*Strophurus taenicauda*)	-	NT	This gecko is endemic to inland southern and central Queensland, where it is found to use habitat of dry woodland and open forest habitats in the Brigalow Belt. This species lives in tree hollows and splits, and under loose bark on live and dead trees (Wilson, 2022). The species also occurs in non-remnant vegetation with abundant Acacia species near to remnant and regrowth habitat patches (BOOBOOK, unpubl. data).	Yes	Yes – adjoining areas.	**Likely to occur.** ■ Project Area is within the distribution for the species. ■ There is suitable remnant and regrowth Acacia dominated woodlands with peeling bark within the Project Area, including along streamlines. ■ No records within the Project Area but the species has been recorded in the adjoining areas in woodland and regrowth vegetation (ALA, 2022).

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Grey Snake	EN	EN	This species inhabits Brigalow (*Acacia harpophylla*) and Belah (*Casuarina cristata*) woodlands on dark brown to black cracking clay soils but are also found in Queensland Bluegrass (*Dichanthium sericeum*) and/or Mitchell Grass (Astrebla spp.) grasslands on alluvial plains with cracking clay soils, and red sodsol soils on the western downs of Queensland. Closely associated with waterbodies, particularly ephemeral wetlands and floodplains. Shelters in and under soils cracks, rocks, logs, flood debris and abandoned burrows. **Breeding habitat:** There is no information about breeding habitat for this species. **Foraging habitat:** Forages for frogs in and around temporary water bodies, including small gullies and ditches, ephemeral wetlands, and floodplains. Uses soil cracks and crevices for cover when hunting.	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Potential habitat in the form of Brigalow and Belah woodlands are present in the Project Area, as well as ephemeral wetlands and creek lines with cracking clay soils in some areas. ■ No records exist for this species within the Project Area or the adjoining areas and no observations were made in the field.
Yakka Skink (*Egernia rugosa*)	VU	VU	The Yakka skink is known to occur in open dry sclerophyll forest, woodland and scrub. The core habitat of this species is within the Mulga lands and Brigalow belt south bioregions. It is known from rocky outcrops and plain areas with dense ground vegetation. There is no delineation between breeding, dispersal and foraging habitat for this species. However, microhabitat features required for this species include cavities under and between partly buried rocks, logs and tree stumps as well as abandoned animal burrows.	Yes	Yes – adjoining area	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ The species is unlikely to occur in the northern part of the Project Area, where woodland fragments are small, narrow and disturbed, with few suitable habitat features for this species. ■ No records within the Project Area and only low amounts of records from the heath and Yuleba North areas (ALA, 2022) (BOOBOOK, 2022).

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Listed Threatened Snails						
Brigalow Woodland Snail (*Adclarkia cameroni*)	EN	VU	Found in Eucalypt and brigalow woodland associated with the Condamine River floodplain, centered on the area between Dalby and Miles/Condamine (Stanisic et al. 2010; DAWE 2022b, ALA 2022).	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ Potential habitat of fragmented isolated patches of Brigalow woodlands are present in areas across the Project Area. ■ No records within the Project Area or adjoining areas.
Dulacca Woodland Snail (*Adclarkia dulacca*)	EN	EN	This species inhabits a variety of remnant and scattered habitats, such as vine thicket and *Acacia harpophylla* woodland patches on rocky outcrops with clay to loam soils, as well as Eucalyptus species and *Acacia shirleyi* woodlands on ridges. This species occurs in a small number of isolated populations in the areas between Miles and Dulacca, and south to Meandarra.	Yes	Yes – adjoining areas.	**Likely to occur.** ■ Project Area is within the distribution for the species. ■ The Project Area includes several small patches of suitable habitat (Brigalow woodland). Elsewhere the species persists in similarly fragmented landscapes. ■ This species was not recorded during surveys of the Project Area. The species has previously been collected from an area of RE 11.9.5a and 11.7.2 south of the Project Area, in the adjoining area (ALA, 2022).
Listed Threatened Fish						
Murray Cod (Maccullochella peelii)	Vu	-	This species is considered a main channel specialist but will occur in floodplains when inundated. They prefer complex structural features that slow the flow of water and provide ambush points, including rocks, snags, tree stumps and overhanging vegetation in water deeper than 2.4 m flowing less than 0.2 m/s.	No	NO	**Unlikely to occur.** ■ Project Area is just outside the distribution for this species. ■ Suitable habitat is not present in the Project Area due to the

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			Breeding habitat: Nests in sunken logs, submerged rocks or excavated depressions in clay banks. Eggs and newly hatched larvae (up to 11 days old) are guarded by the male.			ephemeral nature of the creeks at the site. ■ No records exist for this species within the Project Area or adjoining areas and no observations were made in the field. The
Listed Threatened Turtles						
Fitzroy River Turtle (*Rheodytes leukops*)	VU	VU	The Fitzroy River Turtle is located mainly in rivers that contain large deep pools associated with rocky, sandy or gravel-based substrates, connected by shallow riffles. Areas that the species prefers are associated with higher water clarity and the species Ribbonweed (*Vallisneria sp.*) is often dominated in the creek beds.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is a lack of rivers with large deep pools and rocky or sandy substrates present within the Project Area. ■ No records within the Project Area or adjoining areas.
White-throated Snapping Turtle (*Elseya albagula*)	CE	CE	The White-throated Snapping Turtle prefers clear, flowing, well-oxygenated waters for its habitat. The species prefers waterways with permanent flowing water, with undercut banks, large woody debris, deep pools (or approximately 6 m deep) and shallow riffle zones.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is a lack of well-flowing rivers with permanently flowing water with large woody debris present within the Project Area. ■ No records within the Project Area or adjoining areas.
Listed Threatened Insects						
Pale Imperial Hairstreak (*Jalmenus eubulus*)	-	VU	Endemic to the Brigalow Belt bioregion, associated with mature Brigalow open forests and woodlands. (Eastwood *et al*. 2008; Valentine and Johnson 2012). The species is usually located in mature Brigalow dominated open forests and woodlands, able to disperse across moderately fragmented landscapes, outside of Brigalow habitats.	Yes	Yes –adjoining areas.	**Likely to occur.** ■ Project Area is within the distribution for the species. ■ There is suitable habitat associated with Brigalow woodland within the Project Area.

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						■ There are no records for this species within the Project Area. One specimen recorded near Gurulmundi State Forest in the adjoining areas (ALA, 2022; DES, 2022)
Listed Threatened Plants						
Austral Toadflax (*Thesium australe*)	VU	VU	A semi-parasitic species that attaches to the roots of a range of grass species, particularly Kangaroo Grass (*Themeda triandra*). Distribution includes parts of Queensland, New South Wales, the ACT and Victoria. In Queensland, the species is known in Kumbia, Glen Rock Regional Park, Carnarvon National Park, Crows Nest, Clifton, Warwick, Greenmount, Cambooya, Dalby, the Bunya Mountains, Blackbutt and Imbil. The species occurs in open grassy heath dominated by Swamp Myrtle (*Leptospermum myrtifolium*), Small-fruit Hakea (*Hakea microcarpa*), Alpine Bottlebrush (*Callistemon sieberi*), Woolly Grevillea (*Grevillea lanigera*), Coral Heath (*Epacris microphylla*) and *Poa* spp. (Griffith 1991); Kangaroo Grass grassland surrounded by *Eucalyptus* woodland; and grassland dominated by Barbed-wire Grass (*Cymbopogon refractus*) (Leigh et al. 1984; Hunter et al. 1999).	Yes	No	**Unlikely to occur.** ■ The Project Area is within the distribution for the species. ■ Suitable habitat (heath, Kangaroo Grass grassland) is not present within the Project Area. ■ No records exist for this species within the Project Area or adjoining areas and no observations were made in the field.
Belson's Panic (*Homopholis belsonii*)	VU	VU	It occurs on rocky hills supporting White Box (*Eucalyptus albens*) and in Wilga (*Geijera parviflora*) woodland; flat to gently undulating alluvial areas supporting Belah (*Casuarina cristata*) forest; and soils and plant communities of Poplar Box (*E. populnea*) woodlands. It may also be associated with shadier areas of Brigalow (Acacia harpophylla), Myall (*A. melvillei*), and Weeping Myall (*A. pendula*) communities; in Mountain Coolibah (*E. orgadophila*) communities; and on roadsides.	Yes	Yes – adjoining areas.	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ There is a presence of areas of potential occurrence for this species in the form of isolated patches of Brigalow and Poplar Box open forests and woodlands within the Project Area. ■ There are no records for this species within the Project Area. One specimen recorded 2 km to the north junction of Woleebee and Wandoan Creeks (ALA, 2022; DES, 2022).

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Bluegrass (*Dichanthium setosum*)	VU	LC	Associated with heavy basaltic black soils and red-brown loams with clay subsoils. Often found in moderately disturbed areas. Threats relate to heavy grazing, clearing for pasture improvement and cropping, fire, introduced grasses and road widening. Associated species include White Box (*Eucalyptus albens*), Silver-leaved Ironbark (*E. melanophloia*), Yellow Box (*E. melliodora*), Manna Gum (*E. viminalis*), Amulla (*Myoporum debile*), Purple Wiregrass (*Aristida ramosa*), Kangaroo Grass (*Themeda triandra*).	Yes	No	**Unlikely to occur.** ■ The Project Area is within the known distribution of the species. ■ Associated species not present within the Project Area and the substrates present were not preferred by the species (prefers basalt derived soils). ■ No recent records exist for this species within the Project Area/adjoining areas and no observations were made during field surveys.
Curly-bark Wattle (*Acacia curranii*)	VU	VU	This species is found in dry sclerophyll forests of heath associated with rock pavements. It is commonly found growing on the slopes and north-facing crests of hills and ranges. They occur on mainly stony soils with an extensive bedrock crop, where they can also be found on sandstone forming red sandy soils.	Yes	Yes	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ Suitable habitat (heath associated with rock pavements) is not present within the Project Area. ■ No records exist within the Project Area however, ten records exist within the adjoining areas.

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Gurulmundi Fringe-myrtle (*Calytrix gurulmundensis*)	VU	VU	This species is recorded as having an area of occurrence in open shrubland with sparse stunted Eucalypt, Casuarina, and Acacia spp., Often they are also found in Triodia hummock grasslands with shallow red gravelly soil and on sandstones.	Yes	Yes – adjoining areas.	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ Suitable habitat (heath associated with rock pavements) is not present within the Project Area. ■ The species is abundant on the plateau area to the south of the Project Area including parts of Gurulmundi SF, Stones Country RR and adjacent properties. Twenty-six specimen records occur within 10 km of the Project Area (DES, 2022a).
Gurulmundi Heath-myrtle (*Micromyrtus carinata*)	-	EN	A pendulous shrub that occurs on the tops of laterised ridges, on shallow to deep, yellow or red sands. This species is often found growing within heath or open woodland. In such habitats it is found to be associated with species including Triodia sp., *Homalocalyx polyandrus*, *Corymbia trachyphloia, Acacia triptera* and *Eucalyptus exserta* (DES, 2022h).	Yes	No	**Unlikely to occur.** ■ The Project Area is within the known distribution of the species. ■ Suitable habitat (heath associated with rock pavements) is not present within the Project Area. ■ No recent records exist for this species within the Project Area/adjoining areas and no observations were made during field surveys.

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Hairy Joint Grass (*Arythraxon hispidus*)	VU	VU	Growing in or on the edges of rainforest and in wet Eucalypt forest, often near creeks or swamps (TSSC, 2008). It has been recorded from many locations in north-eastern NSW and southeast Queensland.	Yes	No	**Unlikely to occur.** ■ The Project Area is within the known distribution of the species. ■ Lack of suitable rainforest and wet Eucalypt forest habitat. ■ No recent records exist for this species within the Project Area/adjoining areas and no observations were made during field surveys.
Ooline (*Cadellia pentastylis*)	VU	VU	Ooline grows in SEVT and sclerophyll vegetation on undulating terrain of various geology, including sandstone, conglomerate and claystone. The species forms a closed or open canopy, as a dominant or commonly with White Box (*Eucalyptus albens*) and White Cypress Pine (*Callitris glaucophylla*), with an open understorey and leaf litter dominating the forest floor.	Yes	Yes – adjoining areas.	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ This species is abundant to the south of the Project Area (South of Giligulgul Road). It was observed as retained isolated trees and clumps or extensively in remnant SEVT or Brigalow woodland. ■ Desktop searches revealed potential habitat for the species present in the form of Brigalow (RE 11.9.5) in the Project Area, however, the extensive field survey effort did not find any individuals, so these areas are not considered habitat for the species. ■ Records occurred within the adjoining areas.

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Plunkett Mallee (*Eucalyptus curtisii*)	-	NT	This species occurs within the dry sclerophyll woodlands on sandy podosols with blocked drainage, often on clay loams and stony clays with loose stones on the surface.	Yes	No	**Unlikely to occur.** ■ Project Area is within the distribution for the species. ■ There is no potential habitat present in the form of stony impeded drainage soils within the Project Area. ■ No records within the Project Area or adjoining areas.
Red-soil Woolly Wrinklewort (*Rutidosis lanata*)	-	NT	This species is a perennial forb that occurs along ecotones between Brigalow and Poplar Box woodland on clay or loam soils. It is also located within dry sclerophyll eucalypt woodland dominated by *Eucalyptus woollsiana, Eucalyptus crebra* or *E. fibrosa* on loam or sand (DES, 2022h).	Yes	Yes	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Potential habitat occurs within the ecotone of Brigalow and Poplar Box woodlands on lay or loam soils. ■ No records within the Project Area or adjoining areas.
Slender Tylophora (*Vincetoxicum forsteri*)	EN	EN	*Vincetoxicum forsteri* has rarely been collected and is known to be present within eight localities in the Dubbo area and Mt Crow, near Barraba in NSW, and "Myall Park" near Glenmorgan in Queensland. Conservation of this species occurs within Goobang National Park, Eura State Forest, Goonoo SF, Pilliga West SF and Coolbaggie Nature Reserve. *Vincetoxicum forsteri* inhabits dry scrub, open forest and woodlands associated with *Melaleuca uncinata*, *Eucalyptus fibrosa*, *E. sideroxylon, E. albens, Callitris endlicheri*, *C. glaucophylla, Allocasuarina luehmannii, Acacia hakeoides, A. lineata, Myoporum spp.,* and *Casuarina spp*. (DECC, 2005a; Forster et al., 2004).	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Potential habitat of Eucalypt woodlands although fragmented occurs within the Project Area. ■ No records within the Project Area or adjoining areas.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Thomby Range Wattle (*Acacia wardellii)*	-	NT	A slender shrub or small tree endemic to south southern inland Queensland from north of Mundubbera to south of Surat (ALA, 2022). Occurs in woodland to tall open forest with *Corymbia trachyphloia, C. intermedia, Eucalyptus major, E. cloeziana, E. decorticans* and *E. crebra* on gravelly soils from shallow weathered sandstone.	Yes	Yes – adjoining areas.	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ Potential habitat of dry Eucalypt woodlands occurs within the Project Area. ■ No records within the Project Area but a specimen has been collected in the adjoining areas from Gurulmundi SF from 2014 (ALA, 2022). It was also recorded during field surveys within adjoining areas (Boobook, 2022).
Winged Peppercress (*Lepidium monoplocoides*)	EN	LC	This species grows in riparian open forest dominated by *Eucalyptus camaldulensis* and *Casuarina cunninghamiana* with a variably dense shrubby understorey of *Hymenanthera dentata*, *Bursaria spinosa, Acacia fimbriata, A. floribunda, Callistemon viminalis* and *Leptospermum brachyandrum*. This species is most abundant in Tussock grasslands fringing riparian open forests.	No	No	**Unlikely to occur.** ■ The Project Area is outside of the known distribution for the species. ■ There is a lack of potential habitat in preferred Eucalyptus camaldulensis riparian areas within the Project Area. ■ No recent records exist for this species within the Project Area/adjoining areas and no observations were made during field surveys.
Winged Nightshade (*Solanum stenopterum*)	-	VU	Occurs in Poplar Box and *Casuarina* woodlands, as well as grassland in clay and loam soils. Distributed across the Darling Downs region. The species has been recorded from the Condamine floodplain around Dalby, Chinchilla and Condamine and also from two localities along Tchanning Creek (ALA, 2022).	Yes	No	**Potential to occur.** ■ Project Area is within the distribution for the species. ■ There is a suitable habitat associated with Poplar Box and Casuarina woodland within the Project Area.

Species Name	EPBC Act Status	NC Act Status	Habitat Requirements	Project Area within Species Distribution	Records in the Project Area/Adjoining Areas	Comment on Likelihood of Occurrence in the Project Area
Xerothamnella herbacea	EN	EN	*Xerothamnella herbacea* is known from two sites northeast of Chinchilla, a single record from near Theodore and a record near Yelarbon east of Goondiwindi, Queensland. This species occurs within the Condamine, Border Rivers Maranoa–Balonne and Fitzroy (Queensland) Natural Resource Management Regions. *Xerothamnella herbacea* occurs in Brigalow (*Acacia harpophylla*) dominated communities in shaded situations, often in leaf litter and is associated with gilgais (shallow ground depressions). Soils are heavy, grey to dark brown clays (Queensland Herbarium, 2008).	Yes	No	**Unlikely to occur.** ■ The Project Area is within the known distribution of the species. ■ There is suitable habitat of Brigalow woodlands present within the Project Area. ■ No recent records exist for this species within the Project Area/adjoining areas and no observations were made during field surveys.

Listing Status per the NC and EPBC Acts: CE = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern and SLC = Special Least Concern.

APPENDIX C BOOBOOK ECOLOGICAL CONSULTING TERRESTRIAL ECOLOGY REPORT

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Broadscale Ecological Assessment Report

Senex Atlas 3 Gasfield Project – Survey of Terrestrial Ecological Values.

Compiled by BOOBOOK for ERM

Revision	Date	Description	Author/s	Verifier	Approved
A	15/08/2022	Draft issued to client for review	M. Cunningham, L. Hardwick, R. Aisthorpe, C. Eddie	C. Eddie	C. Eddie
B	23/09/2022	Revised draft issued to client	M. Cunningham, L. Hardwick, R. Aisthorpe, C. Eddie	C. Eddie	C. Eddie
C	31/10/2022	Final issue	M. Cunningham, L. Hardwick, R. Aisthorpe, C. Eddie	C. Eddie	C. Eddie

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List of Abbreviations

ALA	Atlas of Living Australia (database)
AU	Assessment Units (vegetation)
Biosecurity Act	*Biosecurity Act 2014* (Qld)
CE/CR	Critically Endangered
DAFF	Department of Agriculture, Forestry and Fisheries (Qld)
DAWE	Department of Agriculture, Water and the Environment (Australia) – now the Department of Climate Change, Energy, the Environment and Water
DEE	Department of the Environment and Energy (Australia) – now the Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science. Queensland (Qld)
DNRM	Department of Natural Resources and Mines. Queensland (Qld)
DoR	Department of Resources (Qld).
E	Endangered
EP Act	*Environment Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Australia)
ESA	Environmentally Sensitive Area/s
GDE	Groundwater Dependent Ecosystem/s
GIS	Geographic Information System
GPS	Global Positioning System
LC/C	Least Concern
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NCAP	No Concern at Present
NC Act	*Nature Conservation Act 1992* (Qld)
NT	Near Threatened
OC/O	Of Concern
PMST	Protected Matters Search Tool
Qld	Queensland
Rd	Road
RE	Regional Ecosystem/s
REDD	Regional Ecosystem Description Database
SF	State Forest
SLC	Special Least Concern
SPRAT	Species Profile and Threats Database
TEC	Threatened Ecological Community/ies
V	Vulnerable
VMA	*Vegetation Management Act 1999* (Qld)
Water Act	*Water Act 2000* (Qld)
WDRC	Western Downs Regional Council
WoNS	Weeds of National Significance

Executive Summary

This report summarises an assessment conducted for ERM, of terrestrial ecological values across the Senex Atlas 3 project area, located southwest of Wandoan, southern inland Queensland. The project area includes the entirety or parts of ATP 2059 (roughly 18.5 km^2), PL 445 (6.2 km^2), PL 1037 (2.8 km^2) and PL 209 (70.3 km^2) tenements, covering a total area of approximately 97.7 km^2. This survey area is referred to here as the Project Area. The Project Area includes parts of the Taroom Downs and Southern Downs biogeographic subregions within the Brigalow Belt Bioregion. The northern part of the Project Area comprises meandering watercourses on broad floodplains surrounded by gently rolling downs on fine sedimentary rocks. Landscapes to the south are increasingly hilly, including steep slopes with outcropping sandstone around hill crests. Landscapes in the northern part of the Project Area are largely converted to non-remnant pasture land but include a network of narrow, winding, riparian woodland corridors along watercourses, with connectivity north to other tributaries of the Dawson River. Landscapes in the southern part of the Project area are dominated by non-remnant pastures on rolling downs but include a wooded plateau in the extreme southeast, which is contiguous with a large area of remnant woodland outside the Project Area, extending to the Great Dividing Range in the Gurulmundi area and beyond. Small, isolated fragments of remnant and regrowth vegetation are scattered on floodplains and rolling downs throughout the Project Area. However, an area around Giligulgul Road contains little native vegetation and forms a filter or barrier to movement of wildlife between north and south.

A field assessment included identification and mapping of regional ecosystems (RE) and Threatened Ecological Communities (TEC), searches for notable flora and fauna, including threatened species and pest species, and verification of Environmentally Sensitive Areas (ESA) across the Project Area. Vegetation structure assessments and faunal habitat assessments were made at 57 locations representing the diversity of landforms and vegetation across the Project Area. BioCondition assessments were made at nine (9) of these locations representing the major vegetation types present in the northern part of the Project Area.

Threatened Ecological Communities present within the Project Area included Brigalow (*Acacia harpophylla* dominant and codominant) and Poplar Box grassy woodland on alluvial plains. Fifteen (15) regional ecosystems were present within the Project Area including four (4) Endangered RE and five (5) Of Concern RE.

Likelihood-of-Occurrence assessments, based on field survey results, desktop assessment and expert knowledge, were made for threatened flora and fauna, and for migratory and marine species listed under the Commonwealth of Australia *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Similar Likelihood of Occurrence assessments were made for threatened flora and fauna listed under the Queensland *Nature Conservation Act 1992* (NC Act). Six (6) threatened flora species were assessed as potentially occurring within the Project Area, including three (3) EPBC Act and NC Act listed species and three (3) further species listed under the NC Act. One EPBC Act and NC Act listed threatened plant species, Ooline (*Cadellia pentastylis*), was detected during field surveys, occurring in the extreme south-eastern part of the Project Area. Seventeen (17) threatened fauna species were assessed as potentially occurring in the Project Area, including fourteen (14) EPBC and NC Act listed species, and an additional three (3) NC Act listed species. Two EPBC Act and NC Act threatened fauna species – Central Greater Glider (*Petauroides armillatus*) and Koala (*Phascolarctos cinereus*) – were detected within the Project Area during field surveys. Twelve (12) marine and migratory species listed under the EPBC were assessed as potentially present within the Project Area. All of these are bird species and they include threatened species as well as common and widespread species, some of which occur in the Project Area as annual visitors and others which may occasionally be present as vagrants. Predictive habitat mapping was conducted for all threatened flora and fauna species assessed as potentially occurring within the Project Area. The results of field surveys and subsequent assessments emphasize the importance of riparian corridors in the north and the extensively wooded area in the south to biodiversity in the Project Area.

1 Introduction

1.1 Site Description

This report provides results from a broadscale assessment of terrestrial ecological values undertaken for ERM across the Senex Energy Atlas 3 Gasfield Project (the Project). The survey area (hereafter termed 'the Project Area') covers approximately 97.7 km^2 (9 771.08 ha) comprising the entirety of the 'Tetris' petroleum exploration area (ATP 2059, 18.5 km^2), the entirety of petroleum tenement PL 445 (6.2 km^2) and parts of PL 1037 (2.8 km^2) and PL209 (70.3 km^2). The Project Area includes parts of 25 cadastral land parcels comprising private and leasehold lands along with road reserves and easements. The Project Area extends from 10 to 24 km southwest and south-southwest of Wandoan and is accessed via Jackson-Wandoan Road, Gurulmundi Road, Giligulgul Road and local roads. The Project Area is entirely within the boundary of Western Downs Regional Council (WDRC), southern inland Queensland (Appendix A)

Biogeographically, the Project Area is entirely within the Brigalow Belt Bioregion and straddles a diffuse boundary between Subregion 25 (Taroom Downs) in the north and Subregion 26 (Southern Downs) in the south (as per Sattler and Williams 1999). ATP2059 and PL445 are entirely within Taroom Downs. Much of PL209, south to the Woleebee Creek and Conloi Creek floodplains, is also within Taroom Downs, with the remaining southern portion in Southern Downs. Landscapes in the Taroom Downs portion are dominated by meandering watercourses traversing broad alluvial plains (Landzone 3) flanked by rolling rises on fine-grained sediments (Landzone 9) with a few scattered patches of colluvial sand deposits (Landzone 5). Elevation in this area varies from 250 m above sea level on Woleebee Creek at the northern limit of the Project Area, up to 350 m on peaks to the southeast, with the bulk of the Taroom Downs portion on flats and gentle slopes below 300 m above sea level. Landscapes in the Southern Downs portion include similar landforms (Landzones 3, 5 and 9) but with alluvial sediments restricted to gullies along of streamlines and increasing topographic relief to the south, rising to a rocky scarp and plateau in the extreme southeast (Landzone 10). Elevation in the Southern Downs portion of the Project Area rises from around 265 m on Woleebee Creek to 420 m on the plateau in the extreme southeast. The Project Area is entirely drained by streams that flow north to the Dawson River, within the Fitzroy Basin.

Geologically the Project Area forms part of the Surat Basin, with substrates following a conformal north to south series of late-Jurassic to early-Cretaceous sedimentary stata, overlain by Quaternary alluvial deposits (Qa-Qld) on floodplains and by fine-grained Tertiary mudrock (Ts-Qld) in the extreme southwest. A minor southwest trending fault is associated with the course of Woleebee Creek south of the junction with Conloi Creek. The Taroom Downs portion lies on fine-grained sediments of the Springbok Sandstone (Jis) and Westbourne Formation (Jiw). The Biogeographic transition between Taroom Downs and Southern Downs subregions is associated with a broad band of medium to coarse-grained Gubberamunda Sandstone (JKig) with fine to medium-grained bedrock of the Orallo formation (Kyo) forming the rolling hills further south. Surface rock is generally absent from the northern part of the Project Area, excepting small patches of gravel that is not derived from the underlying substrate. By contrast, surface rocks and bedrock outcropping around hillcrests and slopes are increasingly common south of Giligulgul Road. Soils across the northern half of the Project Area vary from grey or brown sandy loams along streamlines, dark brown clay on floodplains and brown clay-loams on the surrounding undulating downs. Patches of duplex soils with a deep surface layer of pale-brown sand occur on Gubberamunda Sandstone in the central part of the Project Area.

The northern part of the Project Area is extensively cleared of native vegetation and converted to non-remnant pasture dominated by native and introduced grasses, notably Buffel Grass (*Cenchrus ciliaris*) and Sabi Grass (*Urochloa mossambicus*). This includes the entire Taroom Downs portion and the northern half of the portion in Southern Downs subregion. Riparian woodland dominated by Queensland Blue Gum (*Eucalyptus tereticornis*) with some fringing areas of Poplar Box (*Eucalyptus populneus*), Brigalow (*Acacia harpophylla*) and Belah (*Casuarina cristata*), follows the winding course of major watercourses through this landscape. These narrow woodland corridors are disturbed by thinning, regrowth, grazing, tracks, weeds, gaps and edge effects causing death of some peripheral trees. However, these corridors have high faunal habitat values, in particular for arboreal mammals and birds, due to features such as an abundance of large trees with hollows occurring on alluvial soils near water sources and ephemeral wetlands in floodplain depressions or cut-off oxbows from changes in stream path. The corridors along Wandoan Creek and Woleebee Creek form part of an extensive dendritic network of riparian woodland with connectivity north to the Dawson River at Taroom but isolated from other large woodland patches to the east, south and west. In the rolling downs beyond the watercourses, remaining fragments of woodland are small, scattered, isolated and disturbed.

The southern part of the Project Area, within Southern Downs subregion, includes similar but less continuous riparian woodland corridors along Hellhole Creek, Woleebee Creek and its tributaries. This area also includes many small,

disturbed fragments of Brigalow and Belah woodland on the rolling downs. A more substantially wooded area occurs around the plateau in the extreme southeast with Brigalow and Belah forest, Mountain Coolibah (*E. orgadophila*) woodland and open forest of Narrow-leaved Ironbark (*Eucalyptus crebra*). Stands of Ooline (*Cadellia pentastylis*) up to 35 m high occur in Brigalow woodland on the footslopes and midslopes in this area. This forest and woodland includes fringing areas of regrowth and in some areas is disturbed by fire, light grazing, weeds, tracks and fencelines. Nonetheless, this area shows high ecological integrity and overall low levels of disturbance. This area is tenuously connected with much larger area of forest beyond the Project Area, to the south and east, and in particular it is on the periphery of the very extensive forested area around Barakula SF. This combined area is of State significance for tract size, connectivity and special biodiversity values.

Significant ongoing threats to biodiversity within the Project Area include further loss of remnant and regrowth vegetation in an area that is already extensively cleared; potential loss of connectivity among areas of remnant and regrowth vegetation, especially though disruption of riverine corridors by tracks, powerlines and other linear infrastructure; loss of ecological integrity of vegetation patches through edge effects around fragments and along narrow corridors, death of larger trees without corresponding recruitment, disturbance of understorey vegetation, and invasion by weeds and pastoral grasses.

The main land use within the Project Area is grazing of stock for beef production. Some flood plain areas have been developed for centre-pivot agriculture. An approval to develop pipeline and gasfield infrastructure and to extract coal seam gas within this area (PL 209) was granted to APLNG incorporated as a component of the much broader Walloons gas fields (DSEWPaC 2009a). Major pipelines and high-voltage powerlines pass through the Site to supply adjacent industrial and agricultural infrastructure.

An overview map of important features of the Project Area is presented in Appendix A. Representative images of landscapes and vegetation within the Project Area are shown in Figure 1a-h.

Figure 1a-b: Representative images of landscapes and vegetation within the Project Area: View east across non-remnant pasture on an extensive floodplain to riparian vegetation along Woleebee Creek (left) and view west in non-remnant pasture on rolling hills near Giligulgul Road (right). Landscapes in the northern part of the Project Area are largely cleared and comprise non-remnant pasture dominated by introduced grasses such as Buffel Grass (*Cenchrus ciliaris*) on floodplains and gently undulating downs with corridors of riparian vegetation along water courses and scattered small fragments of remnant and regrowth woodland elsewhere.


Figure 1c-d: Queensland Blue Gum (*Eucalyptus tereticornis*) riparian woodland (RE 11.3.25) at BioCondition survey site 873-B04 near the proposed horizontal directionally drilled pipeline crossing point on Woleebee Creek (left), and Poplar Box (*Eucalyptus populnea*) grassy woodland on alluvial plains (RE 11.3.2, Poplar Box TEC) at BioCondition survey site 873-B03 (right).


Figure 1e-f: View east from non-remnant area to scarp and plateau in the southeastern part of the Project Area, with an isolated Kurrajong tree (*Brachychiton populneus*) in the foreground, Brigalow (*Acacia harpophylla*) and Ooline (*Cadellia pentastylis*) dominant (RE 11.9.5, Brigalow TEC) on the slopes behind and Narrow-leaved Ironbark (*Eucalyptus crebra*) open forest (RE 11.10.7) on the summit (left), and open forest of Ooline and Brigalow with Narrow-leaved Bottle Tree (*Brachychiton rupestris*) and Broad-leaved Bottle Tree (*B. australis*) emergent and semi-evergreen vine thicket understorey species (RE 11.9.5a, Brigalow TEC) at site 873-S96 (right).


Figure 1g-h: Ooline, Brigalow and Mountain Coolibah woodland (RE 11.9.5, Brigalow TEC) on the slopes of the plateau in the southeast at site 873-S97, which is part of an extensive patch along this scarp with varying abundance of Brigalow (left), and view south in low Brigalow woodland (RE 11.9.5, not TEC) with the plateau area in the background. This vegetation meets the criteria for mapping as remnant but is not TEC, due to evidence of past clearing with introduced Buffel Grass forming over 50% of the total vegetation cover.

1.2 Purpose & Scope

The purpose of this report is to provide a baseline description of terrestrial ecological values and potential constraints within the Project Area. Results presented here are based on an initial desktop assessment combined with field surveys to confirm vegetation communities, notable flora and fauna species and habitat values present within the Project Area.

BOOBOOK was requested to undertake the following assessments for Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) within the Project Area:

- Assess ground-truthed ecological values, specifically:
  - Identify Threatened Ecological Communities (TEC) listed under the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act);
  - Verify mapped Regional Ecosystems (RE) and identify their *Vegetation Management Act 1999* (VMA) and biodiversity status;
  - Identify areas of regrowth vegetation equivalent to endangered RE;
  - Conduct BioCondition assessments at up to 10 sites in the within the Project Area; and,
  - Verify mapped Environmentally Significant Areas (ESA) and identify any other potential ESA;
- Identify MNES or MSES flora and fauna species potentially present in the Project Area, including:
  - Threatened species listed under the EPBC Act and/or the *Nature Conservation Act 1992* (NC Act);
  - Migratory and Marine species listed under the EPBC Act; and,
  - Pest species, focussing on Weeds of National Significance (WoNS) and on species listed under the *Biosecurity Act 2014* (Biosecurity Act);
- Assess Queensland Government mapped areas of Essential Habitat for NC Act listed threatened flora and fauna species; and,
- Provide predictive mapping of habitat for EPBC Act and NC Act listed threatened flora and fauna species potentially present within the Project Area.

1.3 Survey Team

Field ecological surveys within the Project Area were conducted by BOOBOOK staff with assistance in land access from Senex staff. Field surveys were conducted by Michael Cunningham (Senior Ecologist), Courtney Andrew (Graduate Ecologist) and Rosamund Aisthorpe (Botanist) in the periods 14 – 18th March 2022, 22 – 25th March 2022; 30 April – 5th May 2022), and 9 – 13th June 2022. All aspects of the project including field survey and reporting were conducted under the supervision of Craig Eddie (Principal Ecologist).

2 Methodology

2.1 Desktop & Literature Review

A was performed prior to the field survey which included interrogation of the following datasets:

- EPBC Act Protected Matters Search Tool (PMST) (DAWE 2022a);
- WildNet Queensland fauna and flora records (DES 2022a);
- Atlas of Living Australia fauna and flora records (ALA 2022);
- Protected Plants Flora Survey Trigger Map (DES 2022b);
- Referable Wetlands mapping (DES 2022c);
- Environmentally Sensitive Area mapping (DES 2022d);
- Matters of State Environmental Significance (DES 2022e);
- State terrestrial biodiversity and aquatic conservation values (DES 2022f);
- Regulated vegetation mapping (DoR 2022);

- Remnant vegetation RE: Regional Ecosystems – biodiversity status (DES 2022g);
- Mature Regrowth mapping (DES 2020b);
- Essential Habitat mapping (DES 2019);
- Ordered stream mapping (DNRM 2010);
- Groundwater dependent ecosystem mapping (DES 2018);
- Previous ecological surveys in the Senex Atlas gasfield (BOOBOOK 2014, 2020, 2021a, 2021b, 2022; ERM 2018), and,
- A prior EPBC referral (DSEWPaC 2009) and Environmental Impact Statement (APLNG 2010a, b) for gasfield and pipeline development within PL 209.

Desktop searches were conducted for the entire Project Area and separately, for each property within the Project Area. Searches were made using online spatial layers, and/or searches using lot/plan details as a reference or centre point coordinates within each property, with a 10 km buffer. The entire Project Area and 10 km buffer around this are referred to below as the 'Desktop Search Area'. Additional searches of species records (ALA 2022; DES 2022a) were made of well surveyed areas nearby (Gurulmundi SF, Cherwondah SF) of Western Downs Regional Council area and, separately, of records within Southern and Central Queensland of each threatened species considered as possibly occurring within the Project Area. These datasets provided a baseline for subsequent field assessment.

2.2 Field Survey

Field ecological surveys were conducted via targeted vehicle based and foot traverses of the Project Area. Location and other data for all notable features encountered were recorded using a Zebra tablet device, hand-held GPS receivers and written notes.

2.2.1 Ground-truthed vegetation survey

Baseline botanical surveys were undertaken to describe dominant flora and vegetation community structure within the Project Area. Ground-truthing of the Regional Ecosystem (RE) designation (DES 2022g) within the Project Area was undertaken using the quaternary level of data collection as described by Neldner *et al.* (2022).

Vegetation community assessments were undertaken within 50 m x 20 m plots (0.1 ha) within representative locations in all identified RE and regrowth vegetation types within the Project Area. Faunal habitat values were also assessed within these plots (see below). The locations of vegetation and habitat survey sites are shown in Appendix A.

Vegetation community polygons were verified in accordance with Queensland RE description and biodiversity status as per the latest updates of the Regional Ecosystem Description Database (REDD) (DES 2021) and TEC criteria (DAWE 2022b; TSSC 2013, 2019).

RE polygons were assigned to remnant or non-remnant status as defined by the *Vegetation Management Act 1999,* with reference to Version 3.2 of the Queensland Government BioCondition Benchmark Database (Queensland Herbarium 2021). Remnant vegetation had obtained a canopy cover more than 50% of the benchmark canopy layer and a height more than 70% of the benchmark height of minimally disturbed vegetation of a given RE (referred to below as the 50/70 rule). The minimum size of areas mapped as TEC follows the specified criteria for each listed vegetation community (TSSC 2013, 2019), which for Brigalow vegetation comprises areas larger than 0.5 ha. No minimum size has been specified for SEVT (McDonald 2010) therefore all patches of this vegetation type larger than 0.5 ha were mapped as TEC. Minimum size thresholds for native vegetation that is not a TEC follow the Queensland Herbarium guidelines and practice, which map vegetation at a scale of 1:100 000, with a minimum area of 5 ha (see p. 26 in Neldner *et al.* 2022). An exception to this rule was made for RE 11.3.27 (Freshwater wetlands), where a minimum size of 0.5 ha was applied to mapping. RE 11.3.27 includes a range of palustrine wetland communities that are typically small in area but contribute disproportionately to biodiversity, faunal breeding sites and habitat for threatened species. Where long, narrow linear corridors of vegetation were present, these features were mapped down to a minimum width of 25 m (equivalent to the 1:25 000 scale in Neldner *et al.* 2022). Note that these minimum thresholds for mapping refer to overall vegetation patch size, which may include two or more polygons of different vegetation types. Small or narrow polygons were also be mapped for patches of vegetation that meet these size criteria but extend beyond the survey boundaries, with only a small portion included within the Project Area. Some patches were excluded from vegetation mapping based on these minimum size criteria but were mapped as potential habitat areas where these included identified habitat features for threatened species. Ground-truthed areas of advanced regrowth vegetation (i.e. native vegetation older than 15 years that does not meet the 50/70 rule cited above) were assigned to the floristically equivalent RE for assessment of potential ESA status.

2.2.2 BioCondition Assessment

BioCondition assessments were used to evaluate ecological functionality of vegetation within the Project Area. These asses sments applied the methodologies described by Eyre *et al*. (2015). This involved the establishment of a 100 m x 50 m plot for measurements relating to canopy layer structure and diversity, a 100 m transect to measure canopy cover, a 50 m x 10 m subplot for measuring plant richness in shrub and ground layers, a 50 m x 20 m subplot for measuring coarse woody debris, and five 1 x 1 m quadrats to estimate ecological components of ground cover within the assessment area. These values were used as indicators of ecosystem function relative to minimally disturbed benchmark sites (Queensland Herbarium 2021) within the same vegetation type (AU). As requested by the client, up to 10 BioCondition assessments were made to gauge ecological condition of the major vegetation types in the northern part of the Project Area only. These BioCondition assessments complement the quaternary vegetation assessments, which were made within remnant and regrowth of each vegetation type present within the Project Area.

The following information was recorded at each BioCondition site:

- Date;
- Observers;
- Description of location (bioregion, general description, co-ordinates for plot origin and centre, plot bearing and alignment);
- General habitat description and RE type;
- Median height for canopy, emergent and sub-canopy strata;
- Slope position/slope degree and slope aspect;
- Tree species richness (within 100 m x 50 m plot);
- Native plant species richness (within 50 m x 10 m plot);
- Non-native plant cover (within 50 m x 10 m plot);
- Total length of coarse woody debris (length >10 cm diameter and >0.5 m long within 50 m x 20 m plot);
- Number and average diameter at breast height (DBH) of large eucalypt and non-eucalypt trees (within 100 m x 50 m plot);
- Recruitment of canopy species (within the 100 m x 50 m plot);
- Tree and shrub canopy cover (within 100 m transect);
- Ground cover within 1 m x 1 m plots (native perennial grass and organic litter cover in the ground layer);
- Disturbances (severity, last event and observation type).

Large tree DBH thresholds for each RE were used where published benchmarks were available, otherwise the default ≥30 cm DBH for eucalypts and ≥20 cm DBH for non-eucalypts was applied.

Site photographs were taken using a digital camera in accordance with Eyre *et al*. (2015) (i.e. one photograph at plot origin and north, east, south and west photographs at the plot centre). Photograph numbers were recorded. Locations of BioCondition sites were determined using a handheld Global Positioning System (GPS) (Garmin GPSmap 78S) and BioCondition assessment data was captured by mobile GIS devices (Zebra tablet device). For this assessment it was not necessary to mark the origin and centre point of BioCondition plots with steel fence posts, as suggested in Eyre *et al*. (2015), due to current and proposed land use (grazing, forestry and coal seam gas development).

Scores for BioCondition sites were calculated in accordance with Eyre *et al*. (2015) which compares the values obtained at each survey site with values in the benchmark document for that particular RE (Queensland Herbarium 2021). Subscores are awarded to each site are totalled and divided by the maximum possible score for that RE. This provides a numeric index along a continuum of biodiversity condition, where scores close to 0 indicate sites that are ecologically 'dysfunctional' and scores closer to 1 indicate increasing functional integrity.

2.2.3 Flora Species Survey

A search was made for EPBC Act and NC Act listed threatened flora and selected Special Least Concern flora within the Project Area. Where found, the species, location and number of individuals were recorded. However, these broadscale surveys were not exhaustive. Many areas of vegetation beyond identified points of interest were not visited but were mapped from viewpoints and imagery, and assigned an appropriate level of confidence. Flora species names follow Brown (2021).

Significant weed species, WoNS and Biosecurity Act Restricted Matters, were recorded as representative examples to indicate the presence and abundance of the species within a given part of the Project Area.

2.2.4 Fauna Species Survey

Incidental and targeted searches were conducted to detect the presence of threatened vertebrate fauna. Incidental searches consisted of opportunistic active searches in suitable habitat while traversing the Project Area. Targeted faunal survey techniques included recordings of bat calls using Anabat recorders, and spotlighting for arboreal mammals. Bat calls were recorded overnight in two locations within the northern part of the Project Area. Spotlighting surveys were made in two sites, in riparian woodland along Wandoan Creek and in similar vegetation along Woleebee Creek, both within the northern part of the Project Area. Each spotlighting survey commenced one hour after sunset and consisted of a two-hour, approximately two-kilometre meandering transect through habitat suitable for arboreal mammals covering all vegetation strata along the route.

2.2.5 Fauna Habitat Assessment

Data were collected for fauna habitat features to inform likelihood of occurrence and significant impact assessments for threatened fauna. These data were collected within the same 50 m x 20 m plot used for vegetation assessments, including proposed infrastructure areas within non-remnant vegetation. Features were assessed semi-quantitatively and included the presence and abundance of:

- hollow-bearing live trees, stags and logs;
- logs by size class;
- leaf and woody litter, stone/rock and grassy ground cover;
- rock outcrops, gilgais, termite mounds and burrows; and,
- mistletoe and other potential food plants.

Active or potential fauna breeding places were also recorded where found. Such places included:

- Decorticating trees and logs; and,
- Hollow-bearing logs, live trees and stags.

The results of habitat assessments, combined with published information and ecologist knowledge of fauna distribution and habitat use, were used to predict habitat suitability for EPBC Act and NC Act listed threatened fauna species. These results were used to develop GIS-based maps of potential habitat for threatened species within the Project Area.

2.2.6 Environmentally Sensitive Areas (ESA)

Government mapped ESA include protected estates defined by cadastral boundaries, such as State Forests and Resource Reserves, as well as ecological features, such as endangered and of concern vegetation communities and mapped essential habitat for threatened species, comprising remnant vegetation within a 1 km radius of validated species records. Ecological ESA identified in desktop assessment (DES 2022d) were ground-truthed in the field to verify the existence and extent of these features. Ground-truthing of vegetation also identified additional areas of ESA.

2.3 Survey Conditions and Limitations

The weather during the survey period was mild and wet with 425.8 mm rainfall measured in January – May at the nearby Woleebee Nevasa weather station compared with long term (1912-2021) median value of 204.2 mm at this weather station (BOM 2022). Multiple survey mobilisations were required over a three-month period due to

disruptions by rain. Weather conditions during the survey were initially warm and humid, becoming mild to cool and humid with light frosts in later survey periods. Much of the soil remained moist with some areas waterlogged throughout this time. Abundant plant growth occurred during the period of initial surveys, with withering and haying off in the later period. There was limited flowering of plants during the survey, with many spring flowering shrubs and forbs in this area. Conditions during the survey period were generally good for detection and identification of threatened plant species. However, this broad scale survey was based on visits to identified points of interest chosen based on desktop and field assessments. It was not possible to visit and search all areas within the available survey time.

Similarly, faunal surveys were limited to incidental searches within areas of suitable habitat and targeted techniques for rapid detection of key species within the Project Area. In general, these targeted surveys conformed to generic guidelines for fauna survey techniques (Eyre *et al.* 2018) but search effort was insufficient to determine the presence or absence of most threatened species within the Project Area. For example, spotlighting surveys conformed to Australian Government guidelines (DSEWPaC 2011a) for detection of arboreal mammals within suitable habitat. However, these surveys were insufficient for estimating abundance and mapping occurrence of species such as Greater Glider, Yellow-bellied Glider and Koala across the Project Area. Several species of Long Eared Bats, *Nyctophilus* spp., may potentially occur within the Project Area and it is not possible to reliably distinguish these species on calls (DSEWPaC 2010a), therefore trapping is required to detect the South-eastern Long-eared Bat, *N. corbeni*. Only incidental searches were made for threatened birds and these do not meet the Australian government guidelines for search effort (e.g. 10 hours over 5 days of targeted stationary observations for Australian Painted Snipe, *Rostratula australis*; DSEWPaC 2010b). Timed surveys (20 min) were made for threatened reptiles at selected habitat assessment points as per DSEWPaC (2011b) guidelines. However, search effort was insufficient to cover the extent of suitable habitat within the project area (e.g. recommendation for 20 min search per hectare for detection of Yakka Skink, *Egernia rugosa*; Ferguson and Mathieson 2014).

Planned additional faunal surveys, including targeted searches for the threatened Dulacca Woodland Snail, *Adclarkia dulacca*, along with further spotlighting, active searches for reptiles and trapping of bats, was stymied by abundant rainfall that constrained access to much of the Project Area during the survey period. Consequently, predictive mapping of threatened flora and fauna occurrence are conservative estimates of occurrence that assume species presence within areas of potentially suitable habitat.

3 Results & Discussion

3.1 Matters of National Environmental Significance

3.1.1 Threatened Ecological Communities

PMST search results (DAWE 2022a) indicated the potential presence of five TECs within the Project Area these being:

- Brigalow (*Acacia harpophylla* dominant and co-dominant);
- Coolibah – Black Box woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions;
- Poplar Box grassy woodland on alluvial plains;
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions; and,
- Weeping Myall woodlands.

Two TEC were detected within the Project Area, these being: Brigalow (*Acacia harpophylla* dominant and co-dominant) ('Brigalow TEC'); Poplar Box grassy woodland on alluvial plains ('Poplar Box TEC').

Seventeen (17) patches of Brigalow TEC were detected with the mapped area varying from 0.14 ha through to a maximum size of 44.93 ha. This includes six patches of regrowth (13.00 ha) and 11 patches of remnant (82.75 ha). These areas of Brigalow TEC (RE 11.9.5 and 11.9.5a) occur on rolling downs throughout the Project Area with larger patches around the plateau in the south. An additional 14 patches of Brigalow vegetation (RE 11.9.5; total 56.21 ha) did not meet the criteria for recognition as TEC – either with *Acacia harpophylla* absent or subdominant or with exotic perennial plants comprising over 50% of total vegetation cover within the patch. Additional patches of Brigalow dominated vegetation (equivalent to RE 11.3.1 and 11.9.5) were less than 0.5 ha in size and were excluded from recognition as TEC but were mapped as habitat areas for Brigalow dependent threatened species.

Ten patches of Poplar Box TEC were detected within the Project Area. All Poplar Box TEC comprised remnant vegetation of RE 11.3.2, including three patches assessed as Category B (Good Quality) and seven patches assessed as Category C (Moderate Quality). Areas of Poplar Box TEC within the Project Area vary in size from 0.03 to 9.58 ha, all

occurring on floodplains in the north, with some patches extending beyond the Project Area boundaries. An additional fourteen polygons of regrowth and remnant Poplar Box woodland on alluvial plains (RE 11.3.2) were assessed and did not meet the criteria for recognition as TEC. The ground stratum of these areas was generally dominated by exotic weeds and all but one of these polygons were smaller than 5 ha, being part of patches with other vegetation types.

Mapped areas of TEC within the Project Area are shown in Appendix B. The extent of TEC in the Project Area is summarised in Table 1. Representative images of TEC within the Project Area are shown in Figure 1d-g.

Table 1: Description and ground-truthed extent of TEC within the Project Area.

TEC Description	RE Codes	Extent of TEC (ha)
Brigalow (*Acacia harpophylla* dominant and codominant)	11.9.5, 11.9.5a	95.75
Poplar Box grassy woodland on alluvial plains	11.3.2	32.29

3.1.2 Threatened Flora

PMST search results (DAWE 2022a) indicated the possible occurrence of nine (9) EPBC Act listed threatened flora species within the Project Area. WildNet (DES 2022a) and ALA (2022) database searches returned records for four (4) of these species within the Desktop Search Area, these being Curly-bark Wattle (*Acacia curranii*), Ooline (*Cadellia pentastylis*), Gurulmundi Fringe-myrtle (*Calytrix gurulmundensis*) and Belson's Panic (*Homopholis belsonii*).

One species of EPBC Act listed threatened flora, Ooline, was detected within the Project Area during field surveys. Ooline occurred from the footslopes to the crest of the scarp in the extreme southeast of the Project Area, occurring at all developmental stages, from juveniles and small trees through to trees over 30 m high. Ooline was recorded as isolated trees or clusters of trees in non-remnant vegetation, and at varying abundance, from scattered trees through to a dominant species in patches of RE 11.9.5 and 11.9.5a. Representative images of EPBC Act listed threatened flora species detected within the Project Area are shown in Figure 2a-b.

Details of the desktop search and field survey results are provided below in Table 2 with the likelihood of occurrence assessment of EPBC Act listed threatened flora that occur or could potentially occur in the Project Area. Desktop records of threatened flora species and locations where threatened flora species were detected during field surveys are mapped in Appendix C.

Table 2: Likelihood of occurrence assessment for EPBC Act-listed threatened flora in the Project Area.

Key to Status: E = Endangered; V = Vulnerable; NT = Near Threatened; LC = Least Concern.

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Acanthaceae	*Xerothamnella herbacea* Herbaceous Xerothamnella	E	E	A small annual forb occurring in well shaded areas around shallow, braided drainage lines and gilgais in Brigalow woodland. Distributed in widely scattered sites across the southern Brigalow Belt of Queensland from Yelarbon, on the NSW border, north to Kokotungo in Central Queensland (ALA 2022).	**Unlikely to be present.** Small areas of suitable habitat are present however there are no known occurrences within 50 km of the Project Area. The closest specimen records occur northeast of Chinchilla and in the Arcadia Valley at Lonesome Holding, approximately 85 km east-southeast and 142 km northwest of the Project Area, respectively (ALA 2022).
Apocynaceae	*Vincetoxicum forsteri* (syn. *Tylophora linearis*) Slender Tylophora	E	E	A twining vine, which is widely distributed in dry woodland along the western slopes of the Great Dividing Range, mainly in NSW, from around West Wyalong north to Yetman. There are very few records of this species from Queensland, with one specimen collected near Glenmorgan in 1960 (ALA 2022) and a recent collection near Miles (BOOBOOK unpubl. data).	**Potentially present.** Suitable habitat (dry eucalypt woodland) exists as several small fragments through the Project Area and a larger area in the southeast corner. A recent collection is known from approximately 36 km southeast of the Project Area (BOOBOOK unpubl. Data).

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Brassicaceae	*Lepidium monoplocoides* Winged Peppercress	V	LC	A small annual forb found in the Murray-Darling basin on floodplains and other periodically waterlogged areas with heavy clay soils (Mavromihalis 2010). The species has a wide distribution through inland NSW and Victoria. The sole records from Queensland are from the Yelarbon area (ALA 2022).	**Unlikely to be present.** Habitat in the Project Area is dissimilar to that at known localities and the Project Area is far outside the known range of this species.
Mimosaceae	*Acacia curranii* Curly-bark Wattle	V	V	A shrub or small tree occurring in widely disjunct areas of dry woodland on rocky ranges, from around Lake Cargelligo in southwestern NSW north to Gurulmundi in inland southern Queensland (ALA 2022). At Gurulmundi it occurs in scattered thickets of diverse heath scrub with emergent trees growing in red sandy soils on a deeply weathered and indurated (ironstone) sandstone plateau (DES 2022h).	**Unlikely to be present.** There is no suitable habitat (heath associated with rock pavements on land zone 7) within the Project Area. The nearest confirmed population being approximately 15 km south-southeast of the Project Area near the southern boundary of Gurulmundi SF (DES 2022a).
Myrtaceae	*Calytrix gurulmundensis* Gurulmundi Fringe-myrtle	V	V	A narrow endemic to areas around Gurulmundi State Forest and western parts of Barakula State Forest, in southern inland Queensland. This species occurs in heathy scrub and shrubby woodland communities, growing on skeletal soils overlying indurated rock pavements on plateau summits.	**Unlikely to be present.** There is no suitable habitat (heath associated with skeletal soils and rock pavements on land zone 7) within the Project Area. This habitat and the species are abundant in Gurulmundi SF to the south, including twenty-six (26) specimen records within 10 km of the Project Area (DES 2022a).
Poaceae	*Arthraxon hispidus* Hairy-joint Grass	V	V	A grass species growing in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (TSSC 2008). It has been recorded from many locations in north-eastern NSW and southeast Queensland. Outlying and disjunct populations of this species associated with springs and spring-fed wetlands occur in the Carnarvon Range and Taroom area (DES 2022h).	**Unlikely to be present.** Suitable habitat (spring-fed wetlands) is absent from the Project Area. The closest known records are 81 km north of the Project Area around artesian springs near Taroom.
Poaceae	*Dichanthium setosum* A bluegrass	V	LC	Distributed across basalt tablelands and ranges of eastern inland NSW and Queensland (ALA 2022). In Queensland, it is recorded in disjunct patches from Toowoomba in the south to the Burdekin River dam in the north. It grows on basaltic black clays and hard-setting red-brown loams (DAWE 2022b) in woodland or open grassy woodland dominated by Brigalow and/or eucalypt species (DES 2022h). It can tolerate moderate disturbance and, in some areas, occurs in cleared woodland, grassy roadside remnants and highly disturbed pasture (DES 2022h).	**Unlikely to be present.** Substrates in the Project Area are dissimilar to those at known localities (basalt derived soils) and there are no records within 100 km of the Project Area.
Poaceae	*Homopholis belsonii* Belson's Panic	V	V	Distributed in the southern Brigalow Belt of northern NSW and southern Queensland (ALA 2022, DES 2022h). Within Queensland it principally occurs in Poplar Box, Brigalow and Belah dominated communities where it occurs in shaded situations on alluvial soils, often along drainage lines (DES 2022h). The species does not persist in intensively grazed landscapes.	**Potentially present.** The Project Area includes suitable habitat areas of Poplar Box and Brigalow/Belah woodland on alluvium. One specimen record occurs approximately 2 km to the north near the junction of Woleebee and Wandoan Creeks (ALA 2022, DES 2022a).

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Surianaceae	*Cadellia pentastylis* Ooline	V	V	Distributed in the southern Brigalow Belt of Queensland and northern NSW (DAWE 2022b). It occurs patchily from around Gunnedah north to Blackall and Duaringa (ALA 2022). It grows on undulating plains, valley slopes, hillsides and scarps, often in association with Brigalow and SEVT communities (Santos 2012; DAWE 2022b; DES 2022h).	**Confirmed present.** This species is abundant in Brigalow woodland around the plateau in the southeastern part of the Project Area. It was observed as isolated trees and clumps or as an common tree in Brigalow woodland in Gurulmundi SF, Stones Country RR and adjacent properties. Four (4) specimen records occur within the Project Area and another six (6) records occurred within the 10 km desktop search area (DES 2022a).

Figure 2a-b: EPBC Act listed threatened flora species detected in the Project Area included Ooline, occurring in the south of the Project Area as isolated paddock trees (left) through to an abundant large tree dominating areas of Brigalow woodland along the southeastern scarp and adjacent footslopes. This species has distinctive ovate leaves (right) and was readily detected at a distance at the time of survey (Autumn) due to a red flush of new growth in the tree canopy.

3.1.3 Weeds of National Significance

Desktop searches of the Queensland Government WildNet database (DES 2022a) found five species of WoNS recorded within the Desktop Search Area, these being *Parthenium hysterophorus*, *Senecio madagascariensis*, *Anredera cordifolia*, *Opuntia stricta* and *O. tomentosa*. An additional WoNS species, *O. aurantiaca*, was detected during field surveys of PL 209 outside the Project Area. Two WoNS species were detected during field surveys within the Project Area, these being *Opuntia stricta* and *O. tomentosa*. Table 3 presents a likelihood of occurrence assessment of WoNS detected within the Desktop Search Area. Locations of WoNS detected within the Project Area are shown in Appendix D. Representative images of these WoNS are shown in Figure 3a-b.

Table 3. WoNS detected or potentially occurring within the Project Area.

Family	Scientific Name	Common Name	WoNS/ Biosecurity Act Status	Comments
Asteraceae	*Parthenium hysterophorus*	Parthenium Weed	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Previously recorded from the Desktop Search Area (DES 2022a).
Asteraceae	*Senecio madagascariensis*	Fireweed	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Previously recorded from the Desktop Search Area (DES 2022a).

Family	Scientific Name	Common Name	WoNS/ Biosecurity Act Status	Comments
Basellaceae	*Anredera cordifolia*	Madeira Vine	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Previously recorded from the Desktop Search Area (DES 2022a).
Cactaceae	*Opuntia aurantiaca*	Tiger Pear	WoNS, Cat. 3 Restricted Matter	Potentially occurring within the Project Area. Detected nearby during field surveys. Occurring at moderate densities in Brigalow woodland around survey site 873-S74. The closest records in ALA (2022) are over 45 km away, around Yuleba North, Barakula and Taroom. No previous records in WildNet from the Desktop Search Area (DES 2022a).
Cactaceae	*Opuntia stricta*	Common Pest Pear	WoNS, Cat. 3 Restricted Matter	Confirmed present within the Project Area. Previously recorded from the Project Area (DES 2022a). Detected in field surveys throughout the Project Area at low densities.
Cactaceae	*Opuntia tomentosa*	Velvety Tree Pear	WoNS, Cat. 3 Restricted Matter	Confirmed present within the Project Area. Previously recorded from the Project Area (DES 2022a). Detected in field surveys throughout the Project Area at low densities.

Figure 3a-b: Weeds of National Significance (WoNS) detected in the Project Area included Velvety Tree Pear (*Opuntia tomentosa*) (left) and Common Pest Pear (*O. stricta*) (right). Both species are also Class 3 Restricted Matter under the Biosecurity Act. These pest species were present at low densities throughout the Project Area.

3.1.4 Threatened Fauna

Desktop searches (ALA 2022; DAWE 2022a; DES 2022a) combined with previous ecological surveys in the vicinity (BOOBOOK 2020, 2021a, 2021b, 2022; ERM 2018), and local knowledge, suggested twenty-two EPBC Act listed threatened terrestrial fauna species that might occur within the Project Area. PMST searches (DAWE 2022a) also identified three EPBC Act listed threatened aquatic fauna species that might occur within the Project Area – Murray Cod (*Machullochella peelii*), Southern Snapping Turtle (*Elseya albagula*) and Fitzroy River Turtle (*Rheodytes leukops*). These aquatic species are outside the scope of the present terrestrial ecological assessment and are addressed in a corresponding assessment of aquatic ecology. Desktop searches (ALA 2022; DES 2022a) revealed records of seventeen EPBC listed threatened terrestrial fauna species recorded from the WDRC Area of which six species were previously recorded within the Desktop Search Area.

EPBC Act listed threatened fauna species detected during field surveys included several Greater Glider (*Petauroides armillatus*) observed during spotlighting surveys of riparian woodland along Wandoan Creek and along Woleebee Creek, and indirect evidence of Koala (*Phascolarctos cinereus*), detected from scratches on riparian Queensland Blue Gum trees in several locations along Wandoan Creek, Woleebee Creek and a tributary of Hellhole Creek. Representative images showing evidence of threatened species detected within the Project Area are shown in Figure 4a-b.

Locations of historical records of threatened fauna, and sites where threatened species were detected during field surveys are shown in Appendix E. A likelihood of occurrence assessment for EPBC Act listed threatened fauna is presented in Table 4.

Table 4: Likelihood of occurrence assessment for EPBC Act listed threatened fauna within the Project Area.

Key to Status: CE/CR = Critically Endangered; E = Endangered; V = Vulnerable; NT = Near Threatened; LC = Least Concern.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Birds	*Calyptorhynchus lathami* Glossy Black-Cockatoo	V	V	Distributed through coastal areas and ranges of eastern Australia with scattered records further inland. This is a specialised feeder dependent on seeds of Casuarinaceae (She-oak) trees. Breeding pairs nest in large hollows generally high up in large eucalypt trees or stags near water and food sources (Pavey *et al.* 2016). The species is capable of moving among isolated trees and small habitat patches within fragmented landscapes (Pavey *et al*. 2016, Holmes 2012). The species roves widely across this landscape, with some evidence of seasonal movements following maturation of She-oak fruits (Stock and Wild 2005; Hourigan 2012; BOOBOOK, unpubl. data).	**Likely to be present.** Casuarinaceae food trees are abundant within the Project Area. These include Belah (*Casuarina cristata*), which occurs throughout the Project Area, Bull Oak (*Allocasuarina luehmannii*) in scattered woodland patches on sandy soils. Potential nest trees occur in remnant eucalypt woodland and forest and in well-developed riparian corridors across the Project Area. No evidence of feeding (chewed cones) was observed during field surveys. However, this species has previously been recorded within the Project Area (BOOBOOK 2021a, DES 2022a).
Birds	*Calidris ferruginea* Curlew Sandpiper	CE	CR	A non-breeding migratory wader species usually encountered on coastal saline and freshwater tidal and palustrine wetlands (Clemens *et al.* 2021; DAWE 2022b). The Australian population has declined by > 50-80% over the past 17 years (Clemens *et al.* 2021). This is a predominantly coastal, gregarious bird that feeds in shallow inundated areas and on recently exposed mudflats or sandy shores (Clemens *et al*. 2021). Passage migrants are very occasionally recorded on inland wetlands (ALA 2022; Birdlife Australia 2022). Nearest records of the species to the Project Area are from Lake Broadwater, a large palustrine wetland near Dalby (ALA 2022).	**Unlikely to be present**. Wetland habitat within the Project Area comprises small ephemeral vegetated swamps and billabongs associated with meandering drainage lines. The species not been recorded in the vicinity of the Project Area.
Birds	*Charadrius leschenaultii* Greater Sand Plover	V	V	This is a gregarious, migratory species that is overwhelmingly coastal in occurrence when in Australia (ALA 2022). Records from inland sites are extremely rare and probably reflect vagrant birds blown off course by storms (TSSC 2016b).	**Unlikely to be present**. This is a coastal species with no significant occurrences inland. There is no suitable habitat for this species within the Brigalow Belt South Bioregion.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Birds	*Erythrotriorchis radiatus* Red Goshawk	V	E	A highly mobile species with a large home range. Breeding habitat is in intact tall open forest and woodland around major drainage lines, especially near permanent water bodies where there is high avian prey diversity, but the species could potentially forage much further away from these areas (Marchant and Higgins 1993). Telemetry studies indicate that the species forms a single wide-ranging population, with individuals covering distances over 1000 km from breeding areas in the tropical north to non-breeding areas further south (MacColl *et al.* 2021). The species is sensitive to landscape level clearing and may now be extinct in NSW and Southern Queensland (DERM 2012, Seaton 2014). There are no recent records in Queensland south of the Wet Tropics, Einasleigh Uplands, Gulf Plains and North West Highlands Bioregions (MacColl *et al.* 2021). The Brigalow Belt Bioregion is now considered to be outside the species extent of occurrence (MacColl *et al.* 2021).	**Unlikely to be present.** The Project Area is within the historical range of this species (ALA 2022). Woodland in the southeastern corner is connected to an extensive, wooded area of potentially suitable habitat around Gurulmundi and Barakula. However, there are no validated recent records from this region (since 1997) and the Brigalow Belt Bioregion is now considered to be outside the species distribution (MacColl et al. 2021).
Birds	*Falco hypoleucos* Grey Falcon	V	V	A rarely seen species, occurring at low densities throughout much of the arid and semi-arid interior of Australia (TSSC 2020). This is a pursuit predator that hunts birds and other small prey in open woodland plains. The species nests in large trees along stream lines (TSSC 2020). The species is very occasionally recorded in more mesic areas such as the Brigalow Belt (ALA 2022).	**Unlikely to be present.** The Project Area is far from the preferred habitat of this species, *Acacia* shrubland plains traversed by tree-lined watercourses in the southwest of the State (TSSC 2020). Occurrence in this region would only involve transient individuals.
Birds	*Geophaps scripta scripta* Squatter Pigeon (southern subspecies)	V	V	This subspecies occurs throughout the Brigalow Belt from Texas to Townsville and from Rockhampton west to Longreach (ALA 2022). This is a ground-feeding, ground-nesting inhabitant of grassy woodlands with open areas for foraging, usually within 3 km of a water source (Higgins and Davies 1996). The species feeds on seeds of legumes, forbs and some grasses (Higgins and Davies 1996; Ward *et al.* 2021). Ongoing declines, particularly in the south of the range, have been attributed to intensive grazing, land clearing, predation by foxes and cats, and encroachment of foraging habitat by introduced pastoral grasses, especially Buffel Grass (*Cenchrus ciliaris*) (Ward *et al.* 2021).	**Potentially present.** The Project Area is within the broad range of this species (ALA 2022). The landscape in the north of the Project Area is unsuitable for this species being largely cleared and with dense encroachment by pastoral grasses in most remaining woodland patches. Suitable dry woodland habitat remains on and around the plateau in the southeastern part of the Project Area. There are very few records from the area between Jackson, Miles and Wandoan, however survey effort is also low (Birdlife Australia 2022). The closest recent record is a 2016 sighting from near Cherwondah SF (ALA 2022), which is a large area of potentially suitable habitat around 6 km east of the Project Area.
Birds	*Grantiella picta* Painted Honeyeater	V	V	The breeding range extends along the eastern Murray-Darling basin from Chinchilla in Queensland to the Grampians range in western Victoria (Watson *et al.* 2021). Dispersed records from further northwest in Queensland represent seasonal migration and nomadic movements across the winter range (Watson *et al*. 2021; ALA 2022). This species lives and breeds in woodland with high densities of *Amyema* mistletoe food plants (Higgins *et al*. 2001, Watson 2012). Recent analyses suggest that the species population is larger than previously thought with no significant decline in the past decade (Watson *et al.* 2021).	**Potentially present.** The Project Area is within the broader range of this species (ALA 2022), however there are no publicly available records of this species from the region between Miles, Jackson and Wandoan (ALA 2022; Birdlife Australia 2022). Mistletoes (*Amyema* spp.) were present but uncommon across the Project Area.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Birds	*Hirundapus caudacutus* White-throated Needletail	V	V	An aerial insectivore present in eastern and south-eastern Australia as a spring/summer non-breeding migrant (Tarburton 2021). Occurring over most habitat types, including disturbed areas, but with a preference for foraging over wooded areas (Tarburton and Garnett 2021). Individuals regularly roost in tall trees or trees on ridgelines, arriving and leaving roosts in the dark (Tarburton 2021). Migrating birds fly at high altitude and at night (Tarburton 2021). Ongoing declines largely due to loss of breeding sites (large trees with hollows) in northeast Asia (Tarburton and Garnett 2021).	**Likely to be present.** Likely to occur annually (September-April), following storm fronts throughout the Project Area.
Birds	*Rostratula australis* Australian Painted Snipe	E	E	A secretive nomadic wader that forages and breeds in variably inundated wetlands with features such as complex shorelines, areas of shallow water, dense low vegetation and exposed wet mud (DEE 2019; Rogers *et al.* 2021). Feeds on seeds and invertebrates (Rogers *et al.* 2021). Partially migratory, with birds in south-eastern Australia moving in autumn-winter to coastal areas of central and northern Queensland, where it occurs year-round (Rogers *et al.* 2021). The species is unpredictable in occurrence and difficult to detect. Total numbers are estimated at below 2500 individuals (DEE 2019).	**Potentially present**. The Project Area is within the species known range, however there are no publicly accessible records in the area between Miles, Roma, Injune and Taroom (ALA 2022). Previous records from WDRC include the Condamine River floodplain and Lake Broadwater near Dalby. Small areas of ephemeral wetland habitat occur within the Project Area and these may periodically provide temporary refuges for this species.
Mammals	*Chalinolobus dwyeri* Large-eared Pied Bat	V	V	This species occurs in coastal and inland ranges of New South Wales through to central Queensland (ALA 2022). In Queensland the species has a disjunct distribution, occurring in the Scenic Rim area of Southeast Queensland, in the Carnarvon and Expedition Ranges, and in the Shoalwater Bay area of central Queensland. to the scenic rim area of southeast Queensland (ALA 2022). Known occurrences of this species are within or near forested landscapes with high relief (DAWE 2022b). The species roosts and breeds in deep fissures in large rocky outcrops and cliffs.	**Unlikely to be present.** The southern part of the Project Area includes forested escarpment areas along the Great Dividing Range. However, there are no records within the WDRC area. The closest records are from over 100 km northwest of the Project Area, in the Expedition Ranges (ALA 2022).
Mammals	*Dasyurus hallucatus* Northern Quoll	E	LC	This species is recorded from subcoastal ranges north from around Toowoomba through to Cape York, extending inland through the Fitzroy Basin (ALA 2022). However, the species has declined markedly and is now confined to rugged and remote areas throughout its distribution (Burnett 2012). Forested uplands with high relief and/or containing abundant rock outcrops may support the species (Oakwood 2008). The nearest recent records are from the Carnarvon Range (ALA 2022).	**Potentially present.** The Project Area is within the broader historical range of this species (ALA 2022), however there are no records within the WDRC area. Potentially suitable rocky habitat occurs around the wooded plateau in the southeastern corner of the Project Area.
Mammals	*Macroderma gigas* Ghost Bat	V	E	This species is a large carnivorous bat. In Queensland the species occurs in 4-5 disjunct populations, north from Rockhampton (TSSC 2016c). Populations are centred around maternity roosts in deep caves. Pairs and small groups disperse widely during the winter non-breeding season, using temporary daytime roosts in caves and rocky overhangs (TSSC 2016c). The species is likely to be sensitive to vegetation clearing (Bullen 2021).	**Unlikely to be present.** The Project Area is outside the known distribution of this species, with the closest record over 200 km further north (ALA 2022).

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Mammals	*Nyctophilus corbeni* Eastern Long-eared Bat	V	V	The Project Area is within the species' known range, which includes the Murray-Darling basin and Dawson River catchment (Churchill 2008). Inhabits shrubby woodland, particularly Box / Ironbark / Cypress Pine vegetation with a dense cluttered understory (TSSC 2015). Roosts solitarily, in tree hollows and crevices and under loose bark (Reardon 2012; TSSC 2015).	**Potentially present.** The species is unlikely to occur in the highly fragmented landscapes in the north of the Project Area. Suitable habitat occurs in wooded areas in the far south. The species has been recorded from Binkey SF, 22 km east, in woodland that is contiguous with that in the southeast of the Project Area.
Mammals	*Petauroides armillatus* Central Greater Glider	V	E	The taxonomy of Greater Gliders is in flux with at least two species now recognised (McGregor *et al.* 2020; TSSC 2022). Geographical boundaries between southern and central populations are unclear (TSSC 2022). The form occurring in this region is referred to *Petauroides armillatus* (Central Greater Glider) in Queensland, and this population is listed under the EPBC Act as *Petauroides volans* (Greater Glider (Southern and Central)). This form occurs in south and central eastern Queensland, extending inland along the Carnarvon Range (ALA 2022). The species occurs in eucalypt woodlands and open forest with large trees containing large hollows (TSSC 2022). This exclusively arboreal species is sensitive to fragmentation and is restricted to large habitat patches and highly connected corridors of riparian woodland with abundant hollow bearing trees.	**Confirmed present.** The species was detected in Queensland Blue Gum (*Eucalyptus tereticornis*) woodland in the north of the Project Area, in the remnant riparian corridors along Wandoan Creek and Woleebee Creek. The species is likely to occur wherever large trees with hollows occur in woodland connected with these corridors and also in the wooded southeast of the Project Area.
Mammals	*Petaurus australis australis* Yellow-bellied Glider (south-eastern)	V	V	Occurs in eucalypt forests from South Australia through to central Queensland, extending inland to the Expedition and Carnarvon Ranges (Eyre and Goldingay 2005; ALA 2022). This is a vocal, group living, territorial species, which feeds on tree exudates, pollen, nectar and invertebrates. The species occurs at low density, relative to other arboreal mammals, and requires large areas of contiguous forest habitat (Eyre and Goldingay 2005). This species is dependent on sap from selected smooth-barked eucalypts, in particular the Grey Gums (*Eucalyptus longirostata*, *E. major*) (Eyre and Goldingay 2005). Feed trees may be identified by characteristic incisions in the bark (Eyre and Goldingay 2005).	**Potentially present.** No feed trees were detected within the Project Area. The species is unlikely to occur in the cleared and fragmented landscape across the north of the Project Area. The wooded plateau in the southeast is connected to suitably large areas of remnant woodland with potential feed trees.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Mammals	*Phascolarctos cinereus* Koala	E	E	Requires eucalypt woodland and forest habitat with suitable food trees (mainly *Eucalyptus* spp.) (DAWE 2022c). Favoured habitat is *E. tereticornis* riparian woodland along streamline (Smith *et al.* 2013). Koalas outside riparian habitat in inland Queensland require access to water sources, generally within 1 km, including farm dams, especially during dry periods (Davies *et al.* 2013). The species is sensitive to habitat fragmentation (McAlpine et al. 2015; DAWE 2022c). Koalas are capable of traversing gaps between habitat patches and may feed in scattered paddock trees, but dispersing individuals in open habitats are at greater risk of predation and vehicle collision (Youngentob *et al.* 2021; DAWE 2022c). The species generally occurs at lower density in fragmented landscapes and depends on larger areas of primary habitat as source populations and as refuges in drought (Smith *et al.* 2013; McAlpine *et al.* 2015).	**Likely to be present.** This area is within the species distribution, with several previous records within 10 km of the Project Area (ALA 2022). Indirect evidence of occurrence within the Project Area (characteristic scratches) was detected from multiple locations during field surveys. This suggests a sparse population occurring across this area. Suitable habitat includes woodland corridors along major streams in the north along with the wooded area in the southeast corner of the Project Area. Potential food trees occurring in the Project Area including *E. tereticornis*, *E. populnea*, *E. crebra*, *E. melanophloia* and *E. orgadophila*).
Reptiles	*Delma torquata* Collared Delma	V	V	The species range extends from around Ipswich in South-east Queensland through the Southern Brigalow Belt, although occupancy appears extremely localised and patchy (DSEWPaC 2011b, ALA 2022). Lives under surface rock or large woody debris in eucalypt woodlands and open forests (Peck 2012, Wilson 2022). The species is rarely encountered, difficult to detect and search effort in this region is low.	**Potentially present.** The closest publicly accessible records are over 100 km distant, around Roma and the Bunya Mountains (ALA 2022). However, the Project Area is within the broad range of the species (ALA 2022). The species is difficult to detect, it has been observed elsewhere in the region (BOOBOOK, unpubl. data) and survey effort is low. The species is unlikely to occur in the northern part of the Project Area, where woodland fragments are small, narrow and disturbed, with few suitable habitat features for this species. Suitable woodland habitat with abundant litter, rocks and woody debris occurs on and around the plateau in the southeastern corner of the Project Area.
Reptiles	*Egernia rugosa* Yakka Skink	V	V	Ranges throughout the Brigalow Belt extending east to subcoastal areas of Central Queensland and north to the Einasleigh Uplands and lower Cape York Peninsula (ALA 2022). The species lives in woodland and open forests, extending into adjacent grassland with regrowth trees. Requires suitable loamy soils with infrequent flooding for burrows or shelters in sinkholes, abandoned rabbit warrens, large hollow logs, or piles of woody debris (Wilson 2022, Eddie 2012). The species is rarely encountered, difficult to detect and search effort in this region is low.	**Potentially present.** The Project Area is within the broad range of the species, with low resolution records from the Gurulmundi and Yuleba North areas (ALA 2022). The species is unlikely to occur in the northern part of the Project Area, where woodland fragments are small, isolated, narrow and disturbed, with few suitable habitat features for this species. Suitable habitat with large logs, rocky outcrops and abundant woody debris occurs in woodland on and around the plateau in the southeastern corner of the Project Area.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Reptiles	*Furina dunmalli* Dunmall's Snake	V	V	This snake occurs in scattered patches throughout the Southern Brigalow Belt and adjacent parts of South-east Queensland (ALA 2022, DSEWPaC 2011b). Occupies woodlands and open forests, and may be reliant on the presence of abundant fallen woody debris (Hobson 2012). Feeds on lizards including skinks and possibly geckos (Shine 1981) and presumably requires abundant prey. Usually occurs on heavy soils (Wilson 2022), often with soil cracks and/or gilgais. The species is rarely encountered, difficult to detect and search effort in this region is low.	**Potentially present.** The Project Area is within the broad range of this species, with the closest publicly accessible records about 35 km distant, around Jackson North and Miles (ALA 2022). The species is unlikely to occur in the northern part of the Project Area, where woodland fragments are small, narrow and disturbed, with few suitable habitat features for this species. Suitable habitat with abundant litter, rocks and woody debris occurs in southern part of the Project Area.
Molluscs	*Adclarkia cameroni* Brigalow Woodland Snail	E	V	This snail is found in eucalypt and brigalow woodland associated with the Condamine River floodplain, centred on the area between Dalby and Miles/Condamine (Stanisic *et al.* 2010; DAWE 2022b, ALA 2022).	**Unlikely to be present** The Project Area is outside the known distribution and separated from known occurrences by substantial barriers of unsuitable habitat. There are no validated records of the species within 50 km of the Project Area. A non-specimen backed record in WildNet and ALA (ALA 2022; DES 2022a) from Gurulmundi SF near Glenaubyn is incorrectly attributed to this species (Craig Eddie, unpubl. data).
Molluscs	*Adclarkia dulacca* Dulacca Woodland Snail	E	E	This snail inhabits vine thicket, Brigalow (*Acacia harpophylla*) woodland/open forest, ironbark (*Eucalyptus* spp.) woodland, Lancewood (*Acacia shirleyi*) woodland and Gum-topped Box (*E. woollsiana*) woodland (TSSC 2016a). It is confined to the Dulacca Downs subregion and adjacent areas of the Southern Downs subregion, occurring in highly fragmented landscapes, living in small woodland patches, strips of habitat retained on roadsides, shade lines and/or on ridges (Stanisic *et al.* 2010; ALA 2022).	**Likely to be present** The Project Area includes several small patches of suitable habitat (Brigalow woodland). Elsewhere the species persists in similarly fragmented landscapes. The species has previously been collected from an area of RE 11.9.5a and 11.7.2 within the Desktop Search Area (ALA 2022).

Figure 4a-b: Threatened Fauna detected in the Project Area included Central Greater Glider (*Petauroides armillatus*), seen here in riparian vegetation along Woleebee Creek (left), and characteristic scratches from Koala (*Phascolarctos cinereus*) (right).

3.1.5 Migratory & Marine Fauna

PMST search results indicated the possible occurrence of 12 migratory and 17 marine species listed under the EPBC Act. Table 5 provides a likelihood of occurrence assessment for these species. All species, excepting the threatened species discussed in section 3.1.4, are common and wide-ranging bird species. Five of these species are annual summer breeding or non-breeding migrants to the Project Area, with an additional four species likely regular visitors. The remaining species assessed as potentially occurring within the Project Area may be occasional transient visitors. One EPBC listed migratory or marine fauna species was detected during field surveys, this being Rainbow Bee-eater (*Merops ornatus*), an annual summer visitor likely breeding within the Project Area, which was observed in Poplar Box woodland near Woleebee Creek.

Table 5: Likelihood of occurrence assessment for EPBC Act listed migratory and marine fauna within the Project Area.

Key to EPBC Status: Mi = Migratory; Ma = Marine; CE = Critically Endangered; E = Endangered; V = Vulnerable

Family	Scientific Name	Common Name	EPBC Act Status	General Habitat Requirements	Likelihood of Occurrence
Birds	*Actitis hypoleucos*	Common Sandpiper	Mi, Ma	Spring-summer migrant to Australia usually found in coastal environments (muddy, sandy or rocky stream banks, mangrove margins) but may occur on any inland freshwater or saline wetland during passage, including artificial habitats (Pizzey and Knight 2010). Less commonly reported from the inland (ALA 2022).	**Potentially present**. Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.
Birds	*Anseranus semipalmata*	Magpie Goose	Ma	A gregarious, nomadic species that ranges widely across northern and eastern Australia (Menkhorst *et al.* 2019). Grazes on grassy margins around wetlands. Congregates during the dry winter season in permanent coastal wetlands in the north (Menkhorst *et al.* 2019).	**Unlikely to be present**. The species is occasionally recorded from larger wetlands in this region. However, there is insufficient suitable habitat to attract this species to the Project Area.
Birds	*Apus pacificus*	Fork-tailed Swift	Mi, Ma	Aerial spring/summer migrant and insectivore, present over most habitat types including disturbed areas (DAWE 2022b).	**Likely to be present**. May potentially occur overhead throughout the Project Area.
Birds	*Ardea ibis*	Cattle Egret	Ma	Widely distributed in northern and eastern Australia, also SW Australia. Inhabits a wide range of dryland and wetland habitats and notably associates with livestock (Pizzey and Knight 2010). Nests colonially in flooded or swamp forests.	**Potentially present**. Limited foraging habitat is present within the Project Area in small ephemeral wetlands and non-remnant grassland, but this species also forages in pasture with cattle. The species may occasionally occur as a casual visitor within the Project Area.
Birds	*Calidris acuminata*	Sharp-tailed Sandpiper	Mi, Ma	A widespread spring-summer migrant to Australia, utilizing both inland and coastal wetlands such as tidal mudflats, saltmarshes and saline and freshwater inland swamps (Pizzey and Knight 2010). There are numerous records from inland southern Queensland (ALA 2022).	**Potentially present**. Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.

Family	Scientific Name	Common Name	EPBC Act Status	General Habitat Requirements	Likelihood of Occurrence
Birds	*Calidris ferruginea*	Curlew Sandpiper	Mi, Ma, CE	A migratory species usually encountered on coastal and near-coastal saline and freshwater tidal and palustrine wetlands (DAWE 2022b). Passage migrants are occasionally present on inland wetlands but the species is sparsely recorded across inland Queensland (ALA 2022).	**Unlikely to be present**. In southern Queensland the species occurs predominantly in coastal areas. There is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), which is unlikely to attract this species.
Birds	*Calidris melanotos*	Pectoral Sandpiper	Mi, Ma	Spring-summer migrant preferring freshwater wetlands, both inland and sub-coastally (Pizzey and Knight 2010). Much less common than the related Sharp-tailed Sandpiper in Australia, there are few records in inland southern Queensland (ALA 2022).	**Unlikely to be present**. In southern Queensland the species occurs predominantly in coastal areas. There is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), which is unlikely to attract this species.
Birds	*Chrysococcyx osculans*	Black-eared Cuckoo	Ma	The Project Area is within the range of the species (ALA 2022). Breeding migrant to inland Australia, inhabiting dry woodlands and shrublands (Pizzey and Knight 2010).	**Likely to be present**. Limited areas of suitable habitat are present within remnant woodland and non-remnant patches of native vegetation. The species is commonly recorded from the region.
Birds	*Charadrius leschenaultii*	Greater Sand Plover	Mi, Ma, V	This species is overwhelmingly coastal in occurrence when in Australia (ALA 2022). Records from inland sites are extremely rare and probably reflect vagrant birds blown off course by storms (TSSC 2016b).	**Unlikely to be present**. This species occurs in coastal wetlands and migrates along coastlines. There is no suitable habitat in this area.
Birds	*Cuculus optatus*	Oriental Cuckoo	Mi	Migrant to coastal and near-inland northern and eastern Australia, inhabiting denser forest types but may occur in other habitats on passage (Pizzey and Knight 2010).	**Potentially present**. Limited areas of suitable habitat are present within remnant woodland and non-remnant patches of native vegetation.
Birds	*Gallinago hardwickii*	Latham's Snipe	Mi, Ma	Spring-summer migrant, preferring wet pastures, boggy margins of vegetated wetlands and similar habitat at a range of elevations (Pizzey and Knight 2010). It occurs throughout eastern Australia including southern inland Queensland (ALA 2022).	**Potentially present**. Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.
Birds	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Ma	Occurs around the entire Australian coast but also penetrates far inland on larger rivers (Pizzey and Knight 2010). Feeds on a variety of vertebrates and will take carrion. There are numerous records of the species in the Dawson catchment (ALA 2019).	**Unlikely to be present**. May overfly the Project Area but there is no suitable lacustrine or riverine habitat to support foraging by the species.
Birds	*Hirundapus caudacutus*	White-throated Needletail	Mi, Ma, V	Aerial spring/summer migrant and insectivore, present over most habitat types including disturbed areas (DAWE 2022b).	**Likely to be present**. Likely to forage over the Project Area seasonally, following low-pressure fronts.

Family	Scientific Name	Common Name	EPBC Act Status	General Habitat Requirements	Likelihood of Occurrence
Birds	*Merops ornatus*	Rainbow Bee-eater	Ma	Widespread and abundant species frequently present in southern inland Queensland during spring and summer (ALA 2022, Barrett *et al*. 2003). Feeds on aerial insects and nests in burrows in sandy soils (Pizzey and Knight 2010).	**Likely to be present**. Spring – Summer visitors are likely to occur regularly in the Project Area.
Birds	*Motacilla flava*	Yellow Wagtail	Mi, Ma	Summer migrant in small numbers to mostly coastal northern Australia but birds often sighted in southern Australia: it prefers open grassed areas such as wetland margins, pasture and parks (Pizzey and Knight 2010).	**Unlikely to be present**. There are no existing records of this species from southern inland Queensland (ALA 2022).
Birds	*Myiagra cyanoleuca*	Satin Flycatcher	Mi, Ma	The Project Area is within the species known range (ALA 2022). A passage migrant in southern Queensland, with birds recorded in a variety of woodland types as well as parks and gardens, but breeding in south-east Australia in more closed forest types (Pizzey and Knight 2010).	**Potentially present**. Limited suitable habitat is present within remnant and non-remnant woodland. Sparse records of this species within the region represent occasional passage migrants.
Birds	*Rhipidura rufifrons*	Rufous Fantail	Mi, Ma	Occurs throughout coastal and subcoastal eastern Australia. Most individuals overwinter on Cape York, Islands of Torres Strait and New Guinea (Menkhorst *et al.* 2019). Occurs as a passage migrant in the southern Brigalow Belt.	**Potentially present**. Limited suitable habitat is present within remnant and non-remnant woodland. Individuals are occasionally recorded in this region, including a Nov 2020 record from non-remnant riparian woodland near Sundown Rd, 8 km north of the Project Area (BOOBOOK unpubl data).
Birds	*Rostratula australis* Listed as *R. benghalensis* (*sensu lato*)	Australian Painted Snipe	Ma, E	The Project Area is within the species' known range (ALA 2022); forages at shallow edges and adjacent vegetated margins of freshwater wetlands (DAWE 2022b).	**Potentially present**. Individuals may sometimes occur in the Project Area. However, there is very limited suitable habitat in the Project Area (ephemeral wetlands on drainage lines and farm dams), and this would only support occasional transient visitors.

3.2 State Biodiversity Values & Constraints

3.2.1 Regional Ecosystems & Other Regulated Vegetation

Areas of Queensland state government mapped remnant and regrowth vegetation are shown in Appendix F1.

Ground truthing of vegetation during field surveys found a total area of 810.89 ha of native vegetation from 15 Regional Ecosystems (RE), including 663.98 ha of remnant and 146.91 ha of advanced regrowth vegetation. Ground-truthed vegetation within the Project Area is shown in Appendix F2. Ground-truthed remnant and regrowth vegetation within the Project Area is summarised in Table 6. Representative images of vegetation within the Project Area are shown in Figure 1c-h.

Table 6: Ground-truthed RE detected within the Project Area.

E = Endangered; OC = Of Concern; LC = Least Concern; NCAP = No Concern at Present

RE Code	*VM Act* Class	Biodiversity Status	Short Description (DES 2021g)	Extent – remnant (ha)	Extent – regrowth (ha)
11.3.2	OC	OC	*Eucalyptus populnea* woodland on alluvial plains	54.74	18.09
11.3.4	OC	OC	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains	1.57	3.92
11.3.17	OC	E	*Eucalyptus populnea* woodland with *Acacia harpophylla* and/or *Casuarina cristata* on alluvial plains	16.42	17.85
11.3.19	LC	NCAP	*Callitris glaucophylla*, *Corymbia* spp. and/or *Eucalyptus melanophloia* woodland on Cainozoic alluvial plains	13.25	0.91
11.3.25	LC	OC	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	267.69	20.63
11.3.27f	LC	OC	Freshwater wetlands: *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	24.81	33.34
11.5.1	LC	NCAP	*Eucalyptus crebra* and/or *E. populnea*, *Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces	11.59	-
11.5.5	LC	NCAP	*Eucalyptus melanophloia*, *Callitris glaucophylla* woodland on Cainozoic sand plains and/or remnant surfaces. Deep red sands	5.79	-
11.9.2	LC	NCAP	*Eucalyptus melanophloia* +/- *E. orgadophila* woodland to open woodland on fine-grained sedimentary rocks	19.52	5.76
11.9.5	E	E	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	98.96	41.61
11.9.5a	E	E	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks: with *Cadellia pentastylis* and *Brachychiton* spp. as emergent or dominant in some places, a dense tall shrub layer and a more open low shrub layer of Semi-evergreen vine thicket species, occurring on undulating plains and rises.	11.40	-
11.9.7	OC	OC	*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	4.45	3.63
11.9.10	OC	E	Eucalyptus populnea open forest with a secondary tree layer of Acacia harpophylla and sometimes Casuarina cristata on fine-grained sedimentary rocks	25.04	1.18
11.10.7	LC	NCAP	*Eucalyptus crebra* woodland on coarse-grained sedimentary rocks	103.38	-
11.10.11	LC	NCAP	*Eucalyptus populnea*, *E. melanophloia* +/- *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks	5.38	-

3.2.2 BioCondition Assessment

Vegetation condition was assessed using the BioCondition methodology of Eyre *et al*. (2015) at nine (9) locations representing major vegetation types in the northern part of the Project Area (Appendix F2). BioCondition sites were located in eight (8) Assessment Units (AU), these being a combination of RE and growth status (remnant or regrowth). All BioCondition sites were in remnant vegetation, and these locations were chosen as the best example of each RE within this area. Representative images of BioCondition sites are shown in Figure 1e-f. Raw data and standard images for BioCondition assessments are provided separately to this report. BioCondition site characteristics and scores are summarised in Table 7.

Table 7: Summary of BioCondition assessment sites and results within the Site.

AU	RE	Structural condition	Assessment sites	Averaged BioCondition score
1	11.3.2	remnant	873-B03	0.58
2	11.3.25	remnant	873-B01, 873-B04	0.53
3	11.3.27f	remnant	873-B05	0.56
4	11.5.1	remnant	873-B02	0.67
5	11.5.5	remnant	873-B06	0.60
6	11.9.5	remnant	873-B07	0.67
7	11.9.7	remnant	873-B09	0.61
8	11.9.10	remnant	873-B08	0.73

All AU received moderate (0.40 – 0.60) to high (0.60 – 0.80) BioCondition scores. These results reflect significant disturbance and consequent loss of ecosystem integrity relative to intact areas of each RE. These scores also reflect landscape level fragmentation with small patch size, low connectivity and a low proportion of remnant and regrowth vegetation in the surrounding landscape.

3.2.3 Threatened Flora

A total of 13 species of NC Act listed threatened flora were predicted to potentially occur or known to occur (DAWE 2022a, DES 2022a, DES 2022h ALA 2022) within the Desktop Search Area. Seven (7) of these species are also EPBC Act listed threatened flora, these being Herbaceous Xerothamnella, Slender Tylophora, Curly-bark Wattle, Gurulmundi Fringe-myrtle, Hairy-joint Grass, Belson's Panic and Ooline, which are discussed above in section 3.1.2 including their likelihood of occurrence assessment provided in Table 2.

The remaining six (6) species of NC Act listed threatened flora included Red-soil Woolly Wrinklewort (*Rutidosis lanata*), Thomby Range Wattle (*Acacia wardellii*), Plunkett Mallee (*Eucalyptus curtisii*), Gurulmundi Heath-myrtle (*Micromyrtus carinata*), *Cryptandra ciliata* and Winged Nightshade (*Solanum stenopterum*). Database searches of WildNet (DES 2022a) and ALA (2022) and previous surveys within the Project Area (e.g. BOOBOOK 2014) found records for four (4) of these species within the Desktop Search Area, these being Thomby Range Wattle, Plunkett Mallee, Gurulmundi Heath-myrtle and Winged Nightshade.

One NC Act listed threatened plant species, Ooline, was detected within the Project Area during field surveys. This species is also EPBC Act listed and is addressed in section 3.1.2. Habitat for Ooline is shown in Figure 1e-g and representative images of Ooline are shown in Figure 2a-b. Locations of threatened flora recorded in the Project Area are shown in Appendix C.

Several High-Risk Areas as shown on a Protected Plants Flora Survey Trigger Map (DES 2022b) are mapped within the extensive remnant vegetation at the southern portion of the Project Area (Appendix C). These areas correspond to WildNet (DES 2022a) records of Curly-bark Wattle, Thomby Range Wattle, Gurulmundi Fringe-myrtle, Gurulmundi Heath-myrtle and Ooline.

Details of the desktop search and field survey results are provided below in Table 8 with the likelihood of occurrence assessment of NC Act listed threatened flora that occur or could potentially occur in the Project Area.

Table 8: Likelihood of occurrence assessment for additional NC Act-listed threatened flora in the Project Area.

Key to Status: E = Endangered; V = Vulnerable; NT = Near Threatened; LC = Least Concern.

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Asteraceae	*Rutidosis lanata* Red-soil Woolly Wrinklewort	-	NT	A perennial forb with a core distribution restricted to the western Darling Downs from Jackson to south of Hannaford, south eastern Queensland (ALA 2022, DES 2022h). An outlying population was recorded southwest of Moura in 2018 (ALA 2022). Occurs along ecotones between Brigalow and Poplar Box woodland on clay or loam soils, and dry sclerophyll eucalypt woodland dominated by *Eucalyptus woollsiana, Eucalyptus crebra* or *E. fibrosa* on loam or sand (DES 2022h).	**Potentially present.** The Project Area is within the species broad distribution and suitable ecotonal habitat occurs within the Project Area.
Mimosaceae	*Acacia wardellii* Thomby Range Wattle	-	NT	A slender shrub or small tree endemic to south southern inland Queensland from north of Mundubbera to south of Surat (ALA 2022). Occurs in woodland to tall open forest with *Corymbia trachyphloia, C. intermedia, Eucalyptus major, E. cloeziana, E. decorticans* and *E. crebra* on gravelly soils from shallow weathered sandstone (DES 2022h). A specimen collection was recorded in 2014 from Gurulmundi State Forest (ALA 2022, DES 2022a).	**Potentially present.** The species was detected during field surveys within 4 km of the Project Area and has previously been found elsewhere in the Desktop Search Area.
Myrtaceae	*Eucalyptus curtisii* Plunkett Mallee	-	NT	Occurs in dry sclerophyll woodland on sandy podosols with impeded drainage, shallow stony soils, clay loams and stony clays with a surface layer of loose stones (DES 2022h). Three low precision (+/- 2 km) records occur in Gurulmundi SF area (DES 2022h, ALA 2022).	**Unlikely to be present.** No suitable habitat (stony, impeded drainage soils) occurs within the Project Area. Gurulmundi SF records are mapped around 14 km from the Project Area boundary. The species has previously been recorded within the Desktop Search Area around 7 km South of the Project Area, along the escarpment in Stones Country RR (C. Eddie, pers. comm.).
Myrtaceae	*Micromyrtus carinata* Gurulmundi Heath-myrtle	-	E	A pendulous shrub species endemic to the Gurulmundi area with the exception of an outlier southwest of Nudley State Forest, in southern inland Queensland (ALA 2022). Occurs on the tops of laterised ridges, on shallow to deep, yellow or red sands. Grows in heath or open woodland with associated species including *Triodia* sp., *Homalocalyx polyandrus, Corymbia trachyphloia, Acacia triptera* and *Eucalyptus exserta* (DES 2022h).	**Unlikely to be present.** There is no suitable habitat (heath associated with skeletal soils and rock pavements on land zone 7) within the Project Area. The species is abundant in parts of Gurulmundi SF, Stones Country RR and adjacent properties around the Great Dividing Range.

Class	Scientific and Common Name	EPBC Act Status	NC Act Status	Distribution and Known Habitat Use	Likelihood of Occurrence
Rhamnaceae	*Cryptandra ciliata*	-	NT	Grows on sandy soil in association with *Acacia shirleyi, Corymbia citriodora, C. watsoniana and Eucalyptus acmenoides*. Two low precision records from Gurulmundi area (ALA 2022, DES 2022a), northeast of Gurulmundi SF.	**Unlikely to be present.** There is no suitable habitat (woodland on sandy soils in landzone 7) within the Project Area. Potentially suitable habitat for this species occurs in the Desktop Search Area within Gurulmundi SF, Stones Country RR and adjacent properties around the Great Dividing Range.
Solanaceae	*Solanum stenopterum* Winged Nightshade	-	V	Occurs in Poplar Box or Belah woodland and in grassland, including disturbed areas, on clay and loam soils (DES 2022h). Occurs in scattered localities from Ashford in northern NSW north to Gayndah and from the Lockyer Valley west to around Jackson (ALA 2022). The species has been recorded from the Condamine floodplain around Dalby, Chinchilla and Condamine and also from two localities along Tchanning Creek (ALA 2022).	**Potentially present.** The Project Area is within the broad distribution of this species and includes areas of potentially suitable habitat.

3.2.4 Special Least Concern Flora

Three species of selected Special Least Concern (SLC) flora (*Brachychiton* spp.) were detected at locations scattered throughout the Project Area, these being Kurrajong (*Brachychiton populneus*), Narrow -leaved Bottle Tree (*B. rupestris*) and Broad-leaved Bottle Tree (*B. australis*) (Figure 1e-f). Other SLC species observed within the Desktop Search Area include various Orchid species (Orchidaceae), Bluebells (*Wahlenbergia* spp.) and Forest Grass Tree (*Xanthorrhea johnsonii*). Additional SLC species are likely to occur within the Project Area.

3.2.5 Biosecurity Act Weeds and other weeds of Management Concern

Desktop searches (ALA 2022; DES 2022a) identified records of seven invasive plant species listed under the Queensland *Biosecurity Act 2014* occurring within the Desktop Search Area. In addition, Tiger Pear was detected during field surveys of PL 209 within 3 km of the Project Area, occurring in a single patch of Brigalow woodland around vegetation assessment site 873-S74, where it was moderately common. These eight invasive plant species include the six WoNS given in Table 3 (Section 3.1.3) – Parthenium Weed, Fireweed, Madeira Vine, Tiger Pear, Common Pest Pear and Velvety Tree Pear – along with Mother-of-millions (*Bryophyllum delagoensis*) and Mother-of-millions Hybrid (*Bryophyllum X houghtonii*).

Four species of weeds (invasive plants) proscribed as Category 3 restricted matter under the Biosecurity Act were detected during field surveys within the Project Area. Velvety Tree Pear (*Opuntia tomentosa*) and Common Pest Pear (*O. stricta*) were common throughout the Project Area occurring at low to moderate density in remnant and regrowth woodland and in non-remnant pasture. These two species are also WoNS (see section 3.1.3). Harrisia Cactus (*Harrisia martini*) was detected at low density in two locations in the north of the Project Area. Mother-of-millions (*Bryophyllum delagoensis*) was detected in two locations, each of which are in Poplar Box woodland on floodplains with numerous shallow drainage channels.

Other weeds of management interest detected within the Project Area include: Willows Cactus (*Cereus uruguayanus*), occurring in Narrow-leaved Ironbark woodland in the central part of the Project Area and African Lovegrass (*Eragrostis curvula*), occurring on sandy soils in the central and southern part of the Project Area. Locations for these species is included in spatial data accompanying this report.

WoNS that are also Category 3 restricted matter under the Biosecurity Act are presented in Table 3 (Section 3.1.3). Additional Biosecurity Act listed invasive plants detected or potentially occurring within the Project Area are given in Table 9. Representative images of these invasive plant species are presented in Figure 5a-b. Locations of WoNS and Biosecurity Act listed flora species recorded within the Project Area are shown in Appendix D.

Table 9. Additional Biosecurity Act listed weeds detected or potentially occurring within the Project Area.

Family	Scientific Name	Common Name	WoNS/ Biosecurity Act Status	Comments
Cactaceae	*Harrisia martini*	Harrisia Cactus	Cat. 3 Restricted Matter	Isolated occurrences recorded in two localities in the north of the Project Area: in Narrow-leaved Ironbark (*Eucalyptus crebra*) woodland (RE 11.5.1) along Weldons Road and in nearby Poplar Box woodland (RE 11.3.2) on the floodplain of Wandoan Creek.
Crassulaceae	*Bryophyllum delagoense*	Mother-of-Millions	Cat. 3 Restricted Matter	Isolated occurrences recorded in Poplar Box woodland on alluvial plains (RE 11.3.2) in two localities: a single plant observed in the reserve area along Jackson-Wandoan road near survey site 873-S93; and abundant within a limited patch in a reserve area along Woleebee Creek south of the crossing on Gadsbys Road.
Crassulaceae	*Bryophyllum X houghtonii*	Mother-of-Millions	Cat. 3 Restricted Matter	Not detected during field surveys. Potentially occurring within the Project Area.

Figure 5a-b: Biosecurity Act listed invasive plants detected in the Project Area included Harrisia cactus (*Harrisia martini*) (left), and Mother-of-Millions (*Bryophyllum delagoense*) (right).

3.2.6 Pest fauna and invasive species

Evidence of pest fauna detected within the Project Area included occasional rabbit (*Oryctolagus cuniculus*) latrines, frequent Dingo or Dog (*Canis familiaris*) tracks, and Pig (*Sus scrofa*) scats and diggings. These species are listed as Category 3,4,5,6 or Category 3,4,6 restricted matter under the Biosecurity Act. Locations for Biosecurity Act listed pest fauna recorded within the Project Area are shown in Appendix G.

3.2.7 Threatened Fauna

Desktop searches (ALA 2022; DES 2022a) revealed records of eight (8) NC Act listed threatened fauna species occurring within the Desktop Search Area. These include six EPBC Act listed threatened fauna species – Glossy Black-Cockatoo, White-throated Needletail, Southern Squatter Pigeon, Central Greater Glider, Southern Yellow-bellied Glider and Koala – which are addressed in section 3.1.4. Central Greater Glider and evidence of Koala was found within the Project Area during field surveys. A likelihood of occurrence assessment of three additional NC Act listed threatened fauna species possibly occurring in the Project Area is given in Table 10. None of these additional species were detected during field surveys of the Project Area, however, there were no targeted searches for these species.

Table 10: Likelihood of occurrence assessment for additional NC Act listed threatened fauna within the Project Area.

Key to Status: CE/CR = Critically Endangered; E = Endangered; V = Vulnerable; NT = Near Threatened; LC = Least Concern.

Family	Scientific & Common Name	EPBC Act Status	NC Act Status	General Habitat Requirements	Likelihood of Occurrence
Reptiles	*Acanthophis antarcticus* Common Death Adder	-	V	A widespread but patchily distributed snake (ALA 2022, DES 2022h). Lives in woodlands, open forests and heathlands; requires abundant shelter/ambush predation cover e.g. low shrubs, rocks, logs and dense leaf litter (Wilson 2022).	**Potentially present.** Unlikely to occur in the largely cleared and fragmented northern part of the Project Area. Suitable habitat with abundant shelter features occurs on and around the plateau in the southeastern part of the Project Area.
Reptiles	*Strophurus taenicauda* Golden-tailed Gecko	-	NT	This gecko is endemic to inland southern and central Queensland, where it inhabits a variety of dry woodland and open forest habitats in the Brigalow Belt (DES 2022h). Within these habitats it lives in tree hollows and splits, and under loose bark on live and dead trees (DES 2022h, Wilson 2022). The species also occurs in non-remnant vegetation with abundant *Acacia* species near to remnant and regrowth habitat patches (BOOBOOK, unpubl. data)	**Likely to be present.** The species has been recorded nearby in woodland and regrowth areas (ALA 2022; DES 2022a). Suitable remnant and regrowth woodland habitat with *Acacia* spp. and other species with abundant peeling bark occurs throughout the Project Area, includes corridors of non-remnant vegetation along minor streamlines.
Insects	*Jalmenus eubulus* Pale Imperial Hairstreak (butterfly)	-	V	This butterfly species is endemic to the Brigalow Belt, distributed from far northern NSW to the Eungella area of central Qld (ALA 2022). Usually associated with mature Brigalow (*Acacia harpophylla*) open forests and woodlands (Eastwood *et al*. 2008; Valentine and Johnson 2012). The species has a naturally fragmented habitat and is capable of dispersal over moderate distances, with vagrant individuals found far from patches of Brigalow habitat (Eastwood *et al*. 2008).	**Likely to be present.** The species has previously been found within the Desktop Search Area (DES 2022a). The closest publicly accessible record is from Gurulmundi SF near Glenaubyn, around 15 km southeast of the Project Area (ALA 2022). The Project Area includes abundant suitable habitat including isolated patches of Brigalow throughout and more extensive areas, within a matrix of other remnant vegetation, in the south.

3.2.8 Special Least Concern Fauna

Short-beaked Echidna (*Tachyglossus aculeatus*) have previously been recorded elsewhere in the Desktop Search Area (ALA 2022; DES 2022a) and are likely to occur in the Project Area. This common, widespread and adaptable species is likely to occur in remnant and regrowth vegetation and adjacent non-remnant areas throughout the Project Area. Fork-tailed Swift (*Apus pacificus*) has also been recorded in the Desktop Search Area (ALA 2022; DES 2022a) and is likely to be an annual summer non-breeding visitor to this area (see section 3.1.5). These taxa are listed as SLC species under the NC Act.

3.2.9 Fauna Habitat Features & Potential Breeding Places

The results of fauna habitat assessments conducted within the Site are included with the associated spatial data. Habitat assessments found that important features for ground-dwelling fauna, such as leaf-litter, rocks with surface contact, rock crevices and low shrubs are generally sparse within small remnant and regrowth fragments and riparian corridors of vegetation within the Project Area. These features are more abundant in the larger area of woodland in the southeastern corner of the Project Area. Other ground level features, such as large logs with hollows and woody debris, vary among sites in similar situations. Conversely, arboreal features such as large trees with hollows, nests and stags are abundant within riparian woodland (> 50 hollows per hectare) and less common in other patches of remnant and regrowth vegetation. Decorticating trees were particularly abundant in remnant and regrowth areas of Brigalow dominated vegetation. Fauna habitat features associated with vegetation clearing such as windrowed timber piles and scattered timber were common across the Project Area.

3.2.10 Environmentally Sensitive Areas (ESA)

Government mapped and ground-truthed ESA, as defined in the *Environmental Protection Regulation 2019*, are mapped across the Project Area in Appendix H. There are no Category A ESA within the Project Area. Category B ESA within the Project Area are ground-truthed endangered RE (Biodiversity Status), which consists of patches of the following RE: 11.3.17, 11.9.5, 11.9.5a and 11.9.10.

Category C ESA within the Project Area include ground-truthed remnant and regrowth vegetation within government mapped areas of 'essential habitat' or 'essential regrowth habitat', and Of Concern RE (Biodiversity Status), which comprises the following RE: 11.3.2, 11.3.4, 11.3.25, 11.3.27f and 11.9.7.

ESA in the north of the Project Area include the extensive riparian corridors along Wandoan Creek and Woleebee Creek (Category C). ESA in the north also comprise small fragments of Brigalow and/or Belah woodland, including areas with co-dominant Poplar Box, either fringing riparian corridors or scattered across the surrounding undulating downs (Category B). ESA in the south of the Project Area also include scattered fragments of Brigalow/Belah dominant and codominant woodland on rolling downs and around the plateau area in the southeast (Category B) along with a riparian corridor along Hellhole Creek (Category C). ESA in the south also comprises a mapped area of essential habitat (Category C) covering part of the wooded plateau in the southeast of the Project Area, including areas of RE 11.10.7 Narrow-leaved Ironbark open forest.

3.3 Predictive Habitat Mapping

Likelihood of occurrence assessments indicated twenty-two (22) EPBC Act and/or NC Act threatened flora and fauna species that may potentially occur within the Project Area (Tables 2, 4, 8 and 10). The results of site-based habitat assessment plots were combined with desktop searches and ecologist knowledge to develop RE-based predictive habitat mapping for these species. Identified habitat areas were assessed as either Essential or General Habitat using the following definitions:

Essential Habitat – consists of areas that contain resources considered essential for the maintenance of populations of the species (e.g. potential habitat for reproduction, growth, roosting, feeding and/or shelter for either migratory or non-migratory species). Essential Habitat may be defined based on known records and expert knowledge of habitat relationships, as habitat types favoured by the species, within which the species is most frequently recorded and/or the species is most abundant.

Note that this definition, which applies to predictive mapping of all potential habitat within the Project Area, differs from state government mapped 'Essential Habitat', which is based on Queensland government mapped vegetation around known records of threatened species (DES 2019).

General Habitat – consists of less favoured areas that may be used by transient individuals or where a species has been recorded but there is insufficient information to assess the area as essential habitat. General Habitat may be defined from habitat around known records and based on expert knowledge of habitat relationships, despite the absence of specimen backed records. General Habitat may include areas of suboptimal habitat for species and habitat types within which the species is less frequently reported or occurs at lower densities. All areas are mapped as General Habitat where there is no clear identification of essential resources or no clear difference in abundance among habitat types in which the species occurs.

Mapping rules and the estimated total availability of habitat within the survey area for threatened flora species potentially occurring within the Project Area are given in Table 11. Corresponding mapping rules and habitat areas for threatened fauna species potentially occurring within the Project Area are given in Table 12. These tables also include brief statements of essential habitat features that could not readily be mapped in this broadscale survey. Refer to the Likelihood of Occurrence assessments for a summary of distribution and habitat requirements for each species (Table 2, Section3.1.2; Table 4, Section 3.1.4; Table 8, Section 3.2.3; and Table 10, Section 3.2.7). Predictive habitat maps for threatened species considered potentially occurring within the Project Area are presented in Appendix I.

3.3.1 MNES & MSES Threatened Flora

Predictive habitat maps for threatened flora species considered potentially occurring within the Project Area are presented in Appendix I1a-c.

Table 11: Potentially suitable REs and estimated extent of General Habitat for EPBC and NC Act listed threatened flora species potentially present in the Project Area.

Family	Species Name	EPBC Act status	NC Act Status	Habitat Mapping Rules	Potentially Suitable RE Within the Project Area	Mapped Extent of Potentially Suitable Habitat (ha)
Apocynaceae	*Vincetoxicum forsteri* (syn. *Tylophora linearis*) Slender Tylophora	E	E	Mapped General Habitat comprises all remnant and regrowth of nominated RE. The species occurs in shrubby dry sclerophyll woodland and forest.	11.5.1, 11.5.5, 11.10.7	122.7
Asteraceae	*Rutidosis lanata* Red-soil Woolly Wrinklewort	-	NT	Mapped General Habitat comprises all remnant and regrowth of nominated RE. The species favours ecotonal transitions between dry eucalypt woodland or forest and Brigalow vegetation.	11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.7, 11.9.10	271.8
Mimosaceae	*Acacia wardellii* Thomby Range Wattle	-	NT	Mapped General Habitat comprises all remnant and regrowth of nominated RE. The species occurs in dry woodlands and forest.	11.5.1, 11.5.5	18.9
Poaceae	*Homopholis belsonii* Belson's Panic	V	V	Mapped General Habitat comprises all remnant and regrowth of nominated RE. The species occurs in Poplar Box and Brigalow dominated woodlands.	11.3.2, 11.3.17, 11.9.5, 11.9.5a 11.9.7, 11.9.10	366.3
Solanaceae	*Solanum stenopterum* Winged Nightshade	-	V	Mapped General Habitat comprises all remnant and regrowth of nominated RE. The species habitat preferences are unclear, however, in this region it has been recorded from remnant and regrowth vegetation on clay and clay-loam soils.	11.3.2, 11.3.17, 11.9.2, 11.9.5, 11.9.7, 11.9.10	380.7
Surianaceae	*Cadellia pentastylis* Ooline	V	V	Mapped Essential Habitat comprises all remnant and regrowth of nominated RE within Southern Downs bioregion. Mapped General Habitat comprises remnant and regrowth of nominated RE and adjacent non-remnant areas of nominated preclear RE, within Southern Downs bioregion. Excludes previously surveyed vegetation patches (e.g. BOOBOOK 2022a).	Essential: 11.9.4, 11.9.5, 11.9.5a General: 11.3.25, 11.5.1, 11.9.2, 11.9.10, 11.10.7 and non-remnant preclear: 11.9.5/11.5.5 80/20, 11.9.10/11.5.5 60/40.	118.7 habitat 3,231.7 potential area of occurrence

3.3.2 MNES & MSES Threatened Fauna

Predictive habitat maps for threatened fauna species considered potentially occurring within the Project Area are presented in Appendix I2a-d.

Table 12: Potentially suitable REs and estimated extent of General Habitat for EPBC and NC Act listed threatened fauna species potentially present in the Project Area.

Class	Species Name	EPBC Act status	NC Act Status	Habitat Mapping Rules	Potentially Suitable RE Within the Project Area	Mapped Extent of Potentially Suitable Habitat (ha)
Birds	*Calyptorhynchus lathami* Glossy Black-Cockatoo	V	V	Mapped General habitat comprises remnant eucalypt dominated RE that typically include large hollow bearing trees along with remnant and regrowth RE with potential feed trees (Casuarinaceae spp.).	Remnant and regrowth: 11.3.17, 11.5.1, 11.5.5, 11.9.5, 11.9.5a, 11.9.10, 11.10.7, 11.10.11 Remnant only: 11.3.2, 11.3.4, 11.3.25, 11.3.27f, 11.9.7	659
Birds	*Geophaps scripta scripta* Squatter Pigeon (Southern Subspecies)	V	V	Mapped General Habitat comprises remnant and regrowth of eucalypt dominated woodland and open forest within largely wooded landscapes. The species favours grassy woodland areas with patchy ground cover. Excludes small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.7, 11.9.10, 11.10.7, 11.10.11	164.3
Birds	*Grantiella picta* Painted Honeyeater	V	V	Not mapped. This nomadic species forages on mistletoe in remnant, regrowth and other non-remnant vegetation, including shadelines and scattered trees and shrubs in cleared areas.	-	-
Birds	*Hirundapus caudacutus* White-throated Needletail	V	V	Not mapped. This is an aerial foraging species that follows weather fronts over wooded and cleared landscapes. The species shows a general preference for wooded landscapes but it is not tied to any specific vegetation or habitat features in the Project Area.	All areas, aerial use only	N/A
Birds	*Rostratula australis* Australian Painted Snipe	E	E	Mapped General habitat comprises wetland areas and wetland associated RE. The species favours wetland areas with dense low vegetation, muddy banks and shallow water.	11.3.27f, mapped wetland areas in other RE and non-remnant vegetation.	69.7

Class	Species Name	EPBC Act status	NC Act Status	Habitat Mapping Rules	Potentially Suitable RE Within the Project Area	Mapped Extent of Potentially Suitable Habitat (ha)
Mammals	*Dasyurus hallucatus* Northern Quoll	E	LC	Mapped Essential Habitat comprises contiguous areas of woodland and forest within 1 km of rocky scarps. Mapped General Habitat comprises contiguous areas of remnant and regrowth woodland and forest within 5 km of cliffs and rocky scarps and connected to these refuges by continuous native vegetation. Excludes small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	All RE (11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.5a 11.9.7, 11.9.10, 11.10.7, 11.10.11)	226.7
Mammals	*Nyctophilus corbeni* Southeastern Long-eared Bat	V	V	Mapped General Habitat comprises larger contiguous areas of remnant and regrowth woodland and open forest. The species favours areas with a multilayered shrubby understorey. Excludes small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	All RE except SEVT (11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.5a 11.9.7, 11.9.10, 11.10.7, 11.10.11)	259.7
Mammals	*Petauroides armillatus* Central Greater Glider	E	E	Mapped General Habitat comprises remnant only woodland within the well-connected riparian corridors along Wandoan Creek and Woleebee Creek in the north of the Project Area, as well as larger contiguous areas of remnant eucalypt woodland and open forest south of Giligulgul Road. The species requires large hollow-bearing trees in areas with eucalypt feed trees. Excludes small isolated fragments and regrowth areas.	11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.7, 11.9.10, 11.10.7, 11.10.11	528
Mammals	*Petaurus australis* Yellow-bellied Glider (Southern Subspecies)	V	E	Mapped General Habitat comprises larger contiguous areas of remnant only eucalypt woodland and open forest of the nominated RE. The species requires large hollow-bearing trees for dens and preferred feed tree species (selected eucalypts). Excludes small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	11.3.25, 11.5.1, 11.10.7	145.9
Mammals	*Phascolarctos cinereus* Koala	E	E	Mapped General Habitat comprises all areas of eucalypt dominated remnant and mature regrowth woodland and open forest within the Project Area. The species requires eucalypt feed trees, shelter trees with dense canopies and access to riparian vegetation.	11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.7, 11.9.10, 11.10.7, 11.10.11	715.7 foraging and breeding habitat 9,098.3 dispersal habitat

Class	Species Name	EPBC Act status	NC Act Status	Habitat Mapping Rules	Potentially Suitable RE Within the Project Area	Mapped Extent of Potentially Suitable Habitat (ha)
Reptiles	*Acanthophis antarcticus* Common Death Adder	-	V	Mapped General Habitat comprises larger contiguous areas of remnant and regrowth woodland and forest. The species favours areas with abundant low shrubs, leaf litter and woody debris. Excludes small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	All RE (11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.5a 11.9.7, 11.9.10, 11.10.7, 11.10.11)	259.7
Reptiles	*Delma torquata* Collared Delma	V	V	Mapped General Habitat comprises larger contiguous areas of remnant and regrowth woodland and forest. The species requires areas with abundant leaf litter and woody debris or rocks. Excludes SEVT and small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	All RE except SEVT (11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.5a 11.9.7, 11.9.10, 11.10.7, 11.10.11)	259.7
Reptiles	*Egernia rugosa* Yakka Skink	V	V	Mapped General Habitat comprises larger contiguous areas of remnant and regrowth woodland and open forest. The species requires loamy soils with large logs, accumulations of woody debris and/or rocky outcrops. Excludes SEVT and small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	11.3.2, 11.3.17, 11.3.19, 11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.7, 11.9.10, 11.10.7, 11.10.11	228
Reptiles	*Furina dunmalli* Dunmall's Snake	V	V	Mapped General Habitat comprises larger contiguous areas of remnant and regrowth woodland and forest. The species favours areas with abundant leaf litter and woody debris. Excludes small isolated fragments, narrow corridors and the largely cleared landscape north of Giligulgul Road.	All RE (11.3.2, 11.3.4, 11.3.17, 11.3.19, 11.3.25, 11.3.27f, 11.5.1, 11.5.5, 11.9.2, 11.9.5, 11.9.5a 11.9.7, 11.9.10, 11.10.7, 11.10.11)	259.7

Class	Species Name	EPBC Act status	NC Act Status	Habitat Mapping Rules	Potentially Suitable RE Within the Project Area	Mapped Extent of Potentially Suitable Habitat (ha)
Reptiles	*Strophurus taenicauda* Golden-tailed Gecko	-	NT	Mapped Essential Habitat comprises remnant and regrowth RE with abundant decorticating trees, stags and woody debris (RE with abundant tall *Acacia* spp. and/or *Callitris*) Mapped General Habitat comprises other RE within which the species is occasionally recorded.	Essential: 11.3.17, 11.3.19, 11.5.1, 11.5.5, 11.9.5, 11.9.5a 11.9.10, 11.10.7, 11.10.11 General: 11.3.2, 11.3.4, 11.3.25, 11.3.27f, 11.9.7	906.7
Insects	*Jalmenus eubulus* Pale Imperial Hairstreak (butterfly)	-	V	Mapped General Habitat comprises Brigalow (*Acacia harpophylla*) dominant remnant woodland.	11.3.17, 11.9.5, 11.9.5a, 11.9.10	180.2
Molluscs	*Adclarkia dulacca* Dulacca Woodland Snail	E	E	Mapped Essential Habitat comprises remnant and regrowth Brigalow woodland and forest, and SEVT. The species favours areas with abundant leaf litter and woody debris. Mapped General Habitat comprises woodland and open forest of the nominated RE that are connected to patches of essential habitat.	Essential: 11.9.4, 11.9.5, 11.9.5a General: 11.9.10, 11.10.7	305.25

4 Conclusions

An ecological assessment within the Project Area identified the following ecological values/potential constraints:

Matters of National Environmental Significance:

- Two Threatened Ecological Communities (TEC):
  - Brigalow (*Acacia harpophylla* dominant and co-dominant); and,
  - Poplar Box grassy woodland on alluvial plains.
- One EPBC Act listed threatened flora species:
  - Ooline (*Cadellia pentastylis*).
- Two additional EPBC Act listed threatened flora species potentially occur.
- Two Weeds of National Significance (WoNS) species:
  - Common Pest Pear (*Opuntia stricta*); and,
  - Velvety Tree Pear (*O. tomentosa*).
- Six WoNS potentially occur.
- Two EPBC Act listed threatened fauna species detected:
  - Central Greater Glider (*Petauroides armillatus*); and,
  - Koala (*Phascolarctos cinereus*).
- Nine EPBC Act listed threatened fauna species likely occur.
- Five EPBC Act listed threatened fauna species potentially occur.
- Two EPBC Act listed migratory and marine fauna species likely occur.
- Ten EPBC Act listed migratory and marine fauna species potentially occur.

Queensland Biodiversity Values and Constraints:

- Four Endangered RE present as remnant and/or regrowth.
- Five Of Concern RE present as remnant and/or regrowth.
- Six No Concern at Present RE present as remnant and/or regrowth.
- One NC Act listed threatened flora species detected.
- Three NC Act listed threatened flora species potentially occur.
- Three targeted SLC flora (*Brachychiton populneus*, *B. rupestris and B. australis*) present.
- Four Biosecurity Act Category 3 Restricted Matter invasive plants present.
- Nine Biosecurity Act Category 3 Restricted Matter invasive plants potentially occur.
- Two NC Act listed threatened fauna species were detected.

Seven NC Act listed threatened fauna species likely to occur.

- Ten NC Act listed threatened fauna species may potentially occur.
- Category B ESA within the Project Area includes: Ground-truthed Endangered RE
- Category C ESA within the Project Area includes: Ground-truthed Essential Habitat Areas and Ground-truthed Of Concern RE.

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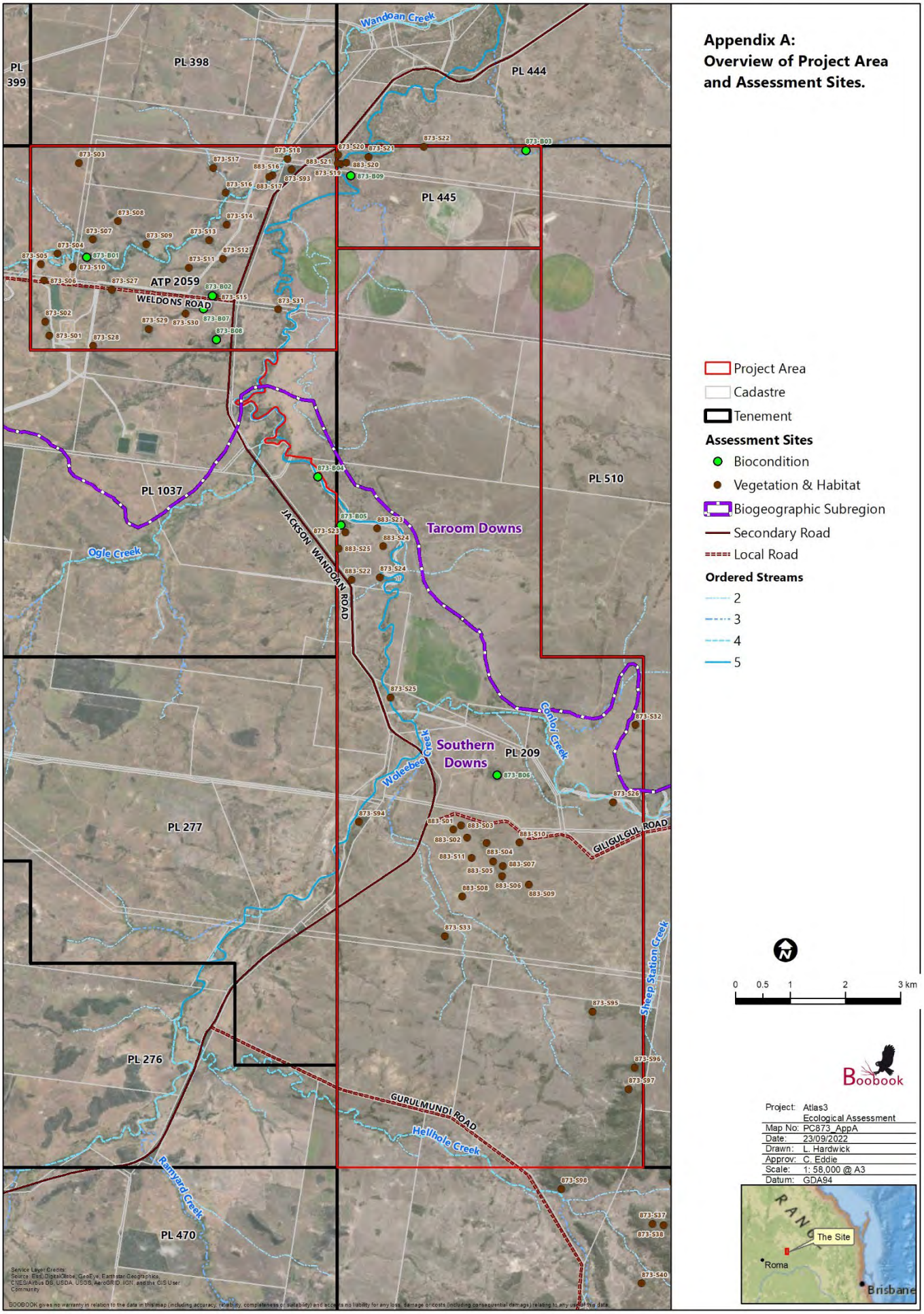
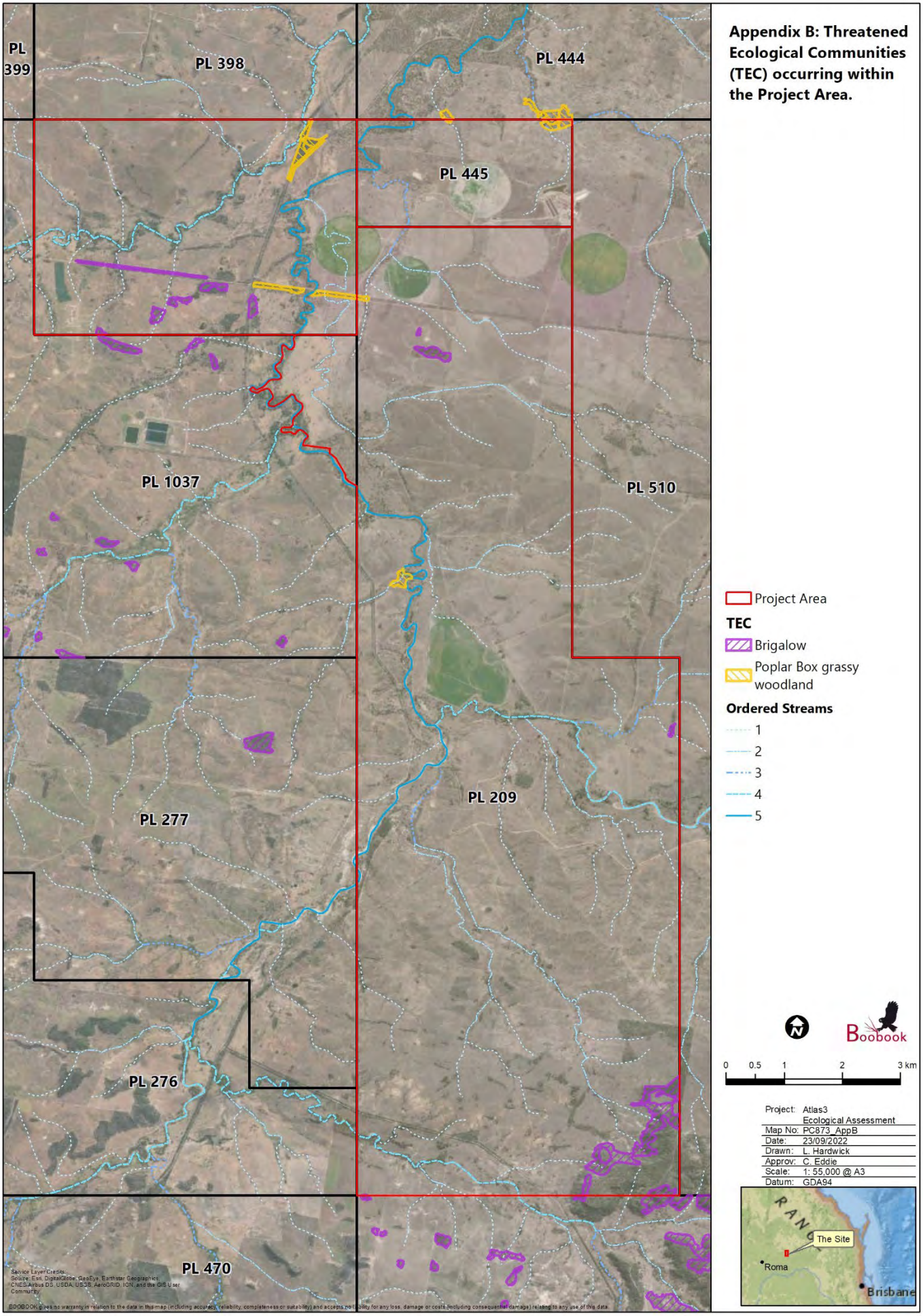
Appendix A. Overview of Project Area.


Wandoan Creek
PL 399
PL 398
PL 444
PL 445
PL 510
PL 1037
PL 277
PL 276
PL 470
PL 209
ATP 2059
WELDONS ROAD
JACKSON WANDOAN ROAD
GILGULGUL ROAD
GURULMUNDI ROAD
Taroom Downs
Southern Downs
Ogle Creek
Woleebee Creek
Condori Creek
Hellhole Creek
Ramyard Creek
Sheep Station Creek
Appendix A:
Overview of Project Area and Assessment Sites.
Project Area
Cadastre
Tenement
Assessment Sites
Biocondition
Vegetation & Habitat
Biogeographic Subregion
Secondary Road
Local Road
Ordered Streams
2
3
4
5
0 0.5 1 2 3 km
Boobook
Project: Atlas3 Ecological Assessment
Map No: PC873_AppA
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 58,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
BOOBOOK gives no warranty in relation to the data in this map (including accuracy, reliability, completeness or suitability) and accepts no liability for any loss, damage or costs (including consequential damage) relating to any use of this data.

Appendix B. Threatened Ecological Communities Occurring within the Project Area.



Appendix B: Threatened Ecological Communities (TEC) occurring within the Project Area.

Project Area

TEC

Brigalow

Poplar Box grassy woodland

Ordered Streams

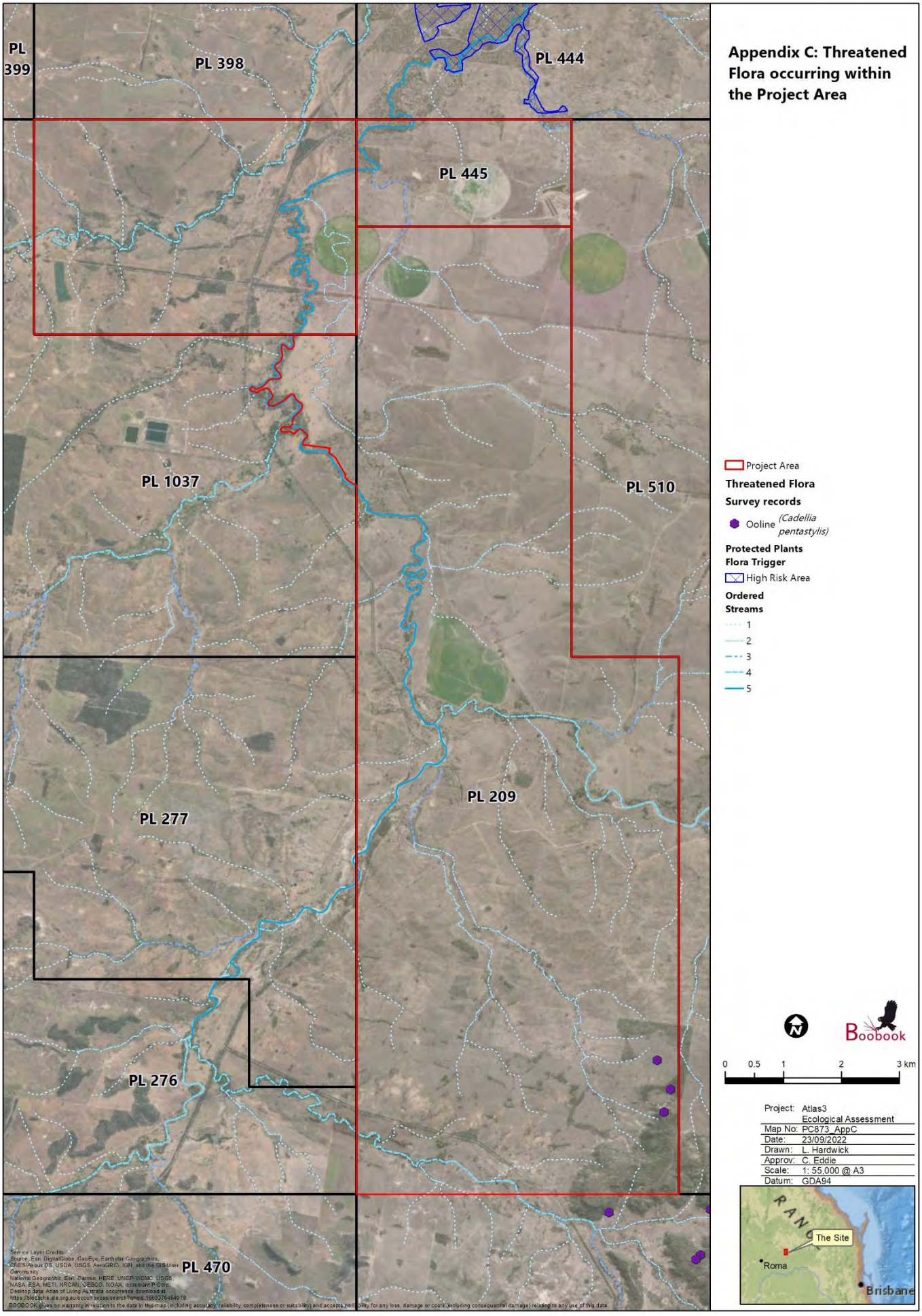
1
2
3
4
5

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_AppB
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 55,000 @ A3
Datum:	GDA94

Appendix C. Threatened Flora Occurring within the Project Area


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 277
PL 209
PL 276
PL 470
Appendix C: Threatened Flora occurring within the Project Area
Project Area
Threatened Flora
Survey records
Ooline (Cadellia pentastylis)
Protected Plants Flora Trigger
High Risk Area
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppC
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp
Desktop data: Atlas of Living Australia occurrence download at https://biocache.ala.org.au/occurrences/search?qred.1666375164078
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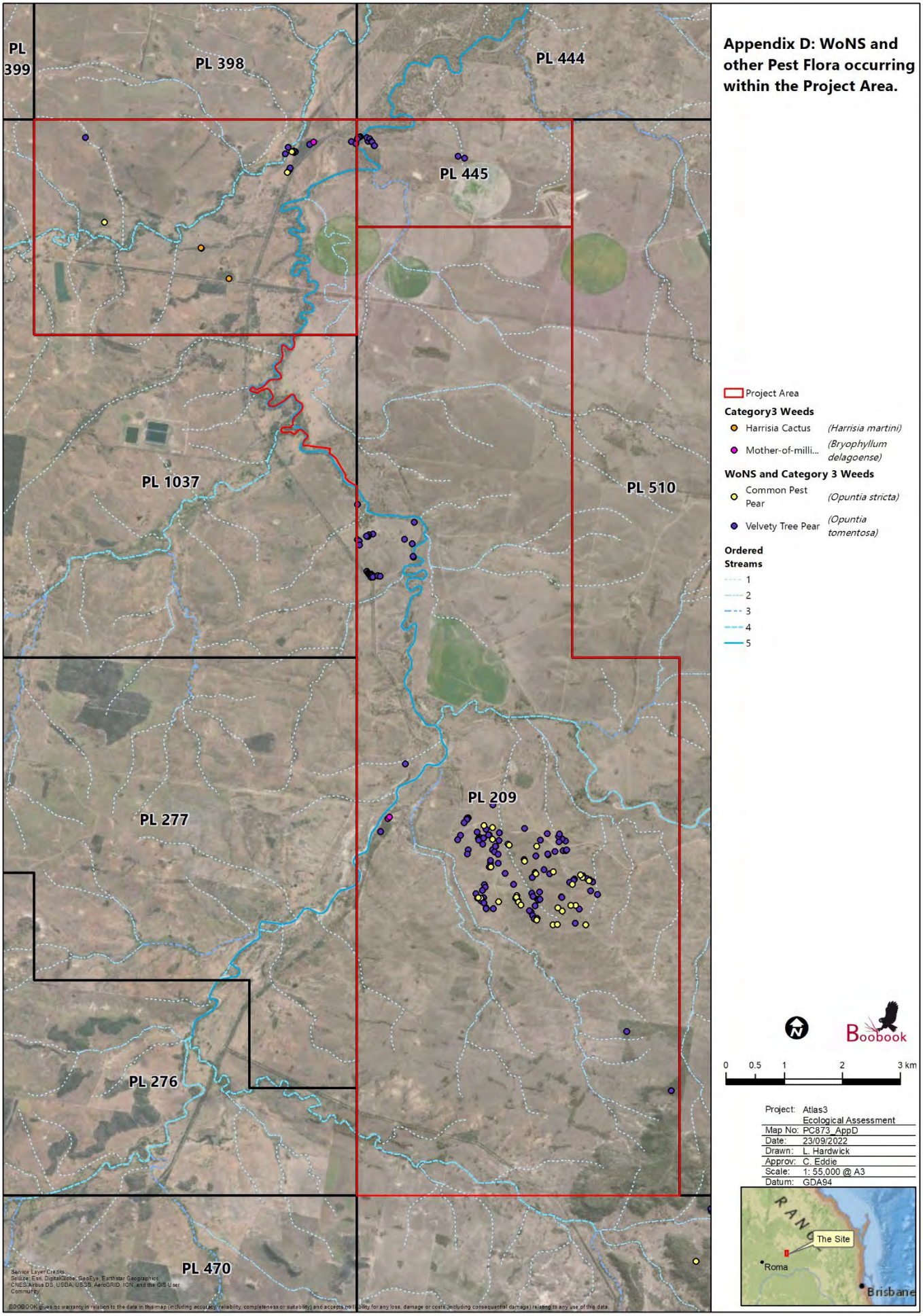
Appendix D. WoNS and other Pest Flora Occurring within the Project Area.


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 277
PL 209
PL 276
PL 470
Appendix D: WoNS and other Pest Flora occurring within the Project Area.
Project Area
Category3 Weeds
Harrisia Cactus (Harrisia martini)
Mother-of-milli... (Bryophyllum delagoense)
WoNS and Category 3 Weeds
Common Pest Pear (Opuntia stricta)
Velvety Tree Pear (Opuntia tomentosa)
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppD
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane
Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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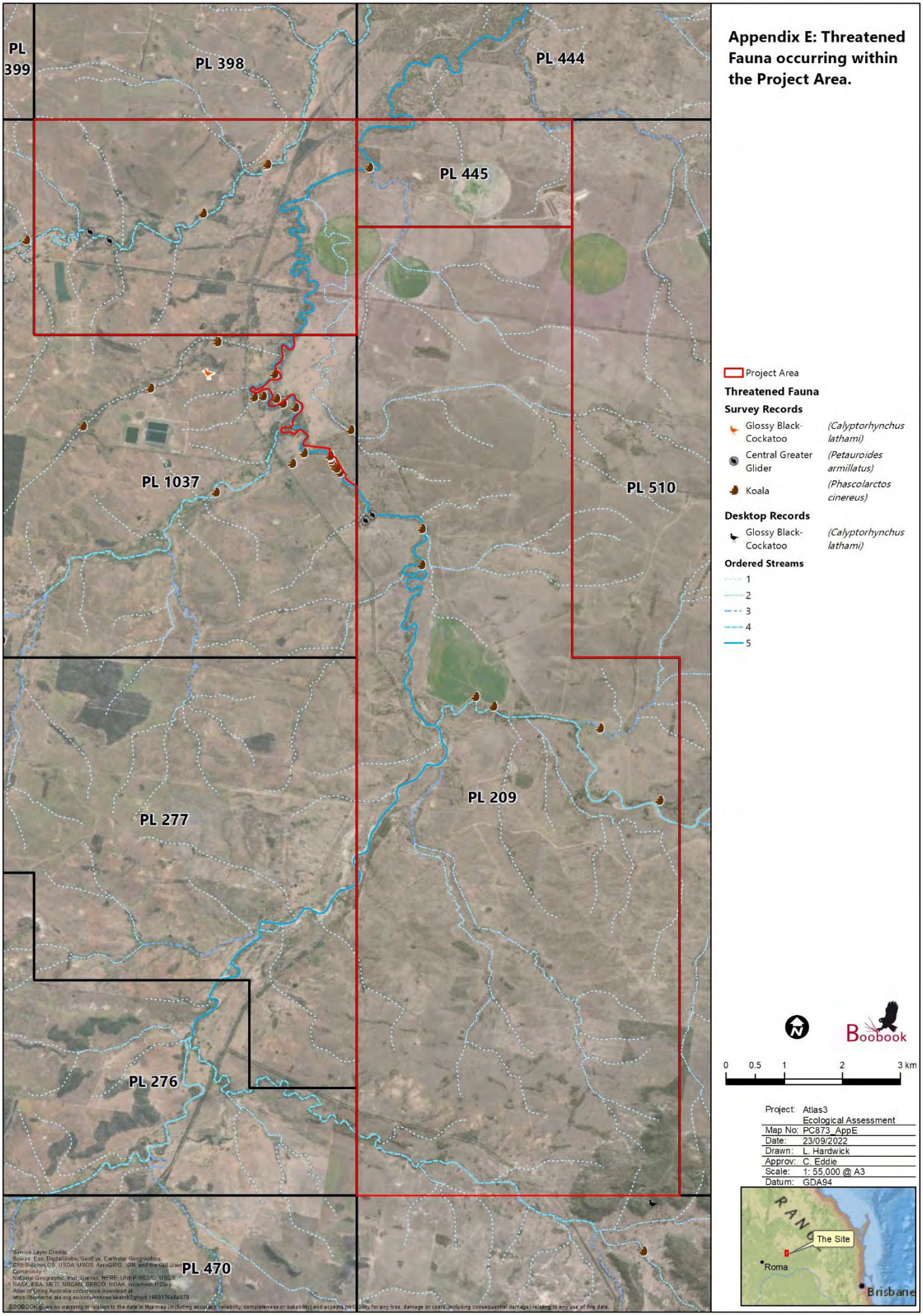
Appendix E. Threatened Fauna Occurring within the Project Area.


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 277
PL 209
PL 276
PL 470
Appendix E: Threatened Fauna occurring within the Project Area.
Project Area
Threatened Fauna
Survey Records
Glossy Black-Cockatoo (Calyptorhynchus lathami)
Central Greater Glider (Petauroides armillatus)
Koala (Phascolarctos cinereus)
Desktop Records
Glossy Black-Cockatoo (Calyptorhynchus lathami)
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppE
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane
Service Layer Credits:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp
Atlas of Living Australia occurrence download at https://biocache.ala.org.au/occurrences/search?qid=1660976464078
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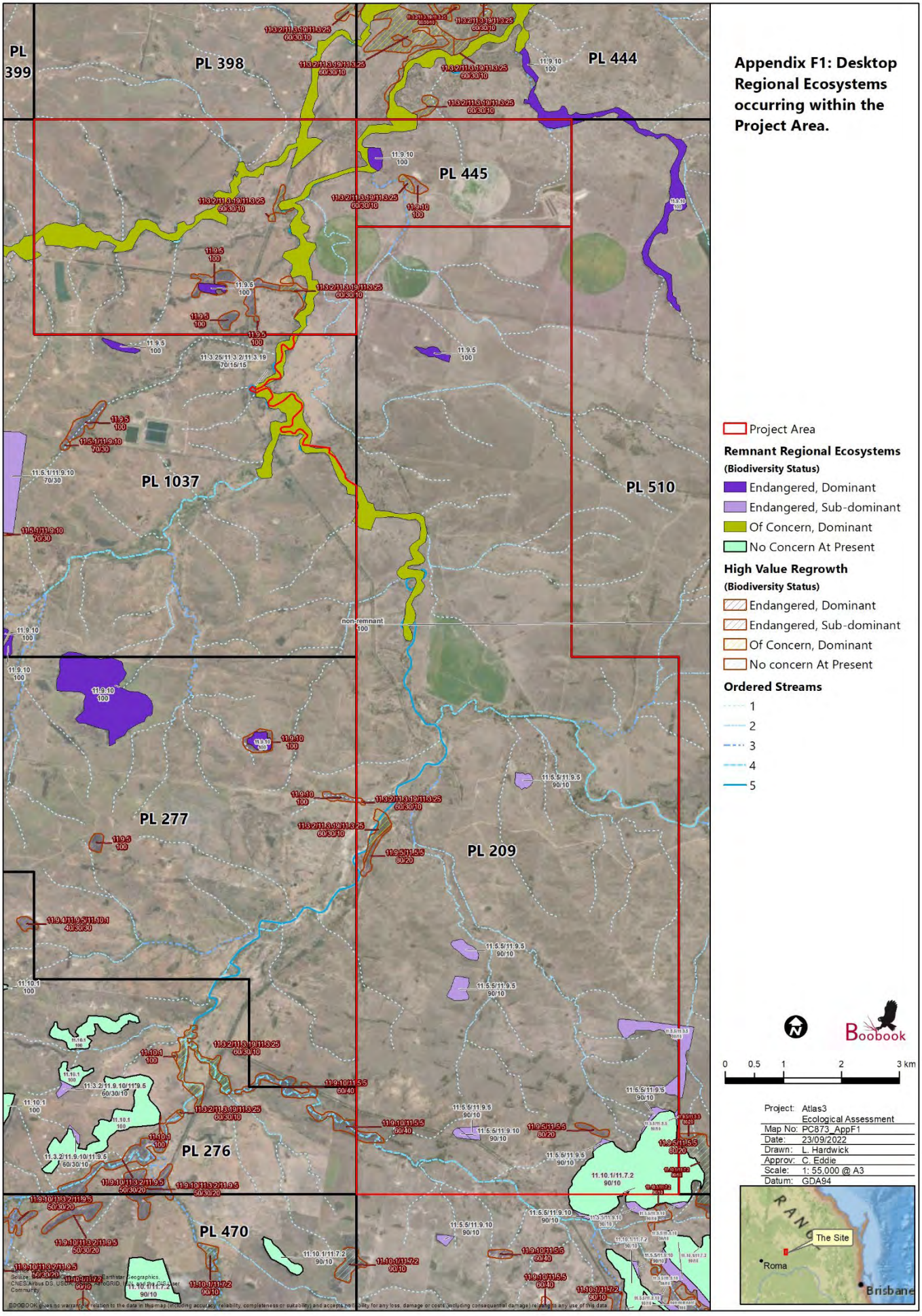
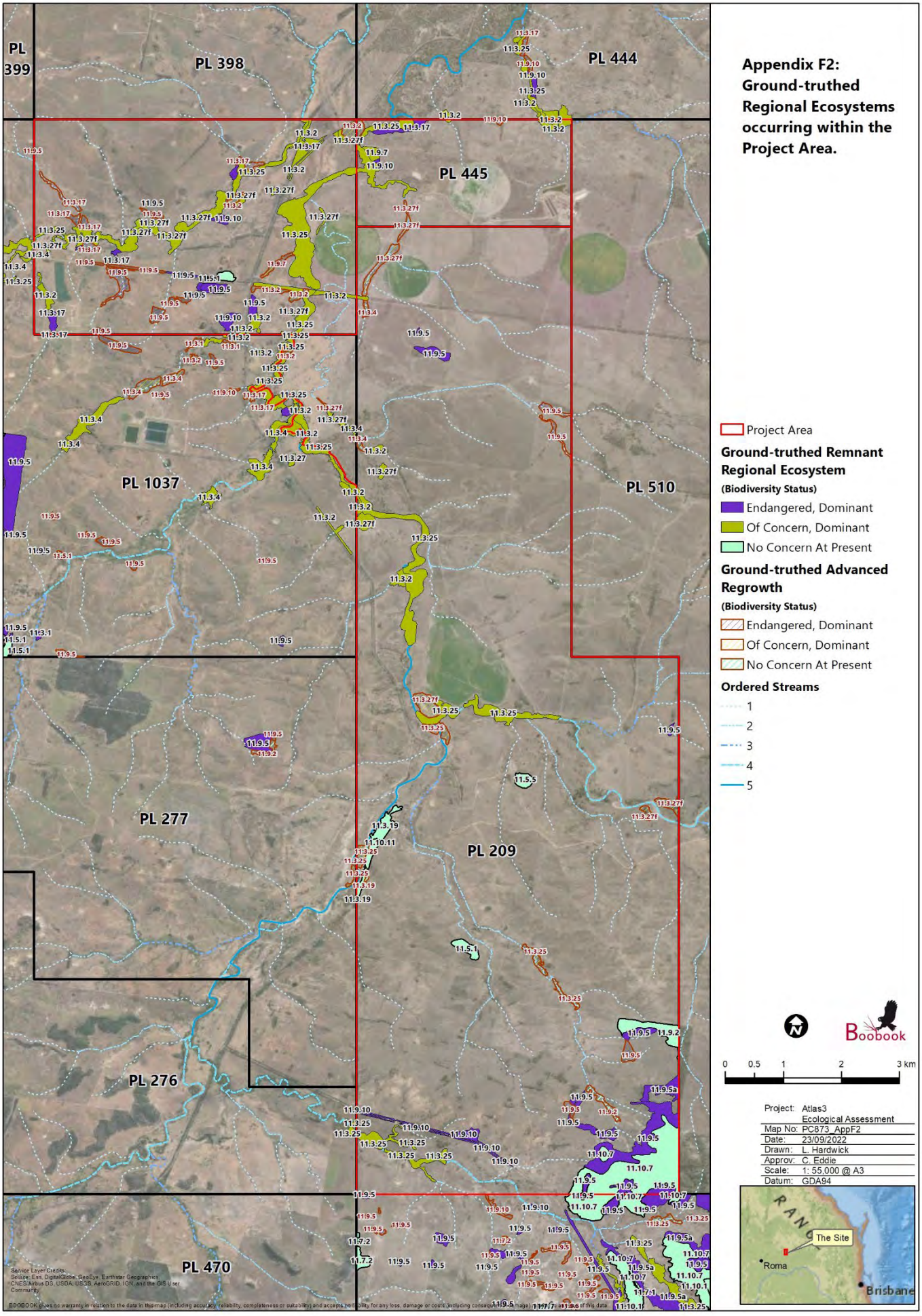
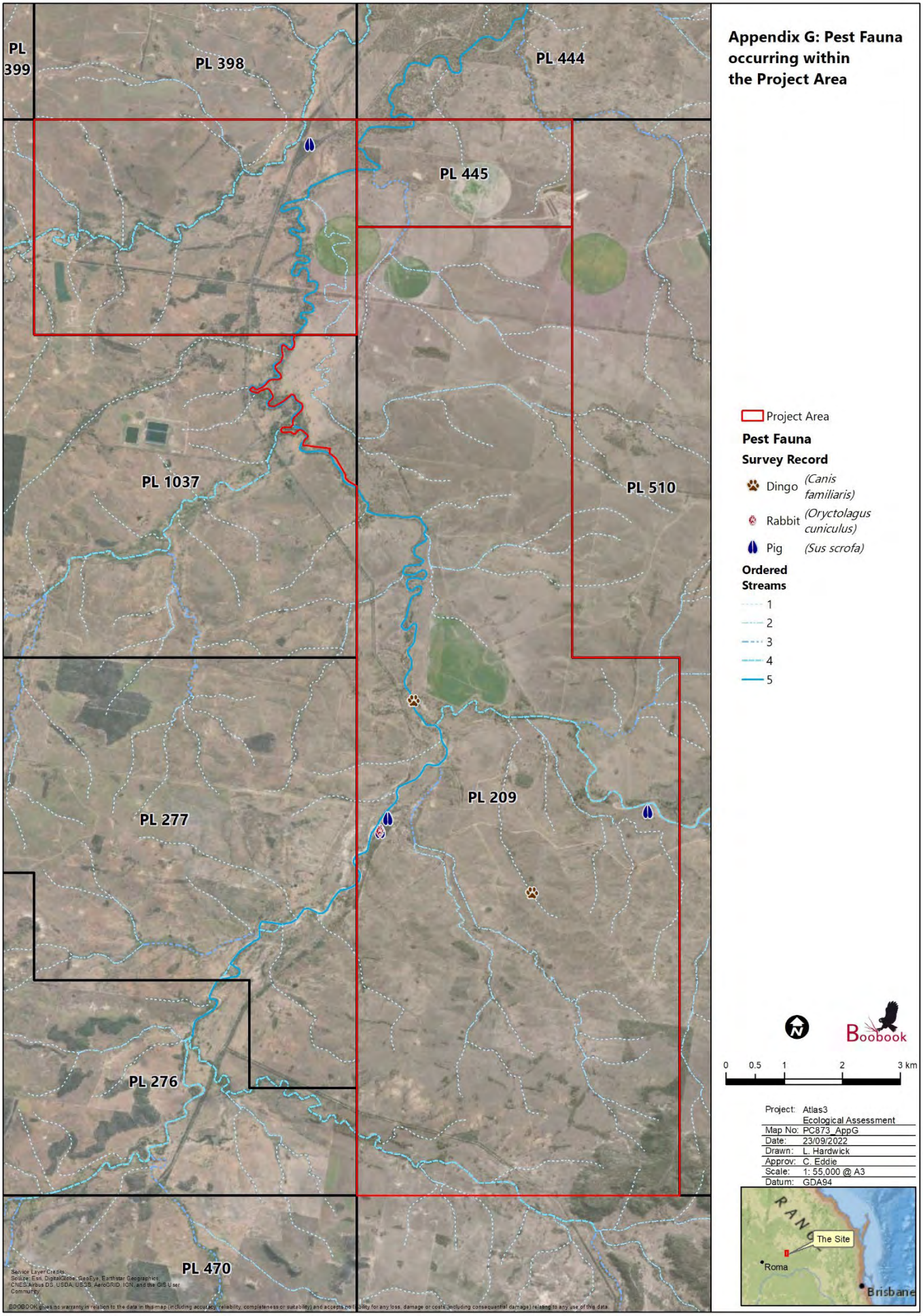
Appendix F. Regional Ecosystems Occurring within the Project Area.


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 277
PL 209
PL 276
PL 470
non-remnant
Appendix F1: Desktop Regional Ecosystems occurring within the Project Area.
Project Area
Remnant Regional Ecosystems
(Biodiversity Status)
Endangered, Dominant
Endangered, Sub-dominant
Of Concern, Dominant
No Concern At Present
High Value Regrowth
(Biodiversity Status)
Endangered, Dominant
Endangered, Sub-dominant
Of Concern, Dominant
No concern At Present
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppF1
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 277
PL 209
PL 276
PL 470
Appendix F2: Ground-truthed Regional Ecosystems occurring within the Project Area.
Project Area
Ground-truthed Remnant Regional Ecosystem
(Biodiversity Status)
Endangered, Dominant
Of Concern, Dominant
No Concern At Present
Ground-truthed Advanced Regrowth
(Biodiversity Status)
Endangered, Dominant
Of Concern, Dominant
No Concern At Present
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppF2
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane

Appendix G. Pest Fauna Occurring within the Project Area.


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 277
PL 209
PL 276
PL 470
Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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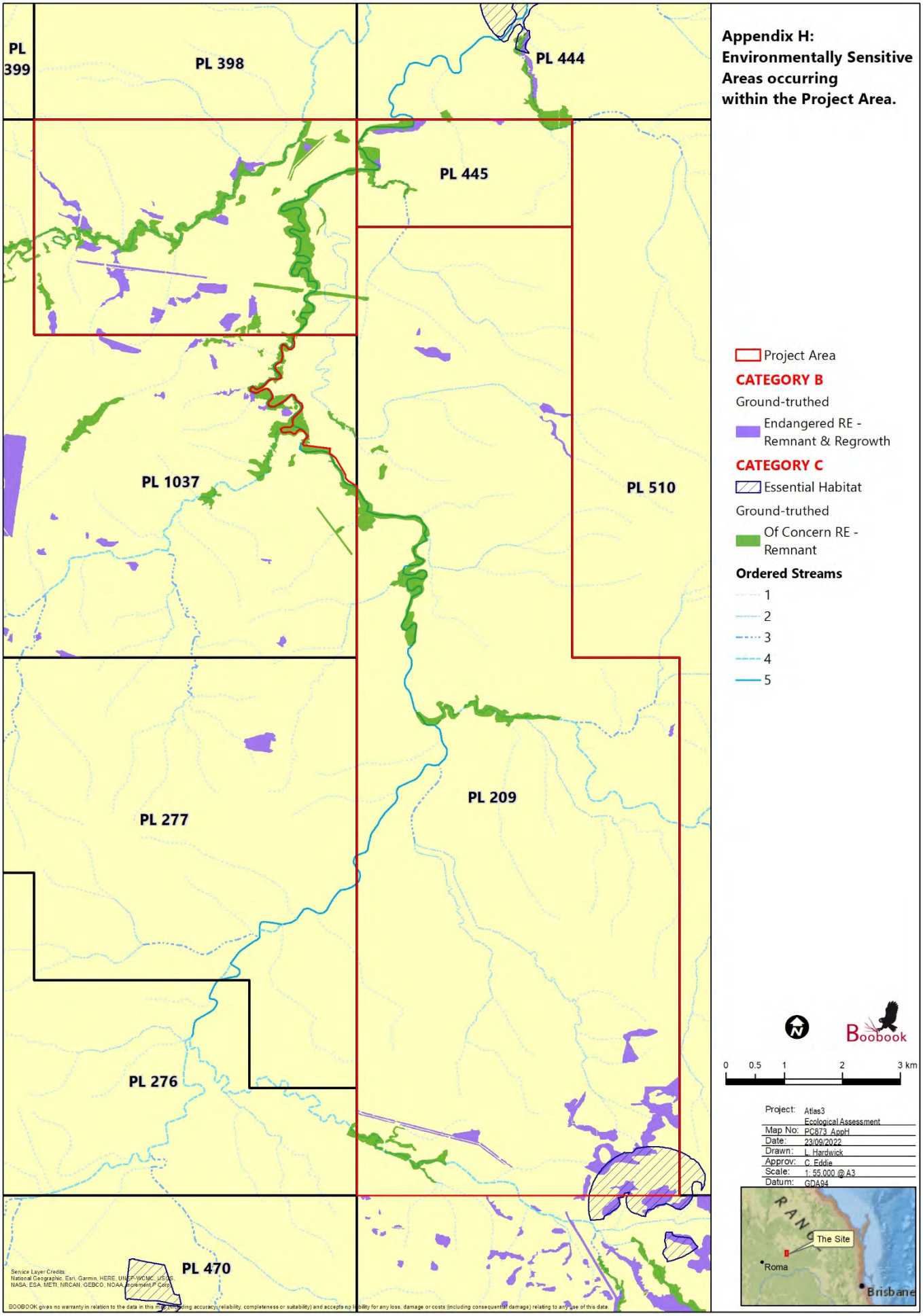
Appendix G: Pest Fauna occurring within the Project Area
Project Area
Pest Fauna
Survey Record
Dingo (Canis familiaris)
Rabbit (Oryctolagus cuniculus)
Pig (Sus scrofa)
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppG
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane

Appendix H. Environmentally Sensitive Areas Occurring within the Project Area.


PL 399
PL 398
PL 444
PL 445
PL 1037
PL 510
PL 209
PL 277
PL 276
PL 470
Appendix H:
Environmentally Sensitive Areas occurring within the Project Area.
Project Area
CATEGORY B
Ground-truthed
Endangered RE - Remnant & Regrowth
CATEGORY C
Essential Habitat
Ground-truthed
Of Concern RE - Remnant
Ordered Streams
1
2
3
4
5
Boobook
0 0.5 1 2 3 km
Project: Atlas3 Ecological Assessment
Map No: PC873_AppH
Date: 23/09/2022
Drawn: L. Hardwick
Approv: C. Eddie
Scale: 1: 55,000 @ A3
Datum: GDA94
The Site
Roma
Brisbane
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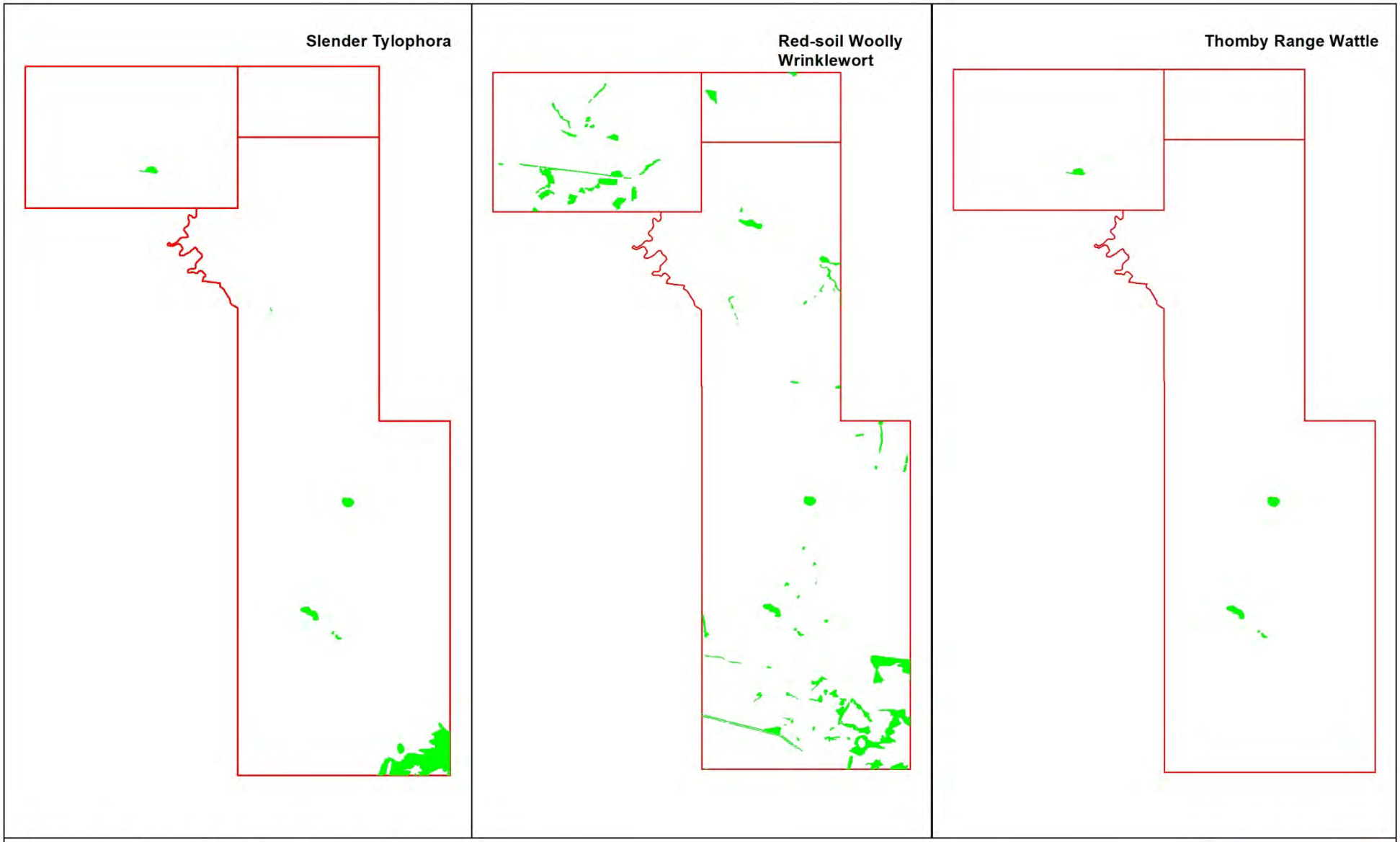
Appendix I. Predictive Habitat Mapping of Threatened Flora and Fauna.



Appendix I1a: Predictive Habitat Mapping of Threatened Flora.

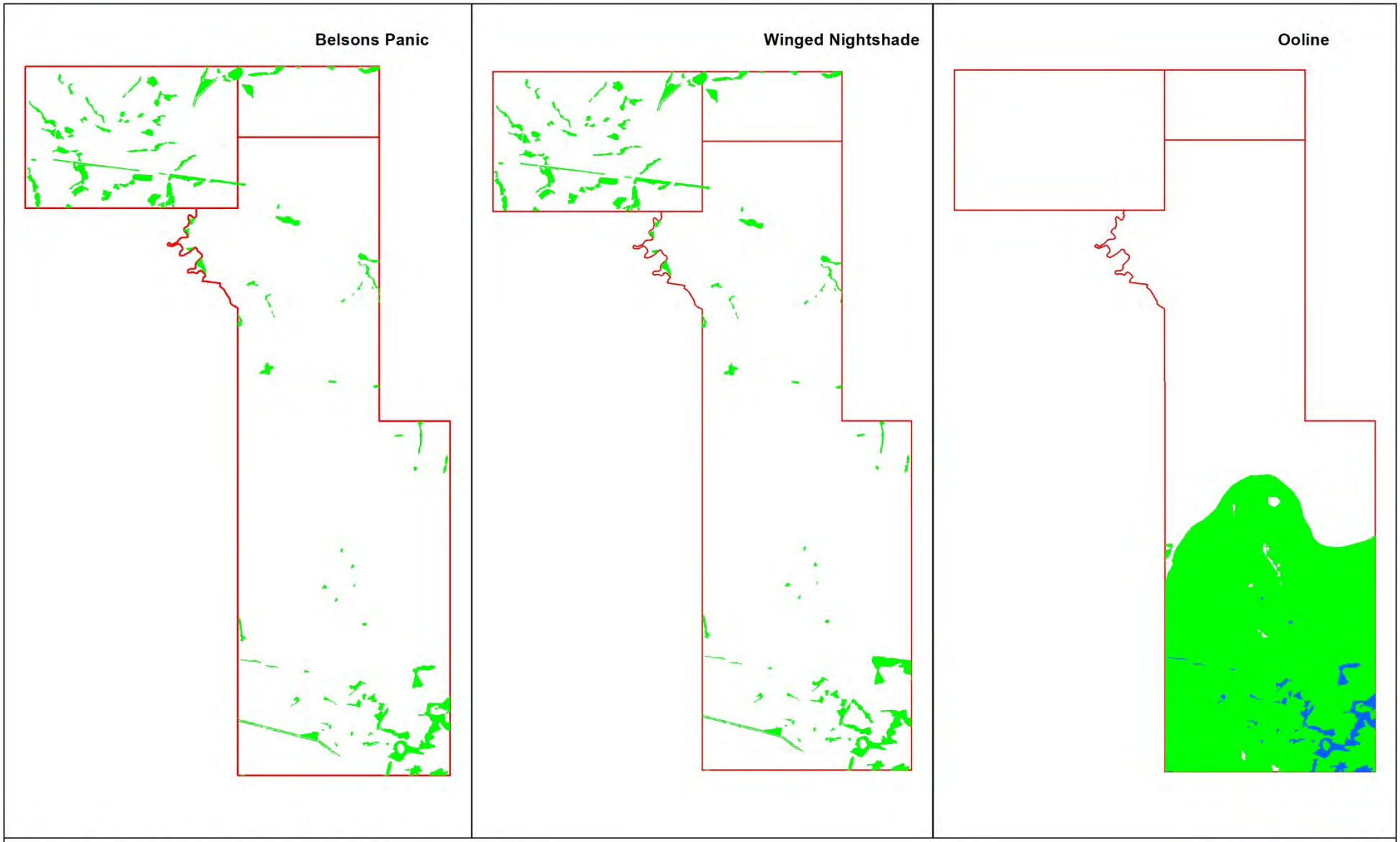
General Habitat

The Site

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_AppI1a
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 89,265 @ A3
Datum:	GDA94



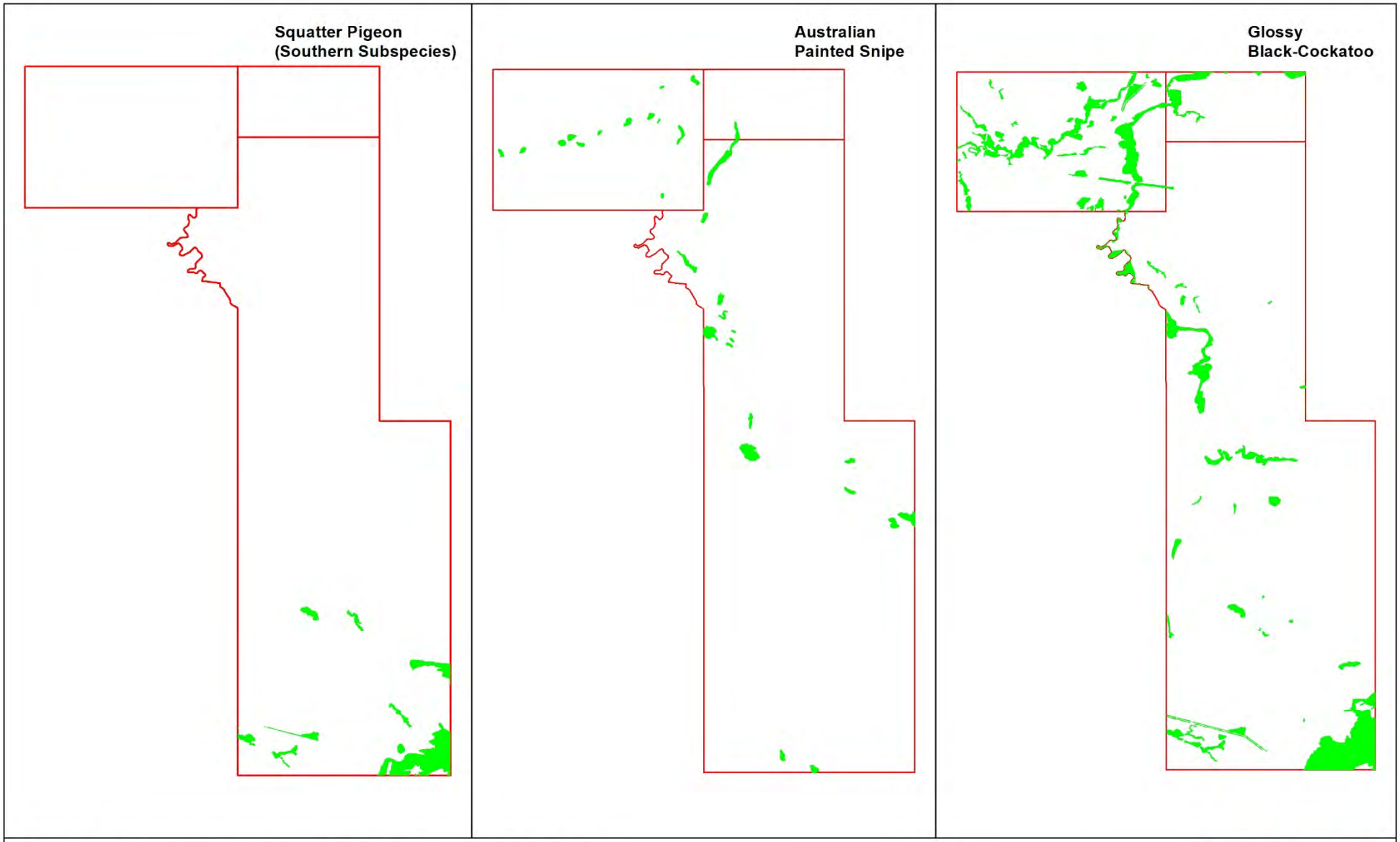
Appendix I1b: Predictive Habitat Mapping of Threatened Flora.

- Essential Habitat
- General Habitat
- The Site

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_Appl1b
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 89,420 @ A3
Datum:	GDA94



Appendix I2a: Predictive threatened fauna habitat mapping within the Site.

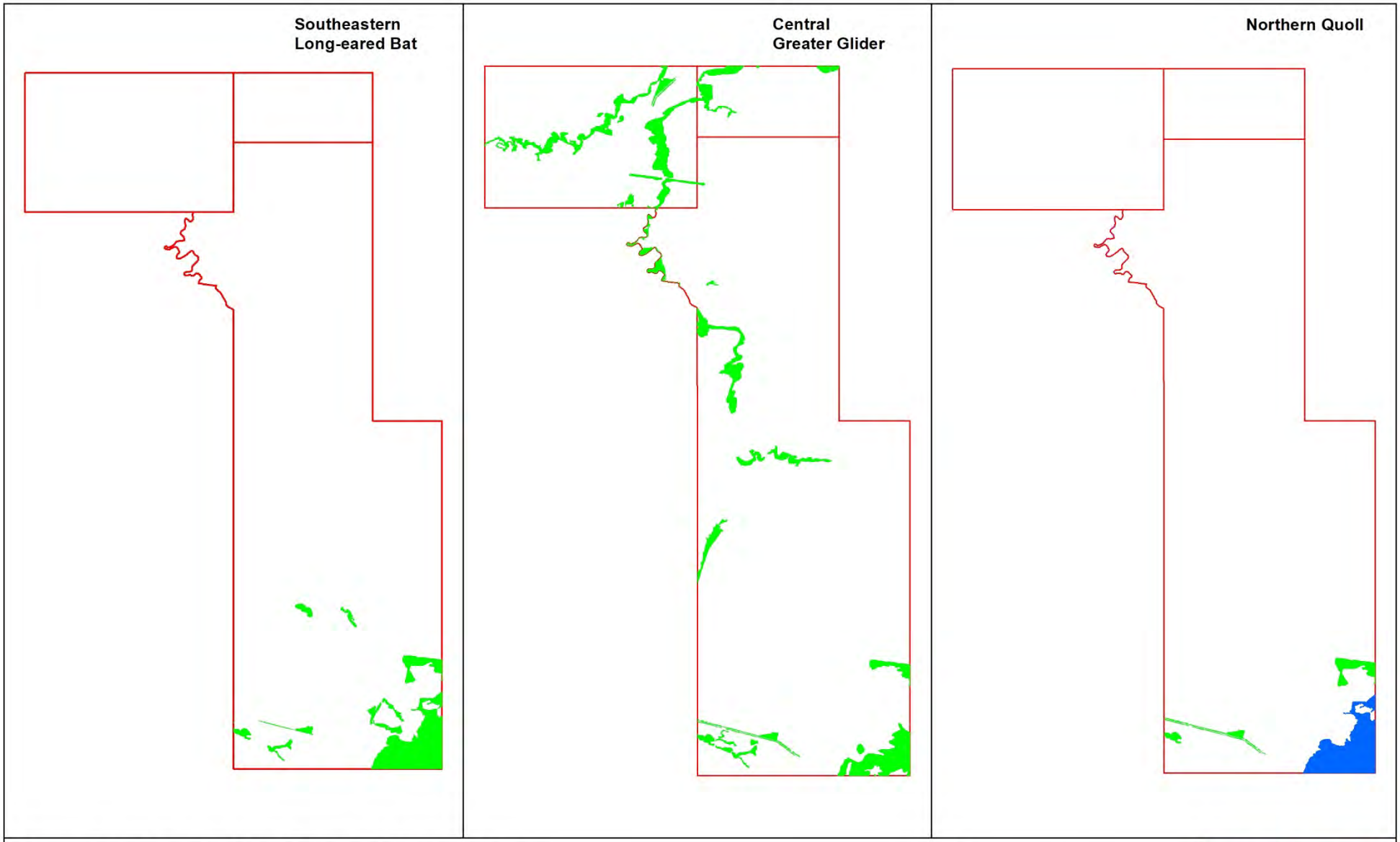
The Site

General Habitat

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_AppI2a
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 89,983 @ A3
Datum:	GDA94



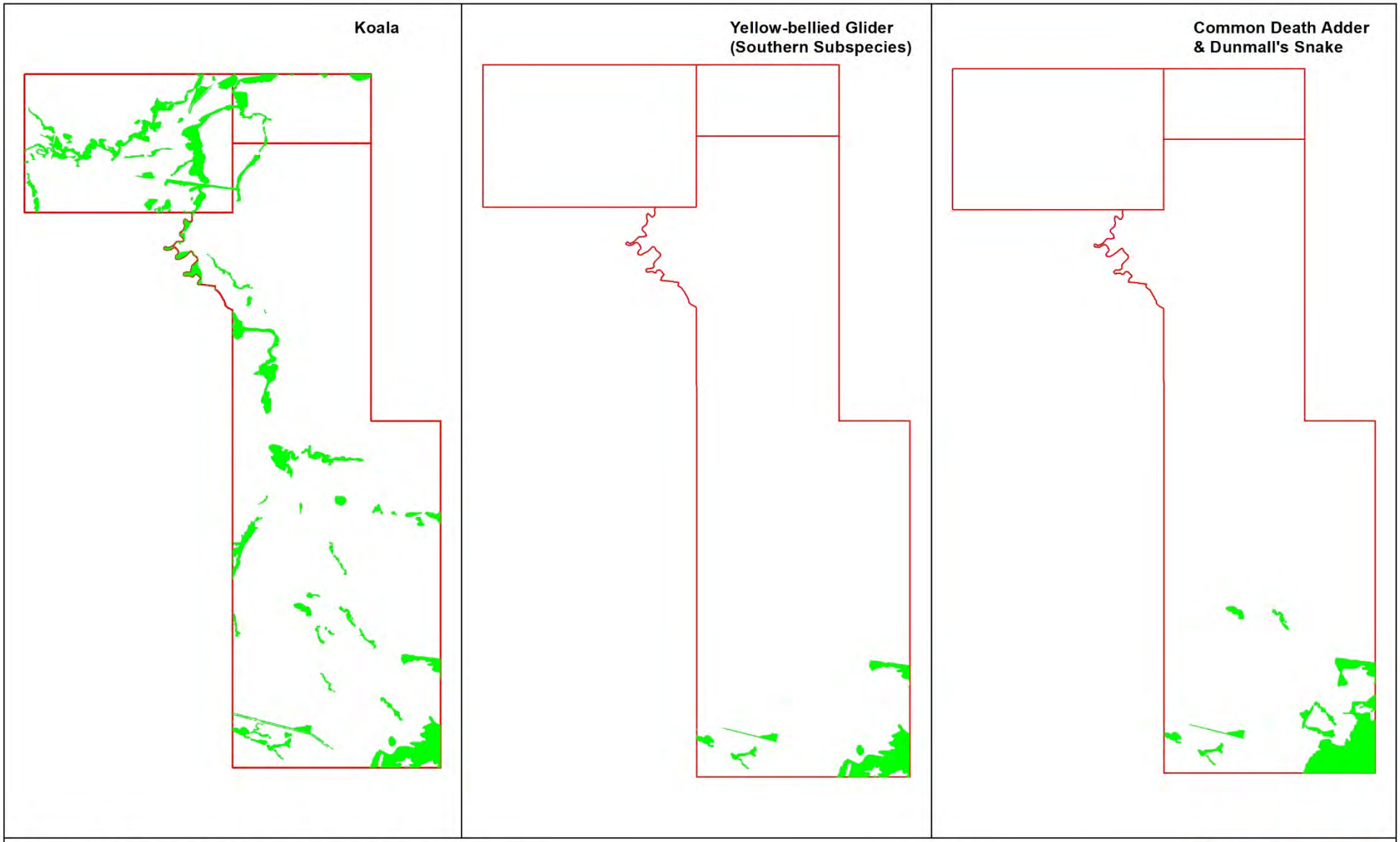
Appendix I2b: Predictive Habitat Mapping of Threatened Fauna.

- The Site
- Essential habitat
- General habitat

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_Appl2b
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 89,141 @ A3
Datum:	GDA94



Appendix I2c: Predictive Habitat Mapping of Threatened Fauna.

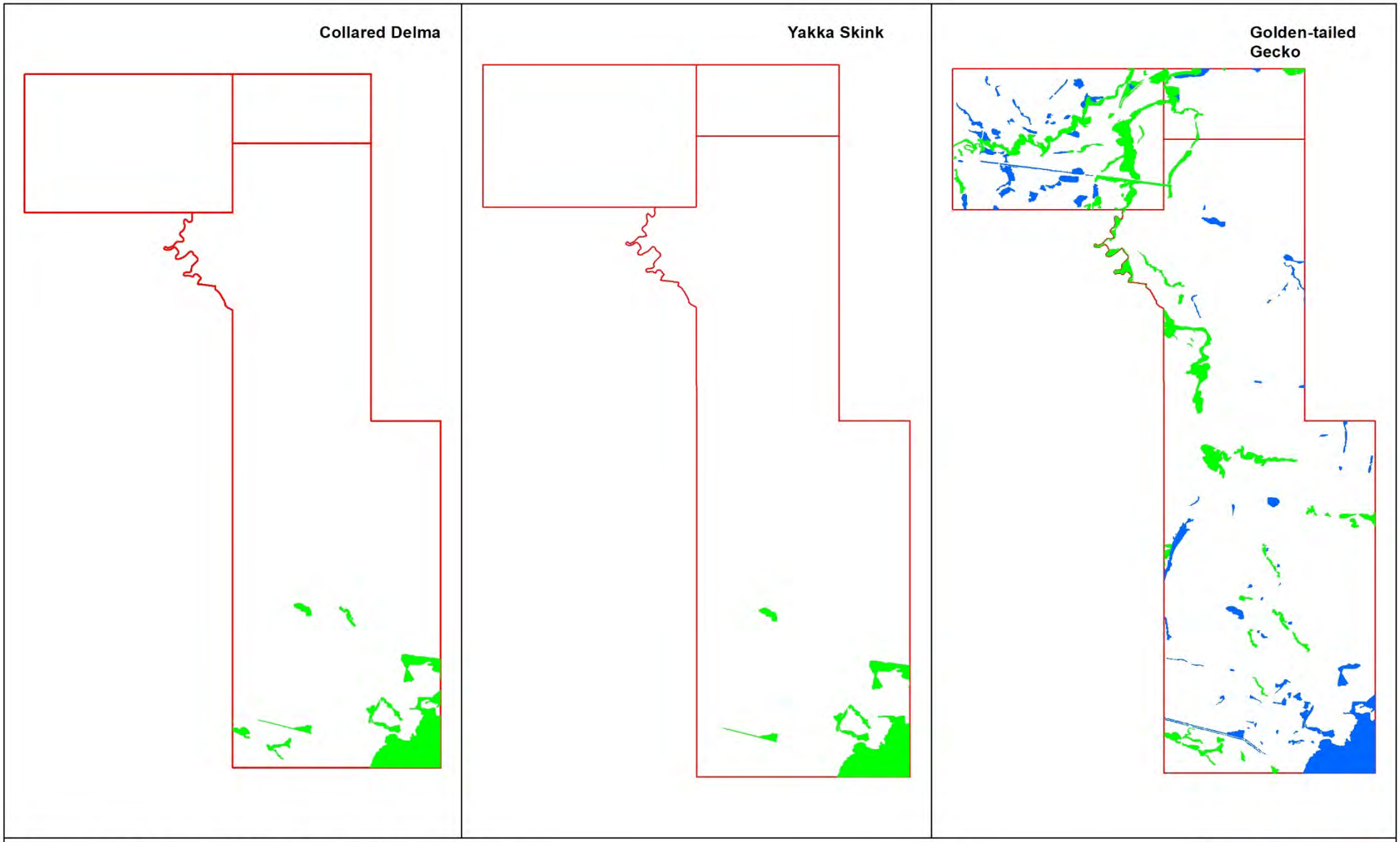
The Site

General Habitat

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_Appl2c
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 89,141 @ A3
Datum:	GDA94



Appendix I2d: Predictive Habitat Mapping of Threatened Fauna.

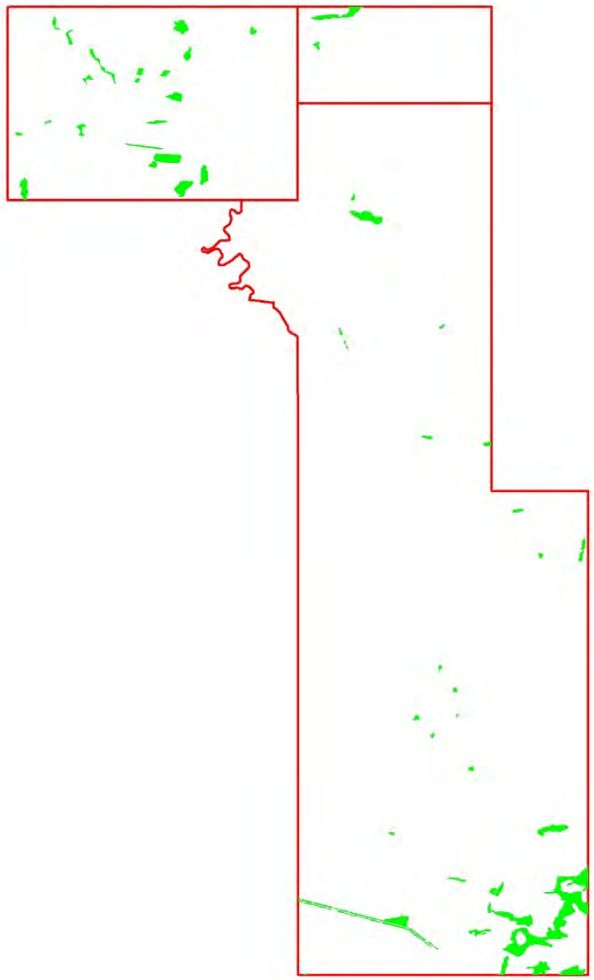
- Essential Habitat
- General Habitat
- The Site

Boobook

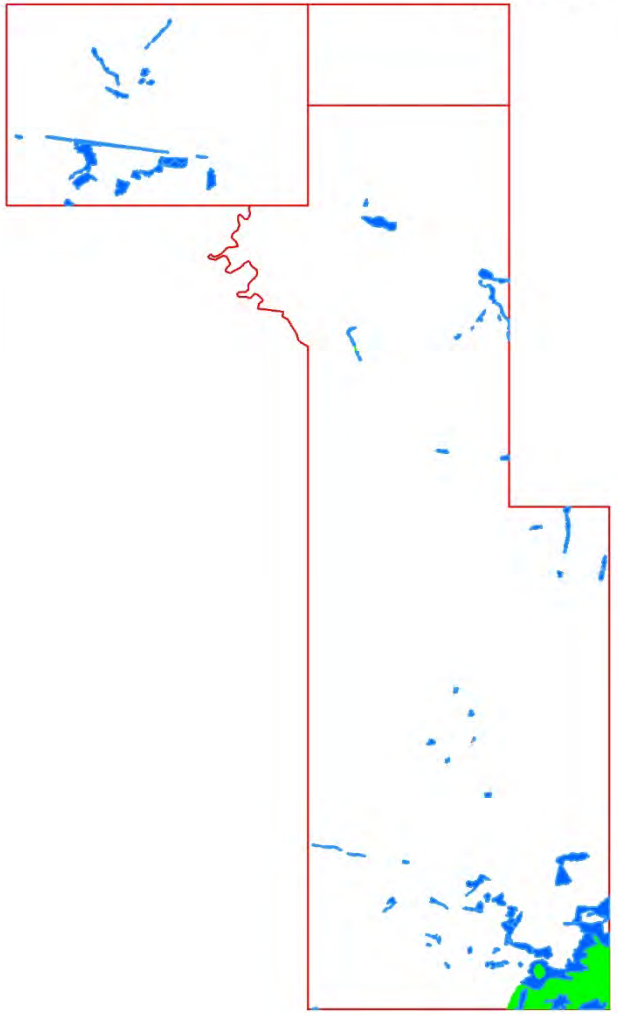
0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_Appl2d
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 89,141 @ A3
Datum:	GDA94

Pale Imperial Hairstreak (butterfly)



Dulacca Woodland Snail



Appendix I2e: Predictive Habitat Mapping of Threatened Fauna.

The Site

Essential Habitat

General Habitat

Boobook

0 0.5 1 2 3 km

Project:	Atlas3 Ecological Assessment
Map No:	PC873_Appl2e
Date:	23/09/2022
Drawn:	L. Hardwick
Approv:	C. Eddie
Scale:	1: 90,001 @ A3
Datum:	GDA94

APPENDIX D FRESHWATER ECOLOGY AQUATIC ECOLOGY REPORT

Freshwater Ecology Pty Ltd

Senex - Atlas Stage 3 Gas Project
Aquatic Ecology Assessment
2022

Prepared for ERM
March 2022

Document Control Summary

Document Revisions

Project Title		Senex – Atlas 3 Aquatic Ecology Assessment 2022			
Project Manager		Dr Timothy Howell			
Freshwater Ecology Reference		FE22007_Senex_AqEcology_March2022			
Electronic File Name	**Status**	**Prepared by**	**Reviewed by**	**Authorised**	**Date**
FE22007_Senex_AqEcology_March2022_V1	Draft	TDH	HQT	TDH	25/8/2022
FE22007_Senex_AqEcology_2022_FINAL	Final	TDH	HQT	TDH	11/10/2022

Document Distribution

Electronic File Name	Status	Issued to	Format	Issued by
FE22007_Senex_AqEcology_March2022_V1	Draft	Matt Davis	MS word	TDH
FE22007_Senex_AqEcology_2022_FINAL	Final	Matt Davis	MS word	TDH

Executive Summary

Freshwater Ecology Consulting was engaged by ERM to undertake the aquatic ecology component of the ecological surveys for the Atlas Stage 3 Gas Project. Sampling was conducted across waterways of the Project Area in March 2022. The purpose of this report is to provide the results of this sampling and to identify aquatic ecological values present within the Project Area.

Twenty-six sites were selected to represent all waterways across the Project Area. Further visual assessments of other reaches were conducted to ensure the selected sites were representative of each waterway. Waterways across the Project Area were ephemeral with some waterways retaining small amounts of flow from rainfall in the months preceding sampling. The main existing stressors on aquatic ecosystems are driven by historical land clearance and current grazing and cropping practices.

Sampling was undertaken in a wetter than normal year with typical rainfall in most months leading up to sampling and much higher rainfall in November 2021 and February 2022. *In situ* water quality across the Project Area was variable but alkaline at all sites (from slightly to strongly). Waterways across the Atlas Stage 3 Project Area are ephemeral, with most waterways anecdotally drying completely in dry periods and few waterways retaining refugial pools after extended dry periods. Habitat bioassessments determined that the habitat quality at sites sampled ranged from 'poor' to 'fair'.

Nineteen aquatic macrophyte species were recorded across all sites; comprised of four floating attached and 15 emergent species. At most sites coverage of macrophytes was very low. No free floating or submerged macrophyte species were detected. No aquatic macrophytes were recorded at five sites.

Aquatic macroinvertebrate communities were relatively poor across all sites with low abundance, diversity, Plecoptera-Ephemeroptera-Tricoptera (PET) taxa and Signal2. Three families of macrocrustaceans were recorded across the sites; Palaemonidae (prawns) and Paratascidae (crayfish) were widespread while Atyidae (shrimps) was recorded at only one site.

Eight species of fish were recorded, five of which were relatively widespread. Only one non-native species was recorded at a single site (tilapia – *Oreochromis mossambicus*). Tilapia is a restricted noxious fish under the Biosecurity Act 2014.

A single specimen of eastern long-necked turtle (*Chelodina longicollis*) was recorded. An assessment of platypus (*Ornithorhynchus anatinus*) habitat suitability was undertaken at each site which held water. Four sites recorded average quality at the time of sampling, all others were considered poor habitat. Considering the ephemeral nature of the waterways and the large amount of rainfall in the months preceding sampling, as well as the distance to any historical records, it is considered unlikely that platypus would inhabit waterways with the Project Area. Three species of frog were noted as incidental observations during the aquatic ecology sampling.

A desktop review was undertaken on available existing information available for the potentially threatened aquatic flora known, or with potential, to be present in proximity to the Project Area. Following the field surveys an assessment on the likelihood of occurrence for aquatic Endangered, Vulnerable and Near Threatened (EVNT) species was undertaken. All EVNT species identified in the desktop assessment were considered unlikely to occur within the Project Area.

Contents

Tables

Figures

1. Introduction

Senex's Atlas Stage 3 Gas Project is located in the Surat Basin, 20 kilometres south-west of the town of Wandoan in Queensland.

ERM was engaged by Senex to coordinate ecological surveys and complete the required impact assessments to support State and Commonwealth environmental approvals for the Atlas Stage 3 Gas project. Freshwater Ecology Consulting was engaged by ERM to undertake the aquatic ecology component of the surveys, that included:

- A desktop assessment to the review the environmental values and aquatic flora and fauna species that could occur in and adjacent to the project area;
- Field sampling of aquatic habitat values at 26 sites across the Project Area, consisting of:
    - Habitat assessment
    - In situ water quality sampling
    - Macrophytes
    - Macroinvertebrate
    - Backpack electrofishing
    - Visual observations
    - fyke netting using large nets
- Preparation of this report to describe the aquatic habitat values within the Project Area, including completing an assessment of the likelihood of occurrence of listed threatened species under the Queensland *Nature Conservation Act 1992* (NC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

2. Project location and site selection

2.1. Project area

The Project Area is located in the upper Dawson River catchment in the Fitzroy River Basin, Central Queensland. The waterways present are ephemeral, although several retain waterholes for extended periods of time following the cessation of rain. The largest waterway that passes through the Project Area is Wooleebee Creek which drains into Juandah Creek approximately 15 kilometres to the north before confluencing with the Dawson River approximately 55 kilometres north of the Project Area. The named tributaries which flow in Wooleebee Creek with the Project Area are Conloi Creek and Hellhole Creek. Wandoan Creek intersects the northwest section of the Project Area and confluences with Wooleebee Creek north to the north of the Project Area.

Much of the Project Area has been historically cleared for grazing and agricultural activities. This has led to widespread erosion, particularly along waterways, and in turn has generated large amounts of mobile sediment in many of the waterway channels. These activities have also reduced the extent of riparian vegetation across many waterways across the Project Area.

2.2. Site selection

Twenty-six sites were selected across the Project Area to be assessed (**Table 1**, **Figure 1**). Initial desktop assessments allocated sampling sites for those considered likely to hold water and habitat assessments for sites considered likely to be dry. However, site examination determined that some of the sampling sites did not contain water and several of the sites designated as habitat assessments only were suitable for sampling. Further visual assessments of other reaches were conducted to ensure the selected sites were representative of each waterway.

2.3. Timing

Aquatic ecology sampling was undertaken from the 14th to the 21st of March 2022.

Table 1: Sampling site details (ordered south to north)

Site code	Waterway	Wetland type	Stream order	Waterway barrier determination	Elevation	Coordinates (UTM 55J)	
						Easting	Northing
LAQ2	Hellhole Creek	Riverine	4	Major	321	786148	7083942
LAQ3	Hellhole Creek	Riverine	4	Major	310	783755	7085063
LH5	Unnamed creek	Riverine	2	Moderate	310	786429	7087531
LH6	Unnamed creek	Riverine	2	Moderate	283	784257	7090324
LAQ4	Conloi Creek	Riverine	4	Major	287	787875	7090806
LAQ7	Woleebee Creek	Riverine	5	Major	280	783693	7091442
LAQ10	Unnamed creek	Riverine	2	Moderate	285	786328	7091373
LAQ8	Woleebee Creek	Riverine	5	Major	276	784508	7092058
LAQ6	Unnamed billabong	Riverine	3	High	283	786897	7092375
LAQ5	Unnamed creek	Palustrine	-	-	277	784944	7092562
LH11	Unnamed creek	Riverine	2	Moderate	274	783417	7094813
LH7	Unnamed creek	Riverine	2	Moderate	271	784519	7095038
LAQ11	Unnamed creek	Riverine	2	Moderate	275	785327	7098360
TAQ4	Woleebee Creek	Riverine	5	Major	262	782643	7100015
LH8	Unnamed creek	Riverine	2	Moderate	257	784135	7100197
TAQ5	Unnamed billabong	Palustrine	-	-	269	778770	7100820
TAQ1	Wandoan Creek	Riverine	4	Major	268	778781	7101064
TAQ2	Wandoan Creek	Riverine	4	Major	261	780904	7101380
TH3	Unnamed creek	Riverine	2	Moderate	257	783131	7100821
LH9	Unnamed creek	Riverine	3	High	256	784091	7101291
TH4	Unnamed billabong	Palustrine	-	-	258	782119	7101726
TH1	Unnamed creek	Riverine	2	Moderate	276	778682	7101830
TAQ3	Wandoan Creek	Riverine	4	Major	256	781924	7102194
TH2	Unnamed creek	Riverine	2	Moderate	258	781497	7102372
LH12	Unnamed billabong	Palustrine	-	-	254	783236	7102518
LAQ9	Woleebee Creek	Riverine	5	Major	256	783331	7102502

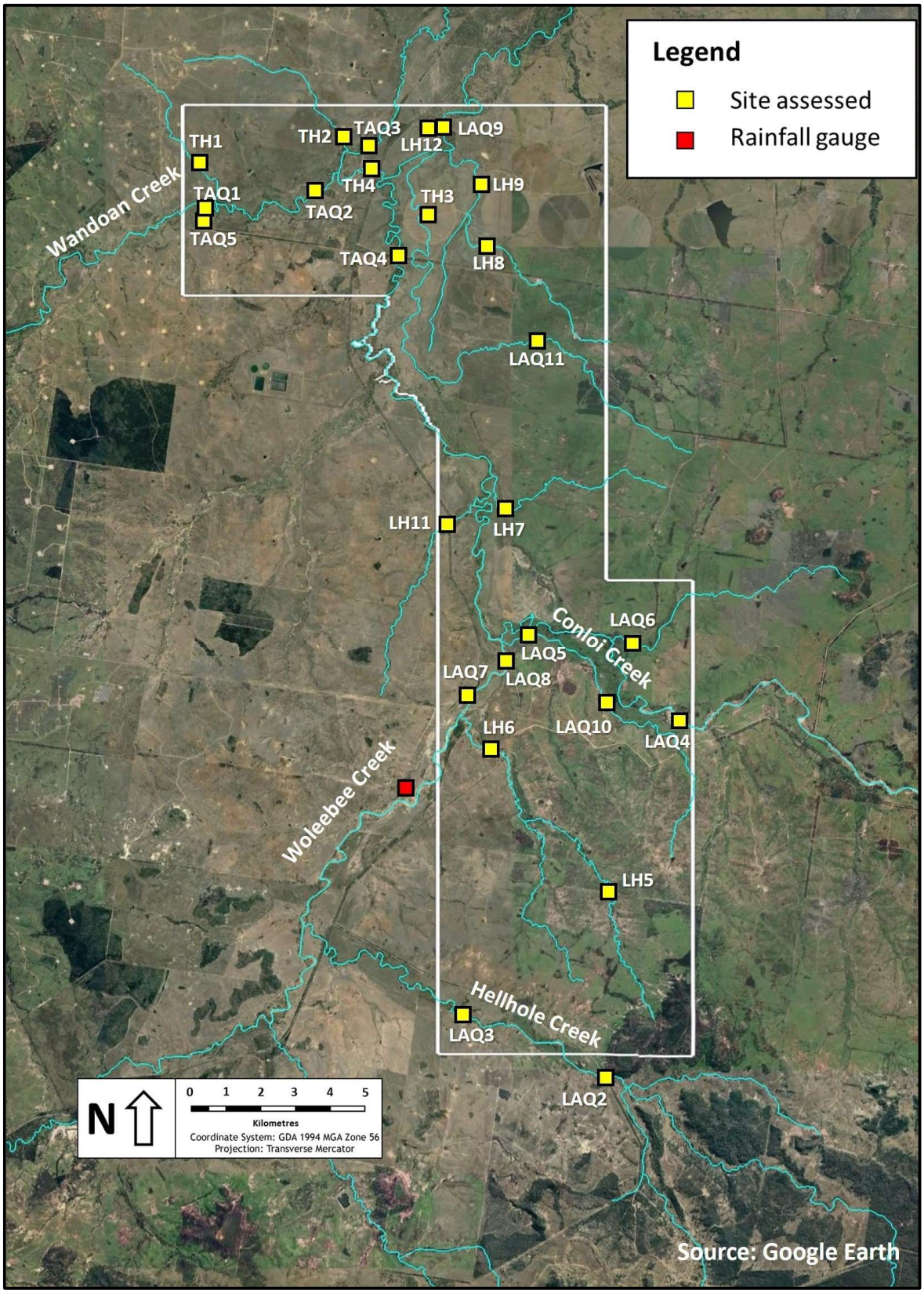


Figure 1: Location of sites sampled across Atlas 3 Project Area

3. Methods

3.1. Desktop assessment

A literature review was undertaken to assess the environmental values and aquatic flora and fauna species that could occur in and adjacent to the project area. The online searches included:

- EPBC Act Protected Matters Report (**Appendix E**)
- A Wildlife Online search (NC Act) (**Appendix F**)
- An Atlas of Living Australia search for records of Endangered, Vulnerable and Near Threatened (EVNT) species (Atlas of Living Australia 2021)
- The Fitzroy NRM Back-on-track Actions for Biodiversity
- Aquatic Conservation Assessments for the Riverine and non-Riverine wetlands of the Dawson section of the Great Barrier Reef catchment (Inglis & Howell 2009, Rollason & Howell 2011)

3.1.1. EVNT species likelihood of occurrence determination

EVNT species identified from the desktop assessment (and subsequent field surveys) were assigned a likelihood of occurrence based on the criteria identified in **Table 2**. The assessment was based on the knowledge of ecologists, habitat suitability, previous surveys/records near the study area and available scientific literature.

Table 2: Likelihood of occurrence determination criteria

Likelihood of occurrence	Criteria
Unlikely	No suitable habitat; few records from desktop assessment and records > 20 km from the Study Area.
Possible	Suitable habitat within or adjacent Study Area; numerous records from desktop assessment Project Site but records > 20 km away or > 20 years old OR Marginal habitat within or adjacent the Study Area; few, but recent (<20 yrs) records within 20 km of Project Site
Likely	Suitable habitat within or adjacent Study Area; numerous relevant records (less than 20 years old and within 20 km of the Project Site) from desktop assessment.
Known	Recorded within and/or immediately adjacent Study Area.

3.2. Field sampling

Sampling was conducted under General Fisheries Permit No. 207913, scientific user permit for non-protected areas WISP18336317, and Animal Ethics Approval No. CA 2020/02/1352, held by Freshwater Ecology.

The sampling techniques used were in line with the Monitoring and Sampling Manual: Environmental Protection (Water) Policy (DES 2018) and are summarised in **Table 3** for each site.

Table 3: Sampling methods used for each site

Site	Habitat assessment	*In situ* water quality	Macrophytes	Macroinvertebrate	Backpack electrofishing	Visual observations	fyke netting (large nets)
LAQ2	✓	✓	✓	✓	✓		
LAQ3	✓	✓	✓				
LH5	✓		✓				
LH6	✓	✓	✓				
LAQ4	✓	✓	✓				
LAQ7	✓	✓	✓	✓	✓		
LAQ10	✓	✓	✓	✓	✓		✓
LAQ8	✓	✓	✓	✓		✓	
LAQ6	✓	✓	✓	✓	✓		
LAQ5	✓	✓	✓	✓	✓		✓
LH11	✓	✓	✓				
LH7	✓		✓				
LAQ11	✓	✓	✓	✓	✓		
TAQ4	✓	✓	✓	✓	✓		✓
LH8	✓						
TAQ5	✓	✓	✓	✓	✓		
TAQ1	✓	✓	✓	✓	✓		
TAQ2	✓	✓	✓	✓	✓		✓
TH3	✓						
LH9	✓	✓	✓	✓	✓		
TH4	✓		✓				
TH1	✓	✓	✓				
TAQ3	✓	✓	✓	✓	✓		✓
TH2	✓	✓	✓				
LH12	✓		✓				
LAQ9	✓	✓	✓	✓	✓		✓

3.3. Aquatic habitat

An aquatic habitat assessment was undertaken following the Australian River Assessment System (AusRivAS) protocols (DNRM 2001). The assessment was undertaken by Dr. Timothy Howell from Freshwater Ecology (FE) who is an AusRivAS accredited ecologist. The habitat assessment included recording quantitative and qualitative measurements and observations of:

- substrate composition;
- flow, water depth and wetted width, noting if surface water was connected or comprised of one or more disconnected pools in the channel;
- channel morphology;
- physical habitat features, such as large woody debris, undercut banks and aquatic plants;
- riparian vegetation cover and condition;
- any notable disturbances including bank erosion, cattle access to waterway and barriers associated with nearby road crossings or dams; and
- other on-site features, such as presence of filamentous or benthic algae, surface scums, unusual sediment deposits, or fish kills.

An aquatic habitat inventory was undertaken at each monitoring location to assist in the interpretation of ecological data. This inventory included a general description of the environment within, and immediately surrounding each site, including:

- Channel characteristics
    - reach length, bankfull bank height, bankfull stream width, mean water depth, mean wetted width.
- Riparian vegetation characteristics
    - riparian vegetation height (max.), riparian zone width (both banks), bare ground, grass, shrubs, trees (< 10 m and > 10 m), canopy cover.
- Mesohabitat composition (%)
    - riffle, run, rocky pool, sandy pool, dry.
- Substrate composition (%)
    - bedrock, boulder (>256 mm), cobble (64-256 mm), pebble (4-64 mm), gravel (2-4 mm), sand (2-4 mm), silt/clay (<0.05 mm).
- Macrophytes (None, Little 1-10%, Some 10-50%, Moderate 50-75%, Extensive >75%)
    - free floating, attached floating, submerged, emergent (as per section 3.5).
- In-stream wood (None, Little 1-10%, Some 10-50%, Moderate 50-75%, Extensive >75%)
    - detritus (leaves etc), sticks (<2 cm diameter), branches (<15 cm diameter), logs (>15 cm diameter).
- Microhabitat (None, Little 1-10%, Some 10-50%, Moderate 50-75%, Extensive >75%)
    - periphyton, filamentous algae, submerged macrophytes, bank overhang vegetation, trailing bank vegetation, blanketing silt, substrate anoxia, bank undercuts.

Aquatic habitat was assessed in accordance with Queensland Australian River Assessment System (AusRivAS) Sampling and Processing Manual (DNRM 2001). Habitat bioassessment score datasheets (DNRM 2001) were used to numerically score nine criteria, which were then allocated to one of four categories (excellent, good, moderate and poor). The sum of the numerical rating from each category produced an overall habitat condition assessment score (**Table 4**).

According to this system sites with scores:

- >110 were considered to be in excellent condition
- Between 75 and 110 were considered to be in good condition
- Between 39 and 74 were considered to be in moderate condition
- ≤38 were considered to be in poor condition.

Whilst the AusRivAS method is an accepted standard for undertaking aquatic habitat assessments, it is less appropriate for ephemeral systems in Queensland than for more permanent waterways; using this method, even pristine ephemeral systems are rarely classed as being in excellent condition, due to the nature of the ephemeral waterways. Nevertheless, it is a useful system for comparing sites within the Project Area.

Table 4: Habitat bioassessment scores

Habitat Category	Category Score Range			
	Excellent	Good	Fair	Poor
Bottom substrate/available cover	16–20	11–15	6–10	0–5
Embeddedness	16–20	11–15	6–10	0–5
Velocity/depth category	16–20	11–15	6–10	0–5
Channel alteration	12–15	8–11	4–7	0–3
Bottom scouring & deposition	12–15	8–11	4–7	0–3
Pool/riffle, run/bend ratio	12–15	8–11	4–7	0–3
Bank stability	9–10	6–8	3–5	0–2
Bank vegetative stability	9–10	6–8	3–5	0–2
Streamside cover	9–10	6–8	3–5	0–2
TOTAL Score for the Site	**111–135**	**75–110**	**39–74**	**0–38**

3.4. Surface water quality

In situ water quality data was recorded using portable multiparameter water quality meters that had been calibrated in accordance with the manufacturer's specifications. Calibrations were regularly checked in the field. Parameters tested *in situ* were: temperature, electrical conductivity (EC), pH, turbidity and dissolved oxygen (DO). *In situ* water quality testing was undertaken in conjunction with macroinvertebrate sampling to assist with the interpretation of results.

All sample collection was completed in accordance with the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES 2018) and *AS/NZ 5667.6:1998 Guidance on sampling of rivers and streams* (AS/NZS 1998).

A summary of the *in situ* parameters measured and their associated measurement precision are presented in **Table 5**. *In situ* water quality data was recorded using a portable multiparameter water quality meter that had been calibrated in accordance with the manufacturer's specifications.

Calibrations were regularly checked in the field. *In situ* water quality testing was undertaken to assist with the interpretation of ecological results.

Table 5: *In situ* water quality measurement parameters

Parameter	Units	Measurement precision
Water temperature	ºC	± 0.1
pH	pH units	± 0.1
Dissolved oxygen	% saturation	± 1
Electrical conductivity	µS/cm	± 1
Turbidity	NTU	± 0.1

3.5. Aquatic flora

Macrophyte surveys were undertaken following completion of the fish and macroinvertebrate surveys to increase the chance of observing macrophytes that were not abundant throughout the reach. All native and exotic macrophyte species at the site were recorded. Species were identified using Stephens & Dowling (2002), Sainty & Jacobs (2003) and MacDonald & Haslam (2016). The relative site coverage of each macrophyte species was recorded (E – extensive, M – moderate, S – some, L - little). Non-macrophyte species also contributed to riparian vegetation but were not assessed within the scope of this project.

Macrophyte species were categorised by growth form in accordance with definitions provided in Sainty and Jacobs (2003), as follows:

- **Free floating** – Species that are normally unattached and float on the surface but may become attached and rooted in drying mud when water levels drop.
- **Floating attached** – Species that are rooted in the substrate but normally have at least the mature leaves floating on the water surface.
- **Submerged**– Species rooted in the substrate or free-floating submerged.
- **Emergent** – Species rooted in the bank substrate with stems, flowers and most of the mature leaves projecting above the water surface.

No free floating or submerged macrophytes were recorded.

3.6. Aquatic macroinvertebrates

Freshwater macroinvertebrates were sampled in accordance with the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES 2018) which defaults to those methods adopted by the Queensland Australian River Assessment System (AusRivAS) *Sampling and Processing Manual* (DNRM 2001). Fourteen sites were sampled in the Project Area, with each including a separate riffle and an edge sample.

A 250 micron (µm) mesh dip net fitted to a triangular frame (250 mm x 250 mm x 250 mm) was used to collect samples. Samples were collected by disturbing the benthos using a kicking or shuffling technique and sweeping the net through the water above the disturbed benthos. The sample was rinsed clean from the net into a bucket and then evenly distributed into sorting trays. Field (live) picking was completed for each sample for a minimum of 30 minutes and a maximum of one hour. Picked macroinvertebrates were placed into a single vial and preserved in a 70% methylated spirits solution. Each vial was labelled with the monitoring site code, replicate number, sampler, habitat, date and time of sampling.

In the laboratory, macroinvertebrates were sorted, identified to the family taxonomic level and relative abundance enumerated. Organisms were identified to family level with the exception of lower phyla (e.g. porifera, nematoda), oligochaetes (freshwater worms), acarina (freshwater mites) and microcrustacea (ostracoda, copeopoda and cladocera). Chironomids were identified to sub-family level in accordance with standard AusRivAS protocols (DNRM 2001).

Enumeration and identification of macroinvertebrate samples was conducted by Susan Jones, an experienced AusRivAS accredited taxonomist. Sorting, enumeration and data entry was cross-checked by a second ecologist for 10% of the samples.

3.7. Fish

Fish sampling was conducted at 14 monitoring locations in line with the approach outlined in the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES 2018).

Backpack electrofishing was undertaken in waterways that held water. A Smith-Root backpack unit (LR20B model) was utilised by a Senior Electrofishing Operator while an appropriately trained assistant aided in the collection of fish for identification and measurement. Sampling was carried out over a site reach spanning at least 100 m (where sufficient water was available), with care being taken to sample all macro and microhabitat types. Settings for the backpack electrofisher varied between sites, depending on water conductivity, depth, fish size and species.
All electrofishing was undertaken in compliance with the Australian Code of Electrofishing Practice (NSW Fisheries 1997) with the minimum power setting used to effectively attract and stun the fish. The settings used for each site sampled for fish and turtles are detailed in **Appendix C**.

Unbaited box trapping is a passive fish sampling technique that targets small bodied pelagic and benthic species. Five to ten unbaited box traps were strategically placed at all sites for between 30 minutes and 2 hours. Extensive field survey experience has shown that most fish enter the traps within the first 30 minutes and removing them after 2 hours minimises the chance of predation within the traps (by both predatory fish and larger macroinvertebrates). Between sampling sites all box nets were cleared of any plant matter and dried to ensure aquatic plants were not inadvertently transferred between sites.

Fyke nets used for sampling turtles were also captured fish that were included in the fish sampling.

3.8. Turtles

There was only sufficient water at sites TAQ2, TAQ3, LAQ9, LAQ10, LAQ5 and TAQ4 to potentially support turtles. At these sites double winged two fyke nets (one large and one small) were set overnight. At sites LAQ9, LAQ10, LAQ5 and TAQ4 there was sufficient depth to also deploy two cathedral traps. The nets and traps were baited with tinned sardines and were buoyed with the cod end suspended above the water line with ropes to prevent drowning of air breathing animals. Nets were set in the late afternoon and were checked early the following morning.

3.9. Platypus

The habitat at each site was assessed for the suitability for supporting platypus. The criteria used to assess each site are shown in **Table 6** and included water permanency, volume of water present, water quality, microhabitat diversity, submerged macrophytes, foraging habitat and burrowing habitat (Grant 2007).

Table 6: Platypus habitat suitability criteria

Suitability	Reason
Good	Sections dominated by deeper pools with steep undercut banks, overhanging vegetation and flowing water. Water is known, or likely, to be permanent. These areas are considered likely to be frequented by platypus.
Average	A mix of deeper pools and stretches of shallower water (<0.5m). Some pools of water may be semi-permanent, possibly drying during severe drought. Undercut banks and overhanging vegetation is frequent, though water may be turbid. Platypus should not be excluded from these areas, though the likelihood that they could occur is lower than in 'good' habitat. These sections may not permanently support platypus through periods of prolonged drought.
Poor	Sections with shallow water; widely separated or no deep pools. Water flow is likely to be less frequent, possibly drying on a regular basis. Undercut banks and overhanging vegetation is infrequent. Poor sections are unlikely to permanently support platypus but may provide access between good and average quality habitat.

3.10. Frogs

Sampling of frogs was restricted to opportunistic visual encounter surveys and call surveys. These were undertaken during general aquatic ecology surveys. At each site suitable habitat searched for any frogs present. No frogs were heard calling and no tadpoles were recorded during the assessment.

4. Results

4.1. Desktop assessment

The literature review identified several environmental values and aquatic flora and fauna species that could occur in and adjacent to the Project Area. These are summarised below.

Matters of National Environmental Significance (MNES) – EPBC Act listed threatened species

- White-throated Snapping Turtle (*Elseya albagula*) - listed as Critically Endangered under the EPBC Act.
- Fitzroy River Turtle (*Rheodytes leukops*) – listed as Vulnerable under the EPBC Act.
- No listed aquatic flora species were identified in the protected matters search.

Matters of State Environmental Significance (MSES) - NC Act listed threatened species

- No listed aquatic flora or fauna were identified in the wildlife online search.

Matters of Local Environmental Significance (MLES) - Back on Track flora and fauna

- Ornate rainbowfish (*Rhadinocentrus ornatus*)
- Fitzroy River Turtle (*Rheodytes leukops*)
- White-throated Snapping Turtle (*Elseya albagula*)
- Spikerush species (*Eleocharis blakeana*)
- Salt Pipewort (*Eriocaulon carsonii*)
- Myriophyllum species (*Myriophyllum artesium*)

4.2. Rainfall

Monthly rainfall at the Bureau of Meteorology's Woleebee rain gauge (station 35081) located just outside the eastern boundary of the Project Area for the 12 months preceding sampling is presented in **Figure 2** along with mean monthly totals between 1912 and 2022.

The monthly rainfall totals were comparable to the long term means for most months in the 12 months preceding sampling. The exceptions were in November 2021 and, to a lesser extent, in February 2022. In these months the monthly rainfall was notably higher than the means. As a result, the November rainfall is more likely to have saturated the area and increased the surface water availability in the following months in comparison to a typical year.

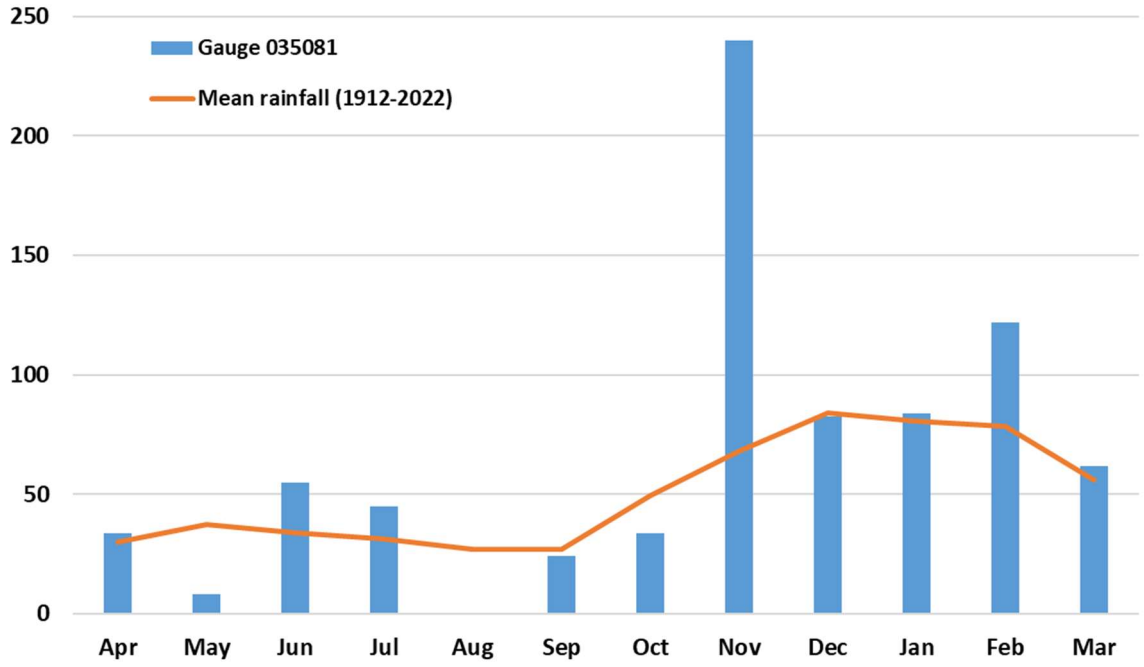


Figure 2: **Total monthly rainfall collected at Woleebee weather station in the 12 months preceding sampling**

4.3. *In situ* water quality

The *in situ* water quality parameters recorded for the 18 sites containing surface water in March 2022 are presented in **Table 7**.

Water temperatures ranged from 20.7 – 32.8^{o}C during the late wet sampling period. Variation in temperature between sites also appeared to largely relate to the time of day that temperature was recorded (i.e. morning values were lower than later in the day) and the degree of riparian shading (i.e. sites with moderate instream shading were generally slightly cooler).

Dissolved oxygen (DO) fluctuated between sites ranging from 9.1 – 200 % saturation. There are a large range of factors that can influence DO concentrations in water including temperature, decomposing organic matter, as well as aquatic macrophyte and algal growth.

The pH of the surface waters ranged from weakly to strongly alkaline (7.3 – 9.4). The pH values recorded along Wandoan Creek were fairly consistent (i.e. 7.7 – 8.1), however those recorded along Woleebee Creek were more variable variable (7.9 – 9.0) and were high (> 8.0) for three of the four sites sampled.

Electrical conductivity of the sites sampled ranged from 198 to 2,540 µs/cm. The highest conductivities measured were along Woleebee Creek itself (1,950-639 µs/cm) as well as two tributaries of Woleebee Creek (LH6 2,540 µs/cm and LAQ10 768 µs/cm). The elevated conductivities in Woleebee Creek decreased downstream, possibly due to inflows from tributaries or groundwater with lower conductivities diluting the water. The remaining tributaries were moderately to very fresh (198-534 µs/cm).

Turbidity was widely variable across all sites ranging from 11.9 to 620 NTU. Sites along Wandoan Creek were amongst the most turbid (i.e. 363 – 620 NTU), as well as site LAQ2 on Hellhole Creek. Sites along Woleebee Creek were relatively clear (22.8-35.5 NTU). Turbidty across the tributaries varied which appeared to be due to differences in substrates and timing since last flows.

Table 7: *In situ* water quality

	Date	Time	Temperature (ºC)	Dissolved oxygen (%)	Conductivity (µs/cm@25ºC)	pH	Turbidity (NTU)
LAQ2	19/03/2022	1220	28.2	32.1	331	7.3	307
LH6	17/03/2022	1515	32.8	200	2,540	9.4	36.3
LAQ7	16/03/2022	1530	28.5	112.1	1,970	7.9	22.8
LAQ10	17/03/2022	1115	23.8	47.6	768	8.1	295
LAQ8	18/03/2022	1200	31.4	133.4	1,510	8.6	25.3
LAQ6	18/03/2022	1545	27.9	108.3	198	7.8	16.3
LAQ5	17/03/2022	1630	31.4	100.6	241	8.3	477
LH11	16/03/2022	1715	26.2	114	248	8.9	17.2
LAQ11	21/03/2022	1230	26.5	162.3	288	8.9	32.6
TAQ4	21/03/2022	800	21.7	81.5	1,171	9.0	26
TAQ5	20/03/2022	1130	24.9	94.5	214	7.8	20.2
TAQ1	14/03/2022	1415	29.8	78	284	8.1	363
TAQ2	15/03/2022	810	20.7	55.7	243	7.7	476
LH9	21/03/2022	1000	25.3	53.2	231	7.9	87.4
TH1	14/03/2022	1245	23.2	68.6	273	8.1	312
TAQ3	15/03/2022	1035	23.1	50.3	249	8.0	620
TH2	16/03/2022	745	22.9	9.1	276	7.7	11.9
LAQ9	15/03/2022	1430	26.4	97.6	639	8.7	35.5

4.4. Aquatic habitat

Full descriptions of physical parameters and habitat for each site in March 2022 are provided in **Appendix A**. The availability and quality of aquatic habitat is strongly influenced by water permanency. Eighteen of the 26 sites held water in March 2022 while all other sites were dry.

Waterways across the Project Area are ephemeral, with most waterways anecdotally drying completely in dry periods and few waterways retaining refugial pools after extended dry periods (various landholders pers. comm.). At the time of sampling most waterways had already ceased surface flows with disconnected pools noted along the watercourses, although subsurface flow was apparent at sites along most creeks with sandy substrates. Along the with clay substrates the disconnection between pools was often separated by open grassland and poorly defined channels. The riparian vegetation density along the sites varied from moderate to non-existent, with most sites having a relatively low coverage of riparian vegetation.

The habitat bioassessment results are presented in **Figure 3**. Sites LH7, LH8 and TH3 were not included in the assessment as they were drainage features and sites TAQ5, TH4, LH12 are wetlands neither of which the habitat bioassessment approach is applicable to. Instream habitat, using habitat bioassessment, found more than half the sites to be in ‘fair’ condition across all sites sampled (12 of the 20 sites). The remaining eight sites were determined to be in ‘poor’ condition.

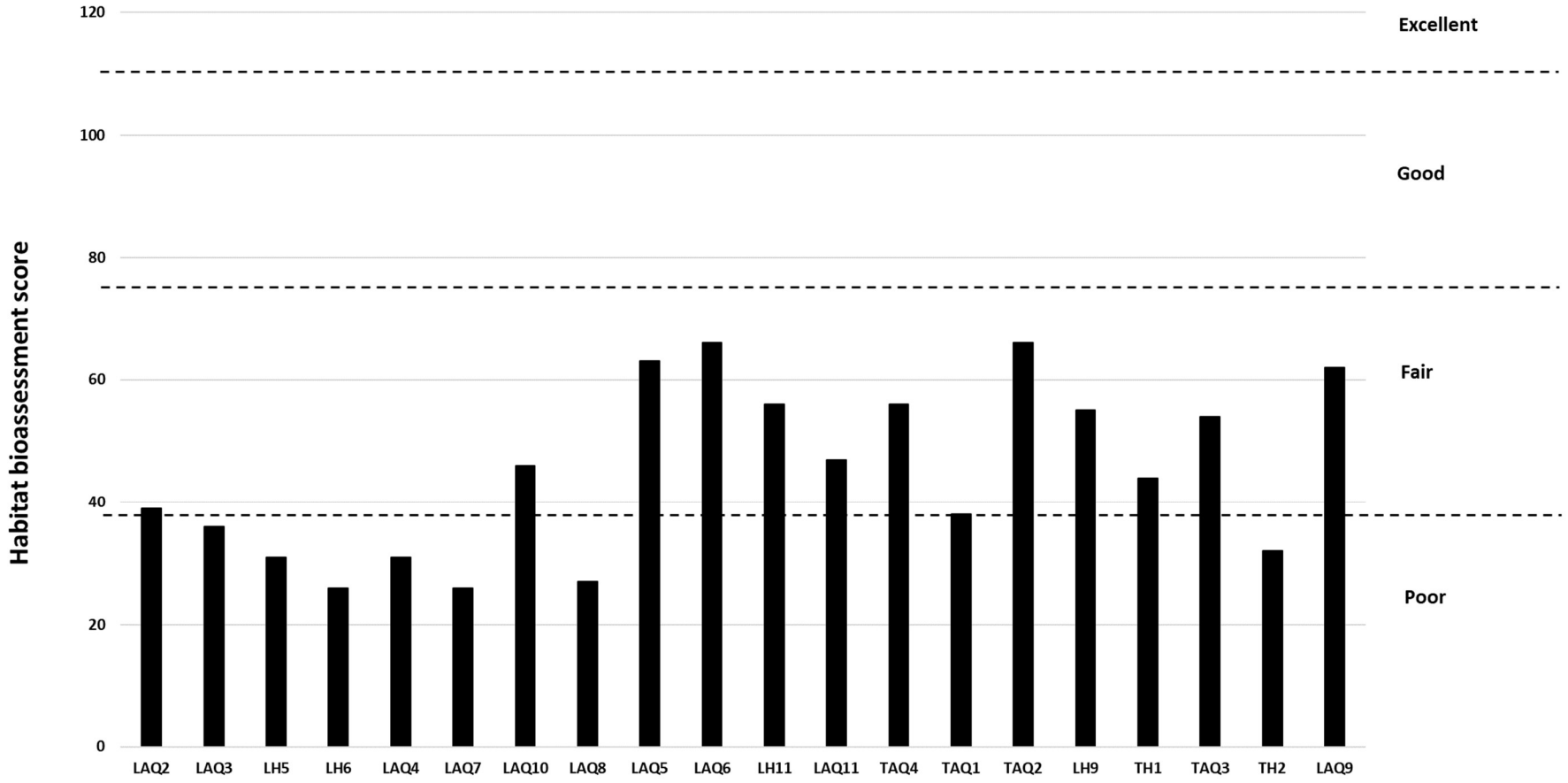


Figure 3: Habitat bioassessment scores for riverine sites

4.5. Aquatic flora

A total of four floating attached macrophyte species and 15 emergent macrophyte species were recorded across all sites (**Table 8**). Floating attached macrophytes were recorded at five sites. No submerged or floating attached macrophyte species were detected. The highest diversity of aquatic macrophytes was recorded at site TA5 which was located on a billabong adjacent to Wandoan Creek. Across all sites, aquatic macrophyte diversity was relatively poor with none being recorded at five sites and between one and three recorded at a further 21 sites. At these sites coverage was sparse and dominated by aquatic macrophytes which can tolerate the absence of water for extended periods of time.

Most macrophyte species recorded are widespread and abundant along eastern Australia and none are listed under state or federal legislation as threatened. No aquatic weeds of national significance (WONS) were recorded.

Table 10a: Aquatic macrophytes and relative coverage in March 2022

Growth form	Floating Attached				Emergent														
Scientific name	***Ludwigia peploides***	***Marsilea drummondii***	***Ottelia ovalifolia***	***Triglochin multifractum***	***Cyperus difformis***	***Cyperus difformis***	***Cyperus exaltatus***	***Cyperus gymnocaulos***	***Cyperus spp***	***Echinochloa colona***	***Eleocharis acuta***	***Eleocharis plana***	***Eleocharis spacelata***	***Juncus spp.***	***Leptochloa digitata***	***Monochoria cyanea***	***Persicaria spp.***	***Phragmites australis***	***Typha orientalis***
Common Name	**Water primrose**	**Nardoo**	**Swamp lily**	**Water-ribbon**	**Dirty dora**	**Sedge sp.**	**Giant sedge**	**Sedge sp.**	**Sedge sp.**	**Awnless barnyard grass**	**Spikerush**	**Flat spike-sedge**	**Sedge sp.**	**Common rush**	**Umbrella canegrass**	**Monochoria**	**Persicaria species**	**Common reed**	**Bullrush**
LAQ2						L				L							L		
LAQ3							L												
LH5															L				
LH6								L										S	
LAQ4															L				
LAQ7					L			L									L		
LAQ10															L				L
LAQ8					L			L		L							L	L	
LAQ6					L		L		L		S			L	S				
LAQ5	L						S	L			L			S	L		L		
LH11																			
LH7																			
LAQ11	S				L		L			L	L								

L – little, S – some, M – moderate, E - extensive

Table 10b: Aquatic macrophytes and relative coverage in March 2022 (continued)

Growth form	Floating Attached			Emergent															
Scientific name	***Ludwigia peploides***	***Marsilea drummondii***	***Ottelia ovalifolia***	***Triglochin multifractum***	***Cyperus difformis***	***Cyperus difformis***	***Cyperus exaltatus***	***Cyperus gymnocaulos***	***Cyperus spp***	***Echinochloa colona***	***Eleocharis acuta***	***Eleocharis plana***	***Eleocharis spacelata***	***Juncus* spp.**	***Leptochloa digitata***	***Monochoria cyanea***	***Persicaria spp.***	***Phragmites australis***	***Typha orientalis***
Common Name	**Water primrose**	**Nardoo**	**Swamp lily**	**Water-ribbon**	**Dirty dora**	**Sedge sp.**	**Giant sedge**	**Sedge sp.**	**Sedge sp.**	**Awnless barnyard grass**	**Spikerush**	**Flat spike-sedge**	**Sedge sp.**	**Common rush**	**Umbrella canegrass**	**Monochoria**	**Persicaria species**	**Common reed**	**Bullrush**
TAQ4					L			L						L					
LH8																			
TAQ5		S	M	S	L		S				S	S		L	S	L			
TAQ1					L									L					
TAQ2														L					
TH3																			
LH9						L	L			L	L			L	S				
TH4		S			L		S					S		L	S				
TH1					L									L					
TAQ3																			
TH2					L		L			L	L				L				
LH12			S		L		S						E		S	L			
LAQ9								L						L					

L – little, S – some, M – moderate, E - extensive

4.6. Aquatic macroinvertebrates

A total of 2,871 aquatic macroinvertebrate individuals from 52 taxa (mainly family level) were collected from the 14 sites that held sufficient water across the Project Area (**Appendix B**). In addition to the macroinvertebrates recorded, three groups of microcrustacea (Cladocera, Copepoda, Ostracoda) were recorded.

Macroinvertebrate relative abundance and taxonomic richness for all sites is presented in **Figure 4**. Abundance values were not absolute but in line with the live picking procedures of the AusRivAS methodology (DNRM 2001). Abundance varied across all sites and samples, ranging from 20 to 350 individuals. Abundances were typically higher for edge samples than bed samples, which is typical for ephemeral waterways. For 20 of the 26 samples collected abundances were less than 150 individuals. AusRivAS methods aim to collect approximately 200 individuals (without over collection of abundant taxa). This illustrates the overall low abundances of aquatic macroinvertebrates across the Project Area. The low abundances are likely to be due to the largely ephemeral nature of the waterways. Taxa diversity across all samples ranged from 6 to 28 (with a mean of 16.3 taxa across all samples) and was typically higher in edge samples than bed samples. These results are also typical for ephemeral streams in central Queensland.

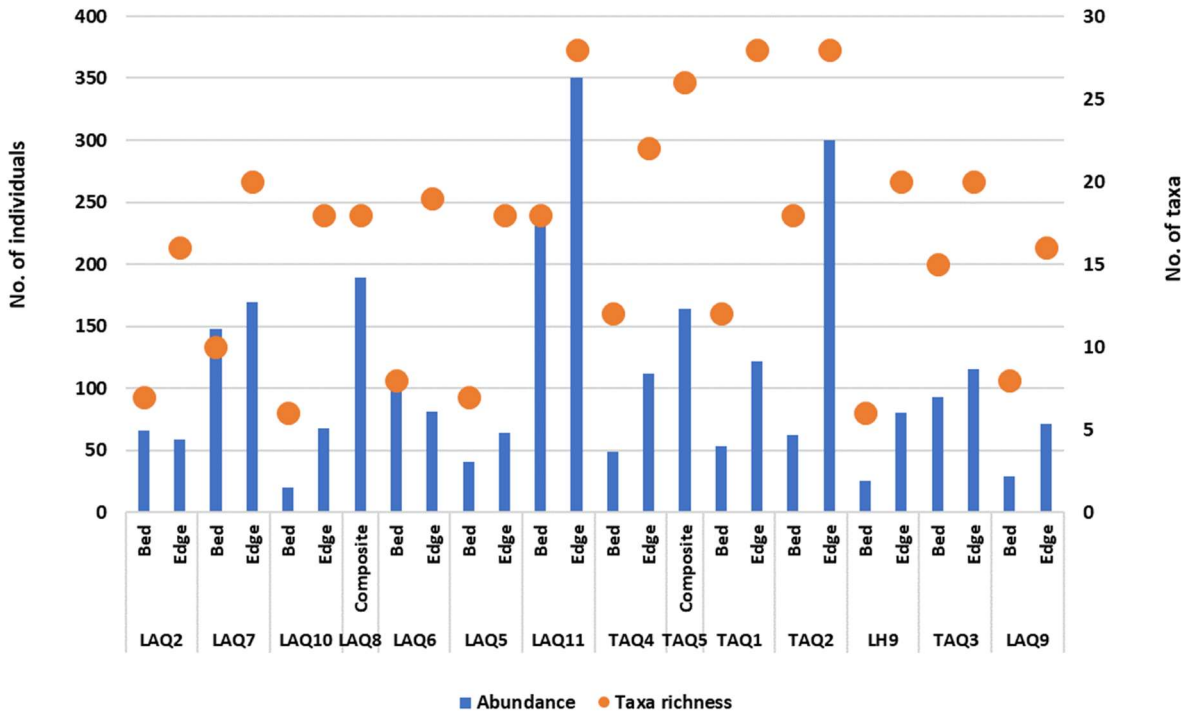


Figure 4: Macroinvertebrate abundance and taxa richness

Macroinvertebrate PET richness and Signal2 scores for all samples for both seasons is presented in **Figure 5**. Two families of ephemeroptera – mayfly (Baetidae and Caenidae) and three families of tricoptera – caddisfly and (Ecnomidae, Hydroptilidae and Leptoceridae) were recorded across all sites. PET richness ranged from 0 to four taxa across all samples, with a mean of 2.0 taxa. This represents a relatively low PET taxa diversity. Signal2 scores ranged from 2.53 to 3.82 across all samples with a mean of 3.27. These Signal2 scores are relatively low indicating the aquatic macroinvertebrate assemblages were relatively depauperate.

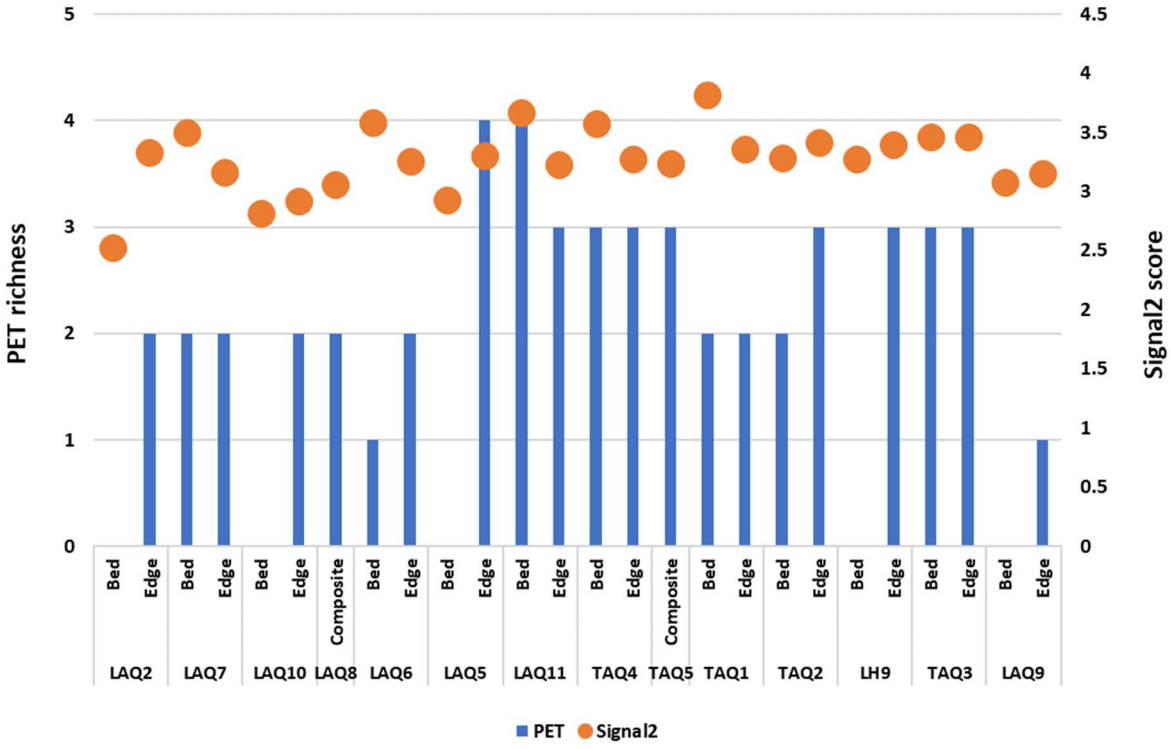


Figure 5: Macroinvertebrate PET richness and Signal2 scores

4.7. Macrocrustaceans

Macrocrustaceans were collected during both macroinvertebrate and fish sampling. Three families of macrocrustacean were detected across the Project Area; Atyidae (glass shrimp), Palaemonidae (freshwater prawns) and Paratacidae (freshwater crayfish) (**Table 9**). Palaemonidae and Paratacidae were widespread across the sites sampled, with Atyidae recorded at only one site (LAQ5 which may represent a more permanent waterhole). The Palaemonidae species was *Macrobrachium australiense*, a common and widespread species across eastern Australia. The Paratacidae species recorded was part of the *Cherax destructor* complex. The natural distribution of this species extends across the Murray-Darling and Lake Eyre Basins, with one population recorded in the Dawson River catchment.

Table 11: Macrocrustacean family and abundance recorded in March 2022

Family	Paratacidae	Palaemonidae	Atyidae
LAQ2	Y	Y	-
LAQ7	-	Y	-
LAQ10	Y	Y	-
LAQ6	-	Y	-
LAQ5	Y	Y	Y
LAQ11	Y	Y	-
TAQ4	Y	Y	-
TAQ5	Y	-	-
TAQ1	Y	Y	-
TAQ2	Y	Y	-
LH9	Y	Y	-
TAQ3	Y	Y	-
LAQ9	Y	Y	-

4.8. Fish

A total of 2,192 fish from eight species were collected from 14 sites that were sampled across the Project Area (**Table 10**). A further nine sites held water but in insufficient amounts to support fish. Eight of the species of fish recorded were native species, with the only introduced specie (tilapia – *Oreochromis mossambicus*) recorded as juveniles at a single site. Tilapia is a restricted noxious fish under the Biosecurity Act 2014.

The most abundant species was spangled perch (*Leiopotherapon unicolor*) which accounted for nearly half of all fish recorded was found at all sites sampled for fish. Other widespread species recorded were Agassiz's glassfish (*Ambassis agassizii*), Midgely's carp gudgeon (*Hypseleotris bucephalus*), eastern rainbowfish (*Melanotaenia splendida splendida*) and bony bream (*Nematalosa erebi*) which were recorded at 79%, 79%, 71% and 50% of sites sampled respectively. Single specimens of eel-tailed catfish (*Tandanus tandanus*) and sleepy cod (*Oxyeleotris lineolata*) were recorded in the March 2022 sampling.

All the native fish species recorded are relatively common and widespread across their distributions.

Table 10: Fish species and abundance recorded March 2022. Exotic species demoted in red.

Scientific name	*Ambassis agassizii*	*Hypseleotris bucephalus*	*Leiopotherapon unicolor*	*Melanotaenia splendida splendida*	*Nematalosa erebi*	*Tandanus tandanus*	*Oxyeleotris lineolata*	*Oreochromis mossambicus*	
Common name	Agassiz's Glassfish	Boofhead carp gudgeon	Spangled perch	Eastern rainbowfish	Bony bream	Eel-tailed catfish	Sleepy cod	Tilapia	**Totals**
LAQ2	-	-	73	-	-	-	-	-	**73**
LAQ7	-	-	3	-	-	-	-	-	**3**
LAQ10	19	97	52	30	-	-	-	-	**198**
LAQ8	-	-	20	-	-	-	-	-	**20**
LAQ6	8	46	61	9	-	-	-	-	**124**
LAQ5	11	13	118	13	12	-	-	-	**167**
LAQ11	7	6	13	10	1	-	-	11	**48**
TAQ4	14	8	126	23	5	4	2	-	**182**
TAQ5	10	170	111	-	-	-	-	-	**291**
TAQ1	21	63	87	76	5	-	-	-	**252**
TAQ2	3	52	66	117	5	-	-	-	**243**
LH9	1	42	90	20	36	-	-	-	**189**
TAQ3	7	26	108	38	-	-	-	-	**179**
LAQ9	15	10	94	81	19	4	-	-	**223**
Totals	**116**	**533**	**1,022**	**417**	**83**	**8**	**2**	**11**	**2,192**

4.9. Turtles and platypus

A single specimen of eastern long-necked turtle (*Chelodina longicollis*) was captured at site LAQ9. This species is capable of moving long distances overland between waterholes, particularly after heavy rainfall.

No platypus (*Ornithorhynchus anatinus*) were recorded in the March 2022 surveys. An assessment of potential habitat suitability was undertaken at each site that was sampled for fish (**Table 11**).

Table 11: Platypus habitat suitability assessment

Site	Rating	Comments
LAQ2	Poor	Poor habitat conditions. Shallow at the time of sampling. Water permanency is low at both the site and for some distance downstream.
LAQ7	Poor	Poor habitat conditions. Shallow at the time of sampling. Water permanency is low at both the site and for some distance downstream.
LAQ10	Average	Water depth and habitat suitable but not of high quality. This site was largely disconnected from other permanent / semi-permanent pools.
LAQ8	Poor	Poor habitat conditions. Shallow at the time of sampling. Water permanency is low at both the site and for some distance downstream.
LAQ6	Poor	Poor habitat conditions. Water permanency is low at both the site and for some distance downstream.
LAQ5	Average	Water depth and habitat suitable but not of high quality. This site was largely disconnected from other permanent / semi-permanent pools.
LAQ11	Poor	Poor habitat conditions. Water permanency is low at both the site and for some distance downstream.
TAQ4	Average	Water depth and habitat suitable. Unknown how many pools within proximity are semi-permanent.
TAQ5	Poor	A small billabong that is likely to dry out regularly. Good feeding habitat but disconnected from the main waterway and no suitable nesting banks.
TAQ1	Poor	Shallow and highly ephemeral.
TAQ2	Poor	Shallow through most of the reach with some deeper pools at the time of sampling and highly ephemeral.
LH9	Poor	Water depth suitable but habitat not of high quality. This site was largely disconnected from other permanent / semi-permanent pools.
TAQ3	Poor	Shallow through most of the reach with some deeper pools at the time of sampling and highly ephemeral.
LAQ9	Average	Water depth and habitat suitable. Unknown how many pools within proximity are semi-permanent.

Based on habitat characteristics alone three sites were assessed as being average for habitat suitability for platypus, while all remaining sites were considered poor habitat suitability for platypus. There were no available historical records for platypus within 50 kilometres of the Project Area, with single records approximately 50 kilometres away from the Project Area in both the Dawson River to the north and Condamine River to the south. Considering the generally poor habitat suitability and the distance from existing records it is considered unlikely that platypus would occur across the Project Area.

4.10. Frogs

A single specimen of eastern long-necked turtle (*Chelodina longicollis*) was captured at site LAQ9. This species is capable of moving long distances overland between waterholes, particularly after heavy rainfall.

Only three species of frog were recorded in the March 2022 sampling. The green-stripe frog (*Cyclorana albugutta*) was recorded at sites (LAQ5, LAQ11, TAQ1, TAQ2, TAQ3, TAQ4 and TAQ5). The specimen at site TAQ4 was observed being consumed by a keelback snake (*Tropidonophis mairii*). The broad-palmed rocket frog (*Litoria latopalmata*) was recorded only at site TAQ1. The broad-palmed frog and green-stripe frog are native species are common and widespread. Cane toads (*Rhinella marina*) were recorded at sites LAQ11 and TAQ1. Cane toads are an introduced pest species.

4.11. Likelihood of occurrence of EVNT species

An assessment of likelihood determined that all but three of the EVNT species identified in the desktop assessment are unlikely to occur in the Project Area (**Table 12** for EVNT and priority aquatic flora and **Table 13** EVNT and priority aquatic fauna). None of the EVNT or priority species were detected during the surveys, neither was suitable habitat identified.

Table 12: Likelihood of occurrence for EVNT and priority aquatic flora

Species	Status			Preferred habitat	Likelihood of occurrence
	EPBC	NC Act	Back on track (Fitzroy NRM region)		
Spikerush species *Eleocharis blakeana*	-	-	H	*Eleocharis blakeana* occurs on plains and low undulating country on poorly drained, clayey soils. It commonly grows in ephemeral wet habitats in melon hole country in brigalow and belah woodlands, and in small depressions along drainage lines in open forest and woodland communities.	Unlikely No suitable habitat or records with 50 km.
Salt Pipewort *Eriocaulon carsonii*	-	-	H	*Eriocaulon carsonii* is confined to the vents and tails of mound-spring wetlands.	Unlikely No suitable habitat or records with 50 km.
Myriophyllum species *Myriophyllum artesium*	-	-	H	*Myriophyllum artesium* is generally restricted to the wetlands associated with springs emanating from the Great Artesian Basin and associated basins.	Unlikely No suitable habitat or records with 50 km.

Table 14: Likelihood of occurrence for EVNT and priority aquatic fauna

Species	Status			Preferred habitat	Likelihood of occurrence
	EPBC	NC Act	Back on track (Fitzroy NRM region)		
White-throated Snapping Turtle *Elseya albagula*	CE	CE	H	The white-throated snapping turtle is recognised as a habitat specialist. Within the river system the white-throated snapping turtle prefers clear, flowing, well-oxygenated waters. The species prefers waterways with permanent flowing water, with undercut banks, large woody debris, deep pools (6 m deep) and shallow riffle zones.	Unlikely No suitable habitat and no records with 20 km.
Fitzroy River Turtle *Rheodytes leukops*	V	V	H	The Fitzroy River Turtle is found in rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity, and are often associated with Ribbonweed (*Vallisneria* sp.) beds.	Unlikely No suitable habitat and no records with 20 km.
Ornate rainbowfish *Rhadinocentrus ornatus*	-	-	H	Creeks, backwaters of larger streams, ponds and dune lakes, usually in sandy coastal lowland wallum and rainforest.	Unlikely No suitable habitat and no records with 20 km.

5. Conclusions

The key findings of the aquatic surveys across the Project Area are;

- The sampling was undertaken in a year of above average rainfall
- Historical vegetation clearing and current grazing practices appear to be the most significant stressors on aquatic ecosystems
- *In situ* water quality measured during sampling was highly variable across the Project Area due to; natural variation of the underlying geology, the ephemeral nature of the watercourses and historical/current land use activities
- All the watercourses present across the Project Area are ephemeral in nature, the smaller watercourses are unlikely to retain any water for extended periods and the larger watercourses are likely to be reduced to dispersed refugial pools
- Several wetlands were noted but these appeared to be partially modified for stock watering
- Aquatic macrophyte diversity and coverage was relatively low at all but a small number of wetland sites. Emergent macrophytes species dominated the diversity of species
- Aquatic macroinvertebrates had relatively low abundance, diversity, PET scores and Singnal2 scores reflective of the ephemeral nature of the watercourses and current stressors
- Fish abundance and diversity was relatively low and was represented by highly dispersive species typically found in ephemeral watercourses in central Queensland
- A single turtle specimen was recorded in Woleebee Creek (the largest watercourse that passes through the Project Area). This species (eastern long-necked turtle) is known to be highly mobile and capable of moving overland and capable of utilising ephemeral watercourses
- The habitat suitability for platypus was poor at all but four sites which have no connectivity within 50 kilometres to previous records of platypus
- All of the EVNT flora and fauna species identified in the desktop assessment were considered unlikely to occur within (or within proximity to) the Project Area.

6. References

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Appendix A – Site Profiles March 2022

LAQ2 Hellhole Creek 19/3/2022		**Co-ordinates (UTM 55J) E 786148 S 7083942**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	4.0 m	Run	-
Bankfull stream width	35 m	Shallow pool (<1m)	80 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.5 m	Dry	20 %
Mean wetted width	5.0		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	22 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	little
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	10 %	Bank overhang veg	-
Grass	75 %	Trailing bank veg	some
Shrubs	5 %	Blanketing silt	some
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	40 %	Bank undercuts	-
Canopy cover	5 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	28.2°C	Bedrock	-
Conductivity	331 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	32 %	Cobble (64-256 mm)	-
pH	7.3	Pebble (4-64 mm)	-
Turbidity	307 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	60%
		Silt/clay (<0.05 mm)	35 %
Comments: Road crossing recently damaged by flooding, closed to road traffic. Large amounts of concrete and debris immediately below crossing. Extensive bank erosion downstream.			

LAQ3 Hellhole Creek 20/3/2022		**Co-ordinates (UTM 55J) E 783755 S 7085063**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	2.0 m	Run	-
Bankfull stream width	25 m	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	20 m	Periphyton	-
Riparian width (left bank)	20 m	Filamentous algae	-
Riparian width (right bank)	20 m	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	-
Grass	95 %	Trailing bank veg	-
Shrubs	-	Blanketing silt	-
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	80 %	Bank undercuts	-
Canopy cover	40 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	1 %
pH	-	Pebble (4-64 mm)	4 %
Turbidity	-	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	90 %
		Silt/clay (<0.05 mm)	-
Comments: Dry site, unlikely to hold water for extended periods immediately following heavy rainfall.			

LH5 Unnamed creek 17/3/2022		**Co-ordinates (UTM 56J) E 786429 S 7087531**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	2.0 m	Run	-
Bankfull stream width	40 m	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	18 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	-
Grass	80 %	Trailing bank veg	-
Shrubs	15 %	Blanketing silt	-
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	5 %	Bank undercuts	-
Canopy cover	5 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	-
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	95 %
		Silt/clay (<0.05 mm)	-
Comments: Dry site, unlikely to hold water for extended periods immediately following heavy rainfall.			

LH6 Unnamed creek 17/3/2022		**Co-ordinates (UTM 55J) E 784257 S 7090324**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	2.0 m	Run	-
Bankfull stream width	20 m	Shallow pool (<1m)	1 %
Mean water depth	0.15 m	Deep pool (>1m)	-
Maximum water depth	0.3 m	Dry	99 %
Mean wetted width	1 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	4 m	Periphyton	little
Riparian width (left bank)	5 m	Filamentous algae	little
Riparian width (right bank)	1 m	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	little
Grass	90 %	Trailing bank veg	little
Shrubs	5 %	Blanketing silt	-
Trees < 10 m	1 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	-		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	-	Emergent	some
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	32.8°C	Bedrock	-
Conductivity	2,540 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	200 %	Cobble (64-256 mm)	-
pH	9.4	Pebble (4-64 mm)	-
Turbidity	36.3 NTU	Gravel (2-4 mm)	2 %
		Sand (0.05-2 mm)	90 %
		Silt/clay (<0.05 mm)	8 %
Comments: Largely dry site. Two small pools. Likely to retain subsurface (hyporheic flows) for some time after the cessation of heavy rainfall.			

LAQ4 Conloi Creek 17/3/2022		**Co-ordinates (UTM 55J) E 787875 S 7090806**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	1.5 m	Run	-
Bankfull stream width	35 m	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	20 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	10 %	Bank overhang veg	-
Grass	60 %	Trailing bank veg	-
Shrubs	30 %	Blanketing silt	-
Trees < 10 m	5 %	Substrate anoxia	-
Trees > 10 m	10 %	Bank undercuts	-
Canopy cover	5 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	80 %
		Silt/clay (<0.05 mm)	10 %
Comments: Dry site. May retain subsurface (hyporheic flows) for some time after the cessation of heavy rainfall.			

LAQ7 Woleebee Creek 16/3/2022		**Co-ordinates (UTM 55J) E 783693 S 7091442**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	4.0 m	Run	-
Bankfull stream width	40 m	Shallow pool (<1m)	40 %
Mean water depth	0.2 m	Deep pool (>1m)	-
Maximum water depth	0.4 m	Dry	60 %
Mean wetted width	3.5 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	8 m	Periphyton	extensive
Riparian width (left bank)	15 m	Filamentous algae	-
Riparian width (right bank)	-	Submerged macrophytes	-
Bare ground	30 %	Bank overhang veg	-
Grass	60 %	Trailing bank veg	-
Shrubs	10 %	Blanketing silt	-
Trees < 10 m	40 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	0 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	-	Emergent	little
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	28.8°C	Bedrock	-
Conductivity	1,970 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	112 %	Cobble (64-256 mm)	-
pH	7.9	Pebble (4-64 mm)	-
Turbidity	22.8 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	75 %
		Silt/clay (<0.05 mm)	20 %
Comments: Likely to retain subsurface (hyporheic flows) for some time after the cessation of heavy rainfall.			

LAQ10 Unnamed creek 17-18/3/2022		**Co-ordinates (UTM 55J) E 786328 S 7091373**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	3.0 m	Run	-
Bankfull stream width	30 m	Shallow pool (<1m)	50 %
Mean water depth	0.8 m	Deep pool (>1m)	50 %
Maximum water depth	> 1.5 m	Dry	-
Mean wetted width	12 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	22 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	little
Riparian width (right bank)	15 m	Submerged macrophytes	-
Bare ground	30 %	Bank overhang veg	little
Grass	60 %	Trailing bank veg	little
Shrubs	10 %	Blanketing silt	little
Trees < 10 m	10 %	Substrate anoxia	little
Trees > 10 m	30 %	Bank undercuts	little
Canopy cover	10 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	23.8°C	Bedrock	-
Conductivity	768 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	48 %	Cobble (64-256 mm)	-
pH	8.1	Pebble (4-64 mm)	-
Turbidity	295 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	55 %
		Silt/clay (<0.05 mm)	40 %
Comments: A large lagoon / billabong. Several hundred metres upstream of the site significant erosion noted, above which point there was no defined channel.			

LAQ8 Woleebee Creek 18/3/2022		**Co-ordinates (UTM 55J) E 784508 S 7092058**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	2.5 m	Run	-
Bankfull stream width	40 m	Shallow pool (<1m)	20 %
Mean water depth	0.1 m	Deep pool (>1m)	-
Maximum water depth	0.3 m	Dry	80 %
Mean wetted width	4 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	8 m	Periphyton	extensive
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	10 %	Bank overhang veg	-
Grass	80 %	Trailing bank veg	little
Shrubs	10 %	Blanketing silt	little
Trees < 10 m	5 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	0 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	some
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	31.4°C	Bedrock	-
Conductivity	1,510 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	133 %	Cobble (64-256 mm)	-
pH	8.6	Pebble (4-64 mm)	2 %
Turbidity	25.3 NTU	Gravel (2-4 mm)	3 %
		Sand (0.05-2 mm)	85 %
		Silt/clay (<0.05 mm)	10 %
Comments: Likely to retain subsurface (hyporheic flows) for some time after the cessation of heavy rainfall.			

LAQ6 Unnamed creek 18/3/2022		**Co-ordinates (UTM 55J) E 786897 S 7092375**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	0.8 m	Run	-
Bankfull stream width	10 m	Shallow pool (<1m)	40 %
Mean water depth	0.4 m	Deep pool (>1m)	-
Maximum water depth	0.8 m	Dry	60 %
Mean wetted width	6 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	18 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	little
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	-	Bank overhang veg	-
Grass	85 %	Trailing bank veg	extensive
Shrubs	15 %	Blanketing silt	-
Trees < 10 m	-	Substrate anoxia	-
Trees > 10 m	15 %	Bank undercuts	little
Canopy cover	10 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	moderate
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	27.9°C	Bedrock	-
Conductivity	198 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	108 %	Cobble (64-256 mm)	-
pH	7.8	Pebble (4-64 mm)	-
Turbidity	16.3 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %
Comments: Clay base likely to facilitate water retention for at least weeks following heavy rainfall.			

LAQ5 Unnamed billabong 17-18/3/2022		**Co-ordinates (UTM 55J) E 784944 S 7092562**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	60 m	Shallow pool (<1m)	60 %
Mean water depth	80 cm	Deep pool (>1m)	20 %
Maximum water depth	> 1.5 m	Dry	20 %
Mean wetted width	12 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	8 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	little
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	-	Bank overhang veg	-
Grass	95 %	Trailing bank veg	extensive
Shrubs	5 %	Blanketing silt	-
Trees < 10 m	5 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	little
Canopy cover	0 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	some
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	31.4°C	Bedrock	-
Conductivity	241 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	101 %	Cobble (64-256 mm)	2 %
pH	8.3	Pebble (4-64 mm)	3 %
Turbidity	477 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	50 %
		Silt/clay (<0.05 mm)	40 %
Comments: A large billabong off the main channel of Conloi Creek.			

LH11 Unnamed creek 16/3/2022		Co-ordinates (UTM 55J) E 783417 S 7094813	
 Upstream		 Downstream	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	1.5 m	Run	-
Bankfull stream width	8 m	Shallow pool (<1m)	10 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.8 m	Dry	90 %
Mean wetted width	3 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	25 m	Periphyton	some
Riparian width (left bank)	15 m	Filamentous algae	little
Riparian width (right bank)	15 m	Submerged macrophytes	-
Bare ground	-	Bank overhang veg	little
Grass	95 %	Trailing bank veg	some
Shrubs	5 %	Blanketing silt	-
Trees < 10 m	20 %	Substrate anoxia	some
Trees > 10 m	30 %	Bank undercuts	little
Canopy cover	25 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	26.2°C	Bedrock	-
Conductivity	248 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	114 %	Cobble (64-256 mm)	-
pH	8.9	Pebble (4-64 mm)	-
Turbidity	17.2 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	60 %
		Silt/clay (<0.05 mm)	40 %
Comments: Largely dry. A pipe passing under the road and into the pool below suggests potential for the pool present to a result of an external source (potentially bore water).			

LH7 Unnamed creek 18/3/2022		**Co-ordinates (UTM 55J) E 784519 S 7095038**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	-	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	1 m	Periphyton	-
Riparian width (left bank)	-	Filamentous algae	-
Riparian width (right bank)	-	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	-
Grass	95 %	Trailing bank veg	-
Shrubs	5 %	Blanketing silt	-
Trees < 10 m	-	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	0 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	-	Emergent	little
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	20 %
		Silt/clay (<0.05 mm)	80 %
Comments: Dry site. No defined channel but within the marked watercourse.			

LAQ11 Unnamed creek 21/3/2022		**Co-ordinates (UTM 55J) E 785327 S 7098360**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	1.8 m	Run	-
Bankfull stream width	6 m	Shallow pool (<1m)	80 %
Mean water depth	0.5 m	Deep pool (>1m)	-
Maximum water depth	0.8 m	Dry	20 %
Mean wetted width	1.2 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	3 m	Periphyton	moderate
Riparian width (left bank)	1 m	Filamentous algae	moderate
Riparian width (right bank)	1 m	Submerged macrophytes	-
Bare ground	10 %	Bank overhang veg	little
Grass	80 %	Trailing bank veg	some
Shrubs	10 %	Blanketing silt	-
Trees < 10 m	5 %	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	0 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	some
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	-	Floating attached	little
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	26.5°C	Bedrock	-
Conductivity	288 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	162 %	Cobble (64-256 mm)	-
pH	8.9	Pebble (4-64 mm)	-
Turbidity	32.6 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	2 %
		Silt/clay (<0.05 mm)	92 %
Comments: 7 juvenile tilapia (*Oreochromis mossambicus*) recorded. Clay base may allow water to be retained for an extended period of time following heavy rainfall (as evidenced in the presence of the floating attached water primrose (*Ludwigia peploides*).			

TAQ4 Woleebee Creek 20-21/3/2022		**Co-ordinates (UTM 55J) E 782643 S 7100015**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	4 m	Run	-
Bankfull stream width	28 m	Shallow pool (<1m)	80 %
Mean water depth	0.3 m	Deep pool (>1m)	10 %
Maximum water depth	1.5 m	Dry	10 %
Mean wetted width	10 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	20 m	Periphyton	little
Riparian width (left bank)	15 m	Filamentous algae	some
Riparian width (right bank)	15 m	Submerged macrophytes	-
Bare ground	15 %	Bank overhang veg	-
Grass	85 %	Trailing bank veg	moderate
Shrubs	-	Blanketing silt	-
Trees < 10 m	-	Substrate anoxia	-
Trees > 10 m	70 %	Bank undercuts	little
Canopy cover	30 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	some	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	21.7°C	Bedrock	-
Conductivity	1,171 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	82 %	Cobble (64-256 mm)	-
pH	9.0	Pebble (4-64 mm)	5 %
Turbidity	26.0 NTU	Gravel (2-4 mm)	10 %
		Sand (0.05-2 mm)	80 %
		Silt/clay (<0.05 mm)	5 %
Comments:			

LH8 Unnamed creek 21/3/2022		**Co-ordinates (UTM 56J) E 784135 S 7100197**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	-	Riffle	-
Bankfull bank height	-	Run	-
Bankfull stream width	-	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	-	Periphyton	-
Riparian width (left bank)	-	Filamentous algae	-
Riparian width (right bank)	-	Submerged macrophytes	-
Bare ground	90 %	Bank overhang veg	-
Grass	10 %	Trailing bank veg	-
Shrubs	-	Blanketing silt	-
Trees < 10 m	-	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	-		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	-	Emergent	-
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	30 %
		Silt/clay (<0.05 mm)	60 %
Comments: Dry site. No channel or sign of a waterway. Paddock has been heavily tilled.			

TAQ5 Unnamed billabong 20/3/2022	**Co-ordinates (UTM 55J) E 778770 S 7100820**
	
Upstream	**Downstream**

Channel characteristics		**Mesohabitat composition**	
Reach length	20 x 50 m	Riffle	-
Bankfull bank height	-	Run	-
Bankfull stream width	-	Shallow pool (<1m)	100 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.6 m	Dry	-
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	18 m	Periphyton	some
Riparian width (left bank)	-	Filamentous algae	moderate
Riparian width (right bank)	-	Submerged macrophytes	-
Bare ground	-	Bank overhang veg	-
Grass	100 %	Trailing bank veg	extensive
Shrubs	-	Blanketing silt	-
Trees < 10 m	-	Substrate anoxia	-
Trees > 10 m	40 %	Bank undercuts	-
Canopy cover	30 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	moderate
Sticks (<2cm diam)	some	Floating	-
Branches (<15cm diam)	little	Floating attached	extensive
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	24.9°C	Bedrock	-
Conductivity	214 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	94 %	Cobble (64-256 mm)	-
pH	7.8	Pebble (4-64 mm)	-
Turbidity	20.2 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %

Comments: Billabong on Wandoan Creek floodplain.

TAQ1 Wandoan Creek 14/3/2022		**Co-ordinates (UTM 55J) E 778781 S 7101064**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	5 m	Run	5 %
Bankfull stream width	18 m	Shallow pool (<1m)	80 %
Mean water depth	0.4 m	Deep pool (>1m)	10 %
Maximum water depth	1.2 m	Dry	5 %
Mean wetted width	4 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	20 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	20 m	Submerged macrophytes	-
Bare ground	20 %	Bank overhang veg	-
Grass	80 %	Trailing bank veg	moderate
Shrubs	-	Blanketing silt	some
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	50 %	Bank undercuts	little
Canopy cover	20 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	-	Emergent	little
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	29.8°C	Bedrock	-
Conductivity	284 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	78 %	Cobble (64-256 mm)	2 %
pH	8.1	Pebble (4-64 mm)	3 %
Turbidity	363 NTU	Gravel (2-4 mm)	10 %
		Sand (0.05-2 mm)	75 %
		Silt/clay (<0.05 mm)	10 %
Comments: Subsurface flows expressing in some reaches. Uncertain whether these were hyporheic or groundwater expressions.			

TAQ2 Wandoan Creek 15-16/3/2022		**Co-ordinates (UTM 55J) E 780904 S 7101380**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	5 m	Run	-
Bankfull stream width	18 m	Shallow pool (<1m)	80 %
Mean water depth	0.6 m	Deep pool (>1m)	20 %
Maximum water depth	1.3 m	Dry	-
Mean wetted width	3.5 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	20 m	Periphyton	-
Riparian width (left bank)	15 m	Filamentous algae	-
Riparian width (right bank)	15 m	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	little
Grass	90 %	Trailing bank veg	extensive
Shrubs	5 %	Blanketing silt	little
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	30 %	Bank undercuts	some
Canopy cover	10 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	some
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	20.7°C	Bedrock	-
Conductivity	243 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	56 %	Cobble (64-256 mm)	20 %
pH	7.7	Pebble (4-64 mm)	5 %
Turbidity	476 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	60 %
		Silt/clay (<0.05 mm)	10 %
Comments:			

TH3 Unnamed creek 21/3/2022	**Co-ordinates (UTM 55J) E 783131 S 7100821**
	
Upstream	**Downstream**

Channel characteristics		**Mesohabitat composition**	
Reach length	-	Riffle	-
Bankfull bank height	-	Run	-
Bankfull stream width	-	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	-	Periphyton	-
Riparian width (left bank)	-	Filamentous algae	-
Riparian width (right bank)	-	Submerged macrophytes	-
Bare ground	95 %	Bank overhang veg	-
Grass	5 %	Trailing bank veg	-
Shrubs	-	Blanketing silt	-
Trees < 10 m	-	Substrate anoxia	-
Trees > 10 m	-	Bank undercuts	-
Canopy cover	-		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	-	Emergent	-
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	-
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	10 %
		Silt/clay (<0.05 mm)	90 %

Comments: Dry site. No channel or sign of a waterway. Paddock has been heavily tilled.

LH9 Unnamed creek 21/3/2022		**Co-ordinates (UTM 55J) E 784091 S 7101291**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	1.0 m	Run	-
Bankfull stream width	25 m	Shallow pool (<1m)	65 %
Mean water depth	0.8 m	Deep pool (>1m)	30 %
Maximum water depth	1.5 m	Dry	5 %
Mean wetted width	12 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	22 m	Periphyton	-
Riparian width (left bank)	10 m	Filamentous algae	moderate
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	15 %	Bank overhang veg	-
Grass	75 %	Trailing bank veg	some
Shrubs	10 %	Blanketing silt	-
Trees < 10 m	5 %	Substrate anoxia	some
Trees > 10 m	20 %	Bank undercuts	little
Canopy cover	20 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	some
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	25.3°C	Bedrock	-
Conductivity	231 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	53 %	Cobble (64-256 mm)	-
pH	7.9	Pebble (4-64 mm)	-
Turbidity	87.4 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	5 %
		Silt/clay (<0.05 mm)	90 %
Comments: A string of billabong like pools along a lower order stream. Possibly topped up artificially for watering stock.			

TH1 Unnamed creek 14/3/2022		**Co-ordinates (UTM 55J) E 778682 S 7101830**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	2.0 m	Run	-
Bankfull stream width	8 m	Shallow pool (<1m)	30 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.5 m	Dry	70 %
Mean wetted width	1.5 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	10 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	30 %	Bank overhang veg	-
Grass	60 %	Trailing bank veg	little
Shrubs	5 %	Blanketing silt	little
Trees < 10 m	30 %	Substrate anoxia	-
Trees > 10 m	15 %	Bank undercuts	little
Canopy cover	25 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	some	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	23.2°C	Bedrock	-
Conductivity	273 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	69 %	Cobble (64-256 mm)	-
pH	8.1	Pebble (4-64 mm)	5 %
Turbidity	312 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	40 %
		Silt/clay (<0.05 mm)	40 %
Comments: A small number of pools remaining after recent rainfall. No signs of water persistence.			

TH4 Unnamed billabong 15/3/2022		Co-ordinates (UTM 55J) E 782119 S 7101726	
 Upstream		 Downstream	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	1.0 m	Run	-
Bankfull stream width	30 m	Shallow pool (<1m)	-
Mean water depth	-	Deep pool (>1m)	-
Maximum water depth	-	Dry	100 %
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	18 m	Periphyton	-
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	10 m	Submerged macrophytes	-
Bare ground	20 %	Bank overhang veg	-
Grass	60 %	Trailing bank veg	-
Shrubs	20 %	Blanketing silt	-
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	30 %	Bank undercuts	-
Canopy cover	20 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	little
Sticks (<2cm diam)	some	Floating	-
Branches (<15cm diam)	little	Floating attached	little
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %
Comments: Dry lagoon. Appears to be a channel that connects Wandoan Creek and Woleebee Creeks during floods rather than a waterway in its own right.			

TAQ3 Wandoan Creek 15-16/3/2022		**Co-ordinates (UTM 55J) E 781924 S 7102194**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	5 m	Run	-
Bankfull stream width	18 m	Shallow pool (<1m)	90 %
Mean water depth	0.4 m	Deep pool (>1m)	5 %
Maximum water depth	1.0 m	Dry	5 %
Mean wetted width	5 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	25 m	Periphyton	-
Riparian width (left bank)	30 m	Filamentous algae	-
Riparian width (right bank)	20 m	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	-
Grass	90 %	Trailing bank veg	some
Shrubs	5 %	Blanketing silt	some
Trees < 10 m	20 %	Substrate anoxia	-
Trees > 10 m	40 %	Bank undercuts	little
Canopy cover	10 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	23.1°C	Bedrock	-
Conductivity	249 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	50 %	Cobble (64-256 mm)	-
pH	8.0	Pebble (4-64 mm)	5 %
Turbidity	620 NTU	Gravel (2-4 mm)	15 %
		Sand (0.05-2 mm)	60 %
		Silt/clay (<0.05 mm)	20 %
Comments:			

TH2 Unnamed creek 16/3/2022		**Co-ordinates (UTM 55J) E 781497 S 7102372**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	50 m	Riffle	-
Bankfull bank height	0.5 m	Run	-
Bankfull stream width	25 m	Shallow pool (<1m)	10 %
Mean water depth	0.3 m	Deep pool (>1m)	-
Maximum water depth	0.5 m	Dry	90 %
Mean wetted width	3 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	8 m	Periphyton	little
Riparian width (left bank)	5 m	Filamentous algae	-
Riparian width (right bank)	5 m	Submerged macrophytes	-
Bare ground	5 %	Bank overhang veg	-
Grass	85 %	Trailing bank veg	moderate
Shrubs	10 %	Blanketing silt	little
Trees < 10 m	15 %	Substrate anoxia	some
Trees > 10 m	-	Bank undercuts	-
Canopy cover	10 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	little
Sticks (<2cm diam)	little	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	22.9°C	Bedrock	-
Conductivity	276 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	9 %	Cobble (64-256 mm)	-
pH	7.7	Pebble (4-64 mm)	-
Turbidity	11.9 NTU	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %
Comments: A single pool remaining sustained by a clay base.			

LH12 Unnamed billabong 16/3/2022		**Co-ordinates (UTM 55J) E 783236 S 7102518**	
 **Upstream**		 **Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	20 x 5 m	Riffle	-
Bankfull bank height	-	Run	-
Bankfull stream width	-	Shallow pool (<1m)	100 %
Mean water depth	0.2 m	Deep pool (>1m)	-
Maximum water depth	0.8 m	Dry	-
Mean wetted width	-		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	-	Periphyton	moderate
Riparian width (left bank)	-	Filamentous algae	moderate
Riparian width (right bank)	-	Submerged macrophytes	-
Bare ground	-	Bank overhang veg	-
Grass	100 %	Trailing bank veg	moderate
Shrubs	-	Blanketing silt	some
Trees < 10 m	-	Substrate anoxia	some
Trees > 10 m	-	Bank undercuts	-
Canopy cover	-		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	little	Emergent	extensive
Sticks (<2cm diam)	-	Floating	-
Branches (<15cm diam)	-	Floating attached	moderate
Logs (>15cm diam)	-	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	-	Bedrock	-
Conductivity	-	Boulder (>256 mm)	-
Dissolved oxygen	-	Cobble (64-256 mm)	-
pH	-	Pebble (4-64 mm)	-
Turbidity	-	Gravel (2-4 mm)	-
		Sand (0.05-2 mm)	-
		Silt/clay (<0.05 mm)	100 %
Comments: A small wetland formed on the floodplain adjacent to Woleebee Creek.			

LAQ9 Woleebee Creek 16-17/3/2022		**Co-ordinates (UTM 55J) E 783331 S 7102502**	
			
Upstream		**Downstream**	
Channel characteristics		**Mesohabitat composition**	
Reach length	100 m	Riffle	-
Bankfull bank height	7 m	Run	-
Bankfull stream width	40 m	Shallow pool (<1m)	60 %
Mean water depth	0.6 m	Deep pool (>1m)	40 %
Maximum water depth	> 1.5 m	Dry	-
Mean wetted width	6 m		
Riparian characteristics		**Microhabitat present**	
Riparian veg height (max)	20 m	Periphyton	some
Riparian width (left bank)	10 m	Filamentous algae	little
Riparian width (right bank)	20 m	Submerged macrophytes	-
Bare ground	15 %	Bank overhang veg	-
Grass	80 %	Trailing bank veg	some
Shrubs	5 %	Blanketing silt	little
Trees < 10 m	10 %	Substrate anoxia	-
Trees > 10 m	50 %	Bank undercuts	little
Canopy cover	20 %		
Instream wood		**Macrophyte coverage**	
Detritus (leaves etc)	some	Emergent	little
Sticks (<2cm diam)	some	Floating	-
Branches (<15cm diam)	little	Floating attached	-
Logs (>15cm diam)	little	Submerged	-
***In situ* water quality**		**Substrate composition**	
Temperature	26.4°C	Bedrock	-
Conductivity	639 µS/cm	Boulder (>256 mm)	-
Dissolved oxygen	98 %	Cobble (64-256 mm)	-
pH	8.7	Pebble (4-64 mm)	-
Turbidity	35.5 NTU	Gravel (2-4 mm)	5 %
		Sand (0.05-2 mm)	75 %
		Silt/clay (<0.05 mm)	20 %
Comments:			

Appendix B – Macroinvertebrate data March 2022

	Site	LH9	LH9	LAQ2	LAQ2	LAQ4	LAQ4	LAQ5	LAQ5	LAQ6	LAQ6	LAQ7	LAQ7	LAQ8
	Habitat	Bed	Edge	Bed	Edge	Bed	Edge	Bed	Edge	Bed	Edge	Bed	Edge	Composite
Microcrustacea														
Cladocera			1	24	50	3	34	16	6	1	4	150	45	250
Copepoda		6	33	27	60	60	145	29	15	35	2	550	17	100
Ostracoda		1	1		1							13		7
Turbellaria	Turbellaria													
	Temnocephalidae							2						
Nematoda	Nematoda										1			
Gastropoda	Ancylidae													
	Lymnaeidae													
	Physidae													
	Planorbidae										3			
Oligochaeta	Oligochaeta									2				
Araneae	Araneae		2											
Acari	Acari		10	1	1	1	8			18	17	5	7	5
Decapoda	Atyidae							1	1					
	Palaemonidae	3		13	2		6	14	8				2	
	Parastacidae													
Coleoptera	Carabidae	3	12	14	3	1	14	17	9	20	21	5	9	5
	Curculionidae													
	Dytiscidae		1	1	10	2	12			14	7		3	8
	Gyrinidae													
	Haliplidae													
	Hydraenidae	1	13		2		4				4		8	7
	Hydrochidae		1		2		2				7			
	Hydrophilidae								1		1		11	3
	Noteridae													
	Scirtidae													
	Spercheidae													
Diptera	Ceratopogonidae	1				1		4	7	3	1	6	3	2
	Chaoboridae			35								1		
	s-f Chironominae	1	8	1	5	16	11	2	16	37	3	46	38	26
	s-f Orthocladiinae		1		1	3	1					1		1
	s-f Tanypodinae	16	1		1	5	4			6	1	55	6	6
	Culicidae				4		5		1		1		13	19
	Tabanidae						1				1		1	
Ephemeroptera	Baetidae		1		4	1	16		7	1	1		26	41
	Caenidae		4			12	8		2		2	2	8	14
Hemiptera	Belostomatidae													
	Gerridae		10		4		3		1				4	
	Hydrometridae		4				1				1			
	Mesoveliidae		1					1	2					
	Micronectidae		1	1	2	4	6		1			25	11	19
	Nepidae		1		1		3							
	Notonectidae						1						1	7
	Ochteridae		1				1						1	
	Pleidae		3								5			1
	Veliidae		4		13		2		3		3		3	
Odonata	Coenagrionidae								1		1		3	4
	S.O. Anisoptera					2								2
	Aeshnidae													
	Gomphidae								1					
	Libellulidae						1		1				11	19
Trichoptera	Ecnomidae		1			1			1					
	Hydroptilidae													
	Leptoceridae				4		2		1			2		
	Abundance	**25**	**80**	**66**	**59**	**49**	**112**	**41**	**64**	**101**	**81**	**148**	**169**	**189**
	Taxonomic Richness	**6**	**20**	**7**	**16**	**12**	**22**	**7**	**18**	**8**	**19**	**10**	**20**	**18**
	PET Richness	**0**	**3**	**0**	**2**	**3**	**3**	**0**	**4**	**1**	**2**	**2**	**2**	**2**
	Signal2	**3.27**	**3.40**	**2.53**	**3.33**	**3.57**	**3.28**	**2.93**	**3.30**	**3.58**	**3.26**	**3.50**	**3.16**	**3.06**

	Site	LAQ9	LAQ9	LAQ11	LAQ11	LAQ10	LAQ10	TAQ5	TAQ1	TAQ1	TAQ2	TAQ2	TAQ3	TAQ3
	Habitat	Bed	Edge	Bed	Edge	Bed	Edge	Composite	Bed	Edge	Bed	Edge	Bed	Edge
Microcrustacea														
Cladocera				41	10	50	110	22	1	5	17	21		11
Copepoda		22	4	100	6	50	105	10	25	28	95	39	5	34
Ostracoda				2		1	5	3		1		7		1
Turbellaria	Turbellaria							1						
	Temnocephalidae										2		16	
Nematoda	Nematoda			1	1		1	2		2	1			
Gastropoda	Ancylidae				1							1		1
	Lymnaeidae				2					1				
	Physidae											3		
	Planorbidae											1		
Oligochaeta	Oligochaeta			3	4			6		1				
Araneae	Araneae													
Acari	Acari	2	6	68	86		1	16	14	18	5	91	2	16
Decapoda	Atyidae													
	Palaemonidae		5	2	1	7	6		2	1	2		3	
	Parastacidae									1			1	
Coleoptera	Carabidae	2	11	74	95	7	8	25	16	24	10	96	22	17
	Curculionidae							1						
	Dytiscidae		12	15	8			13	1	5	10	9	10	11
	Gyrinidae												1	
	Haliplidae							1						
	Hydraenidae	2	1		5		1	6		3	2	7		7
	Hydrochidae		2		1		1	3		2		3		2
	Hydrophilidae			1	1			10		3		2		2
	Noteridae									2				
	Scirtidae											1		
	Spercheidae											1		
Diptera	Ceratopogonidae	3	1	5	15	1		7	4	2	2	5		1
	Chaoboridae								2	1	6			
	s-f Chironominae	8	2	11	15	3	12	15	1	16	10	16	2	5
	s-f Orthocladiinae		1	2	1					2	1	1		
	s-f Tanypodinae	2		30	9	1		17	6	8	1	5	2	2
	Culicidae		11		14		3	1		1		1	1	3
	Tabanidae						4				1	2		
Ephemeroptera	Baetidae		4	11	14		5	6	2		2	11		6
	Caenidae			6	4			12	3	6	3	3	23	9
Hemiptera	Belostomatidae							2						
	Gerridae		5		2		5	1		7	1	6		1
	Hydrometridae		1		4		1			1		2		
	Mesoveliidae				8		1	2						
	Micronectidae	9	1	5	1	1	7	3	1	1	1	3	5	9
	Nepidae				1		1			1		2	1	2
	Notonectidae	1								1		1		2
	Ochteridae											1		
	Pleidae				17		1	10						
	Veliidae		7		13		9			1	2	17		10
Odonata	Coenagrionidae			1	17			1		3		6		2
	S.O. Anisoptera			1										
	Aeshnidae				6									
	Gomphidae		1					1						
	Libellulidae							1	1	4				
Trichoptera	Ecnomidae												2	
	Hydroptilidae			1										
	Leptoceridae			3	4		1	1		4		3	2	7
	Abundance	**29**	**71**	**240**	**350**	**20**	**68**	**164**	**53**	**122**	**62**	**300**	**93**	**115**
	Taxonomic Richness	**8**	**16**	**18**	**28**	**6**	**18**	**26**	**12**	**28**	**18**	**28**	**15**	**20**
	PET Richness	**0**	**1**	**4**	**3**	**0**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**3**
	Signal2	**3.08**	**3.16**	**3.67**	**3.23**	**2.82**	**2.92**	**3.24**	**3.82**	**3.36**	**3.29**	**3.42**	**3.47**	**3.47**

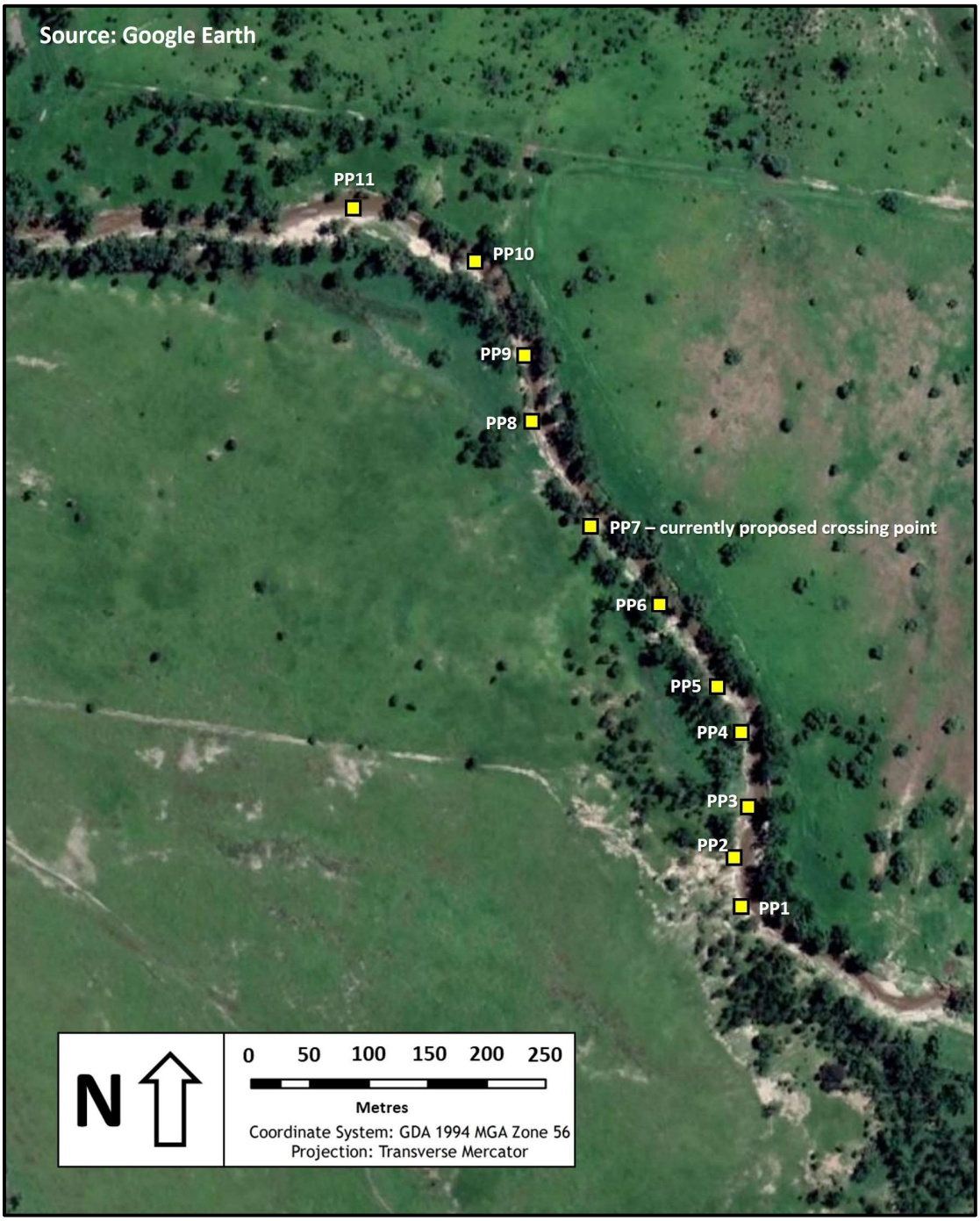
Appendix C – Fish and turtle sampling effort

Site number	Method	Conductivity (µS/cm)	Time start	Time end	Effort time (minutes)	Electrofishing on-time (seconds)	Volts	% duty cycle	Frequency (Hz)
LAQ2	BPE	331	1250	1310	20	558	250	20	100
LAQ7	BPE	1,970	1610	1615	5	60	100	20	100
LAQ10	BPE	768	1145	1215	30	614	150	20	100
	FN / CT		1300	1030	1170				
LAQ8	VO	1,510	1202	1215					
LAQ6	BPE	198	1600	1610	10	423	300	20	100
LAQ5	BPE	241	810	900	50	1168	300	20	100
	FN / CT		1430	740	850				
LAQ11	BPE	288	1255	1305	10	408	250	20	100
TAQ4	BPE	1,171	815	845	30	628	150	20	100
	FN / CT		1630	800	930				
TAQ5	BPE	214	1150	1220	30	684	350	20	100
TAQ1	BPE	284	1430	1525	55	1198	300	20	100
TAQ2	BPE	243	815	905	50	1241	300	20	100
	FN		1630	830	960				
LH9	BPE	231	1020	1050	30	721	300	20	100
TAQ3	BPE	249	1120	1215	55	1247	300	20	100
	FN		1600	730	930				
LAQ9	BPE	639	1030	1050	20	660	200	20	100
	FN / CT		1600	945	1065				

BPE – backpack electrofisher, FN – fyke net, VO – visual observations, CT – cathedral traps

Appendix D – Woleebee Creek Crossing

A site inspection was undertaken at eleven sites at the proposed pipeline crossing point over Woleebee Creek as well as upstream and downstream (figure below) to provide any recommendations to inform the location least likely to impact on aquatic ecosystems. At each site photographs were taken, and notes taken on the bank forma and stability, existing root protection provided within the riparian zone and channel width (table below). It is our contention that the existing proposed site (PP7) would likely impact on bank stability the least (thus impacts to aquatic ecosystems) of the eleven sites inspected. Senex have subsequently committed to utilise horizontal directional drilling to cross the Creek in this area so that impacts are avoided.


Source: Google Earth
PP11
PP10
PP9
PP8
PP7 – currently proposed crossing point
PP6
PP5
PP4
PP3
PP2
PP1
N
0 50 100 150 200 250
Metres
Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator

Upstream	Downstream	Notes
PP1	Co-ordinates (UTM 55J) E 782967 S 7096740	
		Bend, likely unstable. Some existing bank erosion.
PP2	Co-ordinates (UTM 55J) E 782962 S 7096776	
		Bend, likely unstable. Some existing bank erosion.
PP3	Co-ordinates (UTM 55J) E 782970 S 7096810	
		Straight, better channel gradient, adjacent floodplain. Some existing bank erosion.
PP4	Co-ordinates (UTM 55J) E 782972 S 7096859	
		Bend, likely unstable. Some existing bank erosion.
PP5	Co-ordinates (UTM 55J) E 782954 S 7096892	
		Bend, likely unstable. Some existing bank erosion.

Upstream	Downstream	Notes
PP6	Co-ordinates (UTM 55J) E 782915 S 7096960	
		Straight, good root protection in many areas of the banks.
PP7	Co-ordinates (UTM 55J) E 782862 S 7097020	
		Straight, good tree root protection in many areas of banks, thinner floodplain, approximately 20 m gap between existing large trees.
PP8	Co-ordinates (UTM 55J) E 782822 S 7097095	
		Bend, likely unstable. Some existing bank erosion.
PP9	Co-ordinates (UTM 55J) E 782815 S 7097144	
		Bend, likely unstable. Some existing bank erosion.
PP10	Co-ordinates (UTM 55J) E 782778 S 7097216	
		Bend, likely unstable. Some existing bank erosion.
PP11	Co-ordinates (UTM 55J) E 782696 S 7097255	
		Bend, likely unstable. Some existing bank erosion.

Appendix E – EPBC Protected Matters Report

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: 15-Aug-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	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	31
Listed Migratory Species:	11

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:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	12
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Banrock station wetland complex	1200 - 1300km upstream from Ramsar site
Narran lake nature reserve	400 - 500km upstream from Ramsar site
Riverland	1100 - 1200km upstream from Ramsar site
The coorong, and lakes alexandrina and albert wetland	1400 - 1500km upstream from Ramsar site

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
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within 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

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
MAMMAL		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area
Petaurus australis australis		
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within 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 likely to occur within area
PLANT		
Acacia curranii		
Curly-bark Wattle [3908]	Vulnerable	Species or species habitat known to occur within area
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Cadellia pentastylis		
Ooline [9828]	Vulnerable	Species or species habitat known to occur within area
Calytrix gurulmundensis		
[24241]	Vulnerable	Species or species habitat known to occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Homopholis belsonii		
Belson's Panic [2406]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Vincetoxicum forsteri listed as Tylophora linearis [92384]	Endangered	Species or species habitat may occur within area
Xerothamnella herbacea [4146]	Endangered	Species or species habitat may occur within area
REPTILE		
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat likely to occur within area
SNAIL		
Adclarkia cameroni Brigalow Woodland Snail [83886]	Endangered	Species or species habitat likely to occur within area
Adclarkia dulacca Dulacca Woodland Snail [83885]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Scientific Name	Threatened Category	Presence Text
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area overfly marine 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

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Stones Country	Resources Reserve	QLD

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Construct and operate 447km high pressure gas transmission pipeline	2009/4976	Controlled Action	Post-Approval
Development of Existing Coal Seam Gas Fields	2008/4398	Controlled Action	Post-Approval
Expansion of Coal Seam Gas Fields	2009/4974	Controlled Action	Post-Approval
Queensland Curtis LNG Project - Pipeline Network	2008/4399	Controlled Action	Post-Approval
Reedy Creek to Glebe Weir Pipeline Project	2011/6181	Controlled Action	Post-Approval
Santos GLNG Gas Field Development Project, QLD	2012/6615	Controlled Action	Post-Approval
Wandoan Coal Mine and Infrastructure Project	2008/4284	Controlled Action	Post-Approval
Wandoan Coal Project - Coal Seam Methane Water Supply South	2008/4287	Controlled Action	Post-Approval
Not controlled action			
High Voltage Transmission line Development	2007/3230	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Project Atlas CSG Project, between Wollumbilla and Wandoan, Qld	2018/8329	Not Controlled Action	Completed
Referral decision			
Development of an underground longwall coal mine	2011/6129	Referral Decision	Completed

Bioregional Assessments		
SubRegion	BioRegion	Website
Maranoa-Balonne-Condamine	Northern Inland Catchments	BA website

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix F – Wildnet search

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: -26.2765
Longitude: 149.8568
Distance: 20
Email: tim@freshwaterecology.com.au
Date submitted: Monday 15 Aug 2022 15:46:40
Date extracted: Monday 15 Aug 2022 15:50:01

The number of records retrieved = 844

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			20
animals	amphibians	Hylidae	*Cyclorana alboguttata*	greenstripe frog		C		8
animals	amphibians	Hylidae	*Cyclorana brevipes*	superb collared frog		C		3
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		4
animals	amphibians	Hylidae	*Cyclorana sp.*			C		1
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		22
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		2
animals	amphibians	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog		C		11
animals	amphibians	Hylidae	*Litoria peronii*	emerald spotted treefrog		C		9
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		5
animals	amphibians	Limnodynastidae	*Limnodynastes fletcheri*	barking frog		C		2
animals	amphibians	Limnodynastidae	*Limnodynastes salmini*	salmon striped frog		C		9
animals	amphibians	Limnodynastidae	*Limnodynastes sp.*			C		1
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		21
animals	amphibians	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk		C		4
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		14
animals	amphibians	Myobatrachidae	*Uperoleia rugosa*	chubby gungan		C		4
animals	birds	Acanthizidae	*Acanthiza apicalis*	inland thornbill		C		10
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		8
animals	birds	Acanthizidae	*Acanthiza lineata*	striated thornbill		C		2
animals	birds	Acanthizidae	*Acanthiza nana*	yellow thornbill		C		12
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		3
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		7
animals	birds	Acanthizidae	*Acanthiza uropygialis*	chestnut-rumped thornbill		C		2
animals	birds	Acanthizidae	*Gerygone fusca*	western gerygone		C		3
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		20
animals	birds	Acanthizidae	*Pyrrholaemus sagittatus*	speckled warbler		C		3
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		49
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		19
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		1
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		1/1
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		2
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		2
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		1
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		C		4
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		14
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		8
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		11
animals	birds	Anatidae	*Aythya australis*	hardhead		C		5
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		6
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		2
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		1
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		2
animals	birds	Anatidae	*Malacorhynchus membranaceus*	pink-eared duck		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		9
animals	birds	Apodidae	*Apus pacificus*	fork-tailed swift		SL		4
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		V	V	2
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		4
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		2
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		5
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		4
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		2
animals	birds	Artamidae	*Artamus cyanopterus*	dusky woodswallow		C		2
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		11
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		3
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		3
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		40
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		65
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		46
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		40
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		47/1
animals	birds	Cacatuidae	*Calyptorhynchus funereus*	yellow-tailed black-cockatoo		C		1
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	3
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		52
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		21
animals	birds	Campephagidae	*Coracina maxima*	ground cuckoo-shrike		C		3
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		23
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		2
animals	birds	Campephagidae	*Edolisoma tenuirostre*	common cicadabird		C		2
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		1
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		1
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		4
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		4
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		3
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		4
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		5
animals	birds	Columbidae	*Columba livia*	rock dove	Y			1
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		16
animals	birds	Columbidae	*Geopelia placida*	peaceful dove		C		8
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	1
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		23
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		7
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		6
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		6
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		33
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		23
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		64
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		8
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cuculidae	*Chalcites osculans*	black-eared cuckoo		C		1
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		2
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		1
animals	birds	Estrildidae	*Neochmia modesta*	plum-headed finch		C		5
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		16
animals	birds	Eurostopodidae	*Eurostopodus mystacalis*	white-throated nightjar		C		5
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		6
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		11
animals	birds	Falconidae	*Falco peregrinus*	peregrine falcon		C		1
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		36
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		1
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		2
animals	birds	Hirundinidae	*Cheramoeca leucosterna*	white-backed swallow		C		1
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		4
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		5
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		1
animals	birds	Maluridae	*Malurus cyaneus*	superb fairy-wren		C		13
animals	birds	Maluridae	*Malurus lamberti sensu lato*	variegated fairy-wren		C		3
animals	birds	Maluridae	*Malurus leucopterus*	white-winged fairy-wren		C		1
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		11
animals	birds	Megaluridae	*Cincloramphus timoriensis*	tawny grassbird		C		1
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		7
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		9
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		12
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		14
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		11
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		7
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		90
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		8
animals	birds	Meliphagidae	*Melithreptus brevirostris*	brown-headed honeyeater		C		4
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		1
animals	birds	Meliphagidae	*Nesoptilotis leucotis*	white-eared honeyeater		C		18
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		18
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		27
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		36
animals	birds	Meliphagidae	*Ptilotula penicillata*	white-plumed honeyeater		C		1
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		10
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		36
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		5
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		8
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		2
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		28
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		2
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		11
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		2
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		6

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		14
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		2
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		26
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		9
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		56
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			3
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		10
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		5
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		1
animals	birds	Petroicidae	*Petroica rosea*	rose robin		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		3
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		4
animals	birds	Phasianidae	*Synoicus ypsilophorus*	brown quail		C		1
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		5
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		6
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		21
animals	birds	Psittacidae	*Alisterus scapularis*	Australian king-parrot		C		12
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		16
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		3
animals	birds	Psittacidae	*Northiella haematogaster*	blue bonnet		C		2
animals	birds	Psittacidae	*Parvipsitta pusilla*	little lorikeet		C		1
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		42
animals	birds	Psittacidae	*Psephotus haematonotus*	red-rumped parrot		C		10
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		22
animals	birds	Psittacidae	*Trichoglossus moluccanus*	rainbow lorikeet		C		22
animals	birds	Psophodidae	*Psophodes olivaceus*	eastern whipbird		C		1
animals	birds	Ptilonorhynchidae	*Chlamydera maculata*	spotted bowerbird		C		8
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		3
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		5
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		26
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		29
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		4
animals	birds	Strigidae	*Ninox connivens*	barking owl		C		1
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		1
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		3
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		1
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		5
animals	birds	Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail		C		1
animals	birds	Turnicidae	*Turnix sp.*			C		2
animals	birds	Turnicidae	*Turnix varius*	painted button-quail		C		2
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		5
animals	insects	Aeshnidae	*Anax papuensis*	Australian Emperor				4
animals	insects	Coenagrionidae	*Ischnura aurora*	aurora bluetail				1
animals	insects	Corduliidae	*Hemicordulia tau*	tau emerald				1
animals	insects	Hesperiidae	*Ocybadistes walkeri sothis*	green grass-dart				1

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animals	insects	Libellulidae	*Crocothemis nigrifrons*	black-headed skimmer				1
animals	insects	Libellulidae	*Diplacodes bipunctata*	wandering percher				3
animals	insects	Libellulidae	*Diplacodes haematodes*	scarlet percher				1
animals	insects	Libellulidae	*Orthetrum caledonicum*	blue skimmer				6
animals	insects	Libellulidae	*Pantala flavescens*	wandering glider				1
animals	insects	Libellulidae	*Rhyothemis graphiptera*	graphic flutterer				1
animals	insects	Libellulidae	*Tramea loewii*	common glider				1
animals	insects	Lindeniidae	*Ictinogomphus australis*	Australian tiger				1
animals	insects	Lycaenidae	*Nacaduba berenice berenice*	large purple line-blue				1
animals	insects	Lycaenidae	*Psychonotis caelius taygetus*	small green-banded blue				1
animals	insects	Lycaenidae	*Zizina otis labradus*	common grass-blue (Australian subspecies)				2
animals	insects	Nymphalidae	*Acraea andromacha andromacha*	glasswing				2
animals	insects	Nymphalidae	*Charaxes sempronius sempronius*	tailed emperor				2
animals	insects	Nymphalidae	*Danaus petilia*	lesser wanderer				5
animals	insects	Nymphalidae	*Danaus plexippus*	monarch	Y			1
animals	insects	Nymphalidae	*Euploea corinna*	common crow				8
animals	insects	Nymphalidae	*Hypocysta pseudirius*	grey ringlet				1
animals	insects	Nymphalidae	*Hypolimnas bolina nerina*	varied eggfly				3
animals	insects	Nymphalidae	*Junonia orithya albicincta*	blue argus				1
animals	insects	Nymphalidae	*Junonia villida villida*	meadow argus				5
animals	insects	Nymphalidae	*Melanitis leda bankia*	evening brown				1
animals	insects	Nymphalidae	*Tirumala hamata hamata*	blue tiger				4
animals	insects	Papilionidae	*Cressida cressida cressida*	clearwing swallowtail				1
animals	insects	Papilionidae	*Papilio aegeus*					5
animals	insects	Papilionidae	*Papilio aegeus aegeus*	orchard swallowtail (Australian subspecies)				3
animals	insects	Papilionidae	*Papilio anactus*	dainty swallowtail				2
animals	insects	Papilionidae	*Papilio demoleus sthenelus*	chequered swallowtail				4
animals	insects	Pieridae	*Belenois java teutonia*	caper white				5
animals	insects	Pieridae	*Catopsilia gorgophone gorgophone*	yellow migrant				1
animals	insects	Pieridae	*Catopsilia pomona*	lemon migrant				2
animals	insects	Pieridae	*Catopsilia pyranthe crokera*	white migrant				2
animals	insects	Pieridae	*Cepora perimale*					1
animals	insects	Pieridae	*Delias argenthona argenthona*	scarlet jezebel				1
animals	insects	Pieridae	*Delias nysa nysa*	yellow-spotted jezebel (Australian subspecies)				1
animals	insects	Pieridae	*Elodina parthia*	striated pearl-white				1
animals	insects	Pieridae	*Eurema hecabe*	large grass-yellow				2
animals	insects	Pieridae	*Eurema smilax*	small grass-yellow				3
animals	malacostracans	Parastacidae	*Cherax destructor*	common yabbie				1
animals	mammals	Acrobatidae	*Acrobates pygmaeus*	feathertail glider		C		1
animals	mammals	Bovidae	*Bos taurus*	European cattle	Y			1
animals	mammals	Bovidae	*Capra hircus*	goat	Y			1
animals	mammals	Canidae	*Canis familiaris*	dog	Y			2
animals	mammals	Canidae	*Canis familiaris (dingo)*	dingo				1

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animals	mammals	Canidae	*Canis sp.*		Y			2
animals	mammals	Canidae	*Vulpes vulpes*	red fox	Y			1
animals	mammals	Dasyuridae	*Sminthopsis murina*	common dunnart		C		1
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		9
animals	mammals	Equidae	*Equus caballus*	horse	Y			1
animals	mammals	Felidae	*Felis catus*	cat	Y			4
animals	mammals	Leporidae	*Lepus europaeus*	European brown hare	Y			4
animals	mammals	Leporidae	*Oryctolagus cuniculus*	rabbit	Y			6
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		30
animals	mammals	Macropodidae	*Notamacropus dorsalis*	black-striped wallaby		C		3
animals	mammals	Macropodidae	*Notamacropus parryi*	whiptail wallaby		C		2
animals	mammals	Macropodidae	*Notamacropus rufogriseus*	red-necked wallaby		C		16
animals	mammals	Macropodidae	*Osphranter robustus*	common wallaroo		C		7
animals	mammals	Macropodidae	*Wallabia bicolor*	swamp wallaby		C		9
animals	mammals	Molossidae	*Austronomus australis*	white-striped freetail bat		C		4
animals	mammals	Molossidae	*Mormopterus lumsdenae*	northern free-tailed bat		C		2
animals	mammals	Molossidae	*Mormopterus petersi*	inland free-tailed bat		C		8
animals	mammals	Molossidae	*Mormopterus ridei*	eastern free-tailed bat		C		1
animals	mammals	Molossidae	*Mormopterus sp.*			C		3
animals	mammals	Muridae	*Mus musculus*	house mouse	Y			13
animals	mammals	Muridae	*Pseudomys patrius*	eastern pebble-mound mouse		C		1
animals	mammals	Petauridae	*Petaurus australis australis*	yellow-bellied glider (southern subspecies)		V	V	12
animals	mammals	Petauridae	*Petaurus norfolcensis*	squirrel glider		C		3
animals	mammals	Petauridae	*Petaurus notatus*	Krefft's glider		C		3
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		32
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	3
animals	mammals	Potoroidae	*Aepyprymnus rufescens*	rufous bettong		C		7
animals	mammals	Pseudocheiridae	*Petauroides armillatus*	central greater glider		E	E	2
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		1
animals	mammals	Suidae	*Sus scrofa*	pig	Y			8
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		SL		7
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		10
animals	mammals	Vespertilionidae	*Chalinolobus picatus*	little pied bat		C		3
animals	mammals	Vespertilionidae	*Nyctophilus geoffroyi*	lesser long-eared bat		C		1
animals	mammals	Vespertilionidae	*Nyctophilus gouldi*	Gould's long-eared bat		C		6
animals	mammals	Vespertilionidae	*Nyctophilus sp.*			C		2
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		12
animals	mammals	Vespertilionidae	*Scotorepens sp.*			C		1
animals	mammals	Vespertilionidae	*Scotorepens sp. (Parnaby)*	central-eastern broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Vespadelus baverstocki*	inland forest bat		C		1
animals	mammals	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat		C		8
animals	mammals	Vespertilionidae	*Vespadelus vulturnus*	little forest bat		C		5
animals	ray-finned fishes	Ambassidae	*Ambassis agassizii*	Agassiz's glassfish				1
animals	ray-finned fishes	Eleotridae	*Hypseleotris species 1*	Midgley's carp gudgeon				1
animals	ray-finned fishes	Melanotaeniidae	*Melanotaenia splendida splendida*	eastern rainbowfish				1

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animals	ray-finned fishes	Plotosidae	*Tandanus tandanus*	freshwater catfish				1
animals	ray-finned fishes	Terapontidae	*Leiopotherapon unicolor*	spangled perch				1
animals	reptiles	Agamidae	*Amphibolurus muricatus*	jacky lizard		C		2
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		6
animals	reptiles	Boidae	*Antaresia maculosa*	spotted python		C		3
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		3
animals	reptiles	Carphodactylidae	*Underwoodisaurus milii*	thick-tailed gecko		C		3
animals	reptiles	Chelidae	*Chelodina longicollis*	eastern snake-necked turtle		C		2
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		3
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		2/1
animals	reptiles	Diplodactylidae	*Diplodactylus vittatus*	wood gecko		C		1
animals	reptiles	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko		C		4
animals	reptiles	Diplodactylidae	*Nebulifera robusta*	robust velvet gecko		C		4
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		13
animals	reptiles	Elapidae	*Brachyurophis australis*	coral snake		C		2/1
animals	reptiles	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake		C		4
animals	reptiles	Elapidae	*Cryptophis nigrescens*	eastern small-eyed snake		C		4
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whipsnake		C		5
animals	reptiles	Elapidae	*Furina diadema*	red-naped snake		C		1/1
animals	reptiles	Elapidae	*Hoplocephalus bitorquatus*	pale-headed snake		C		2/2
animals	reptiles	Elapidae	*Pseudechis australis*	king brown snake		C		1
animals	reptiles	Elapidae	*Pseudonaja textilis*	eastern brown snake		C		3
animals	reptiles	Elapidae	*Suta suta*	myall snake		C		1
animals	reptiles	Elapidae	*Vermicella annulata*	bandy-bandy		C		1
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		95/1
animals	reptiles	Gekkonidae	*Gehyra sp.*			C		1
animals	reptiles	Gekkonidae	*Gehyra versicolor*			C		9
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		47/2
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		1
animals	reptiles	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot		C		9
animals	reptiles	Scincidae	*Anomalopus leuckartii*	two-clawed worm-skink		C		1/1
animals	reptiles	Scincidae	*Carlia munda*	shaded-litter rainbow-skink		C		3
animals	reptiles	Scincidae	*Carlia pectoralis*	open-litter rainbow skink		C		6/1
animals	reptiles	Scincidae	*Carlia pectoralis sensu lato*			C		17
animals	reptiles	Scincidae	*Carlia schmeltzii*	robust rainbow-skink		C		2
animals	reptiles	Scincidae	*Carlia sp.*			C		3
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		4
animals	reptiles	Scincidae	*Cryptoblepharus australis*	inland snake-eyed skink		C		2
animals	reptiles	Scincidae	*Cryptoblepharus metallicus*	metallic snake-eyed skink		C		1
animals	reptiles	Scincidae	*Cryptoblepharus plagiocephalus sensu lato*			C		4
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		41
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		6
animals	reptiles	Scincidae	*Eremiascincus fasciolatus*	narrow-banded sand swimmer		C		1
animals	reptiles	Scincidae	*Lerista fragilis*	eastern mulch slider		C		27/1
animals	reptiles	Scincidae	*Lerista punctatovittata*	eastern robust slider		C		6

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animals	reptiles	Scincidae	*Lerista sp.*			C		2
animals	reptiles	Scincidae	*Lerista timida*	timid slider		C		3
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		23/2
animals	reptiles	Scincidae	*Menetia greyii*	common dwarf skink		C		3
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		2
animals	reptiles	Scincidae	*Pygmaeascincus timlowi*	dwarf litter-skink		C		3
animals	reptiles	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard		C		1
animals	reptiles	Typhlopidae	*Anilios proximus*	proximus blind snake		C		2/2
animals	reptiles	Varanidae	*Varanus gouldii*	sand monitor		C		6
animals	reptiles	Varanidae	*Varanus panoptes*	yellow-spotted monitor		C		2
animals	reptiles	Varanidae	*Varanus tristis*	black-tailed monitor		C		7
animals	reptiles	Varanidae	*Varanus varius*	lace monitor		C		9
animals	snails	Camaenidae	*Adclarkia cameroni*			V	E	1
animals	snails	Camaenidae	*Lynfergusonia mundubbera*					1
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending				50
fungi	lecanoromycetes	Caliciaceae	*Dirinaria batavica*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine berteriana*			C		2/2
fungi	lecanoromycetes	Caliciaceae	*Pyxine petricola*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine rugulosa*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Pyxine subcinerea*			C		2/2
fungi	lecanoromycetes	Collemataceae	*Collema rugosum*			C		1/1
fungi	lecanoromycetes	Lecanoraceae	*Lecanora helva*			C		2/2
fungi	lecanoromycetes	Lecanoraceae	*Lecanora novaehollandiae*			C		2/2
fungi	lecanoromycetes	Ochrolechiaceae	*Ochrolechia africana*			C		1/1
fungi	lecanoromycetes	Ochrolechiaceae	*Ochrolechia hawaiensis*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema subsumptum*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Punctelia subflava*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria pertusella*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria planaica*			C		1/1
fungi	lecanoromycetes	Pertusariaceae	*Pertusaria ternata*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Physcia nubila*			C		2/2
fungi	lecanoromycetes	Physciaceae	*Physcia undulata*			C		1/1
fungi	lecanoromycetes	Stereocaulaceae	*Lepraria*					1/1
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca flavorubescens*			C		2/2
fungi	lecanoromycetes	Teloschistaceae	*Caloplaca fraserensis*			C		1/1
plants	land plants	Acanthaceae	*Brunoniella australis*	blue trumpet		C		2
plants	land plants	Acanthaceae	*Dipteracanthus australasicus subsp. corynothecus*			C		1/1
plants	land plants	Acanthaceae	*Hypoestes floribunda var. floribunda*			C		1/1
plants	land plants	Acanthaceae	*Pseuderanthemum variabile*	pastel flower		C		1
plants	land plants	Acanthaceae	*Rostellularia adscendens*			C		1/1
plants	land plants	Alismataceae	*Echinodorus cordifolius*		Y			1/1
plants	land plants	Amaranthaceae	*Achyranthes aspera*			C		1/1
plants	land plants	Amaranthaceae	*Alternanthera denticulata var. denticulata*			C		1/1
plants	land plants	Amaranthaceae	*Alternanthera nana*	hairy joyweed		C		2
plants	land plants	Amaranthaceae	*Alternanthera pungens*	khaki weed	Y			2/1
plants	land plants	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		1

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plants	land plants	Amaranthaceae	*Gomphrena celosioides*	gomphrena weed	Y			1
plants	land plants	Amaranthaceae	*Nyssanthes erecta*			C		3/2
plants	land plants	Amaranthaceae	*Ptilotus semilanatus*			C		2/1
plants	land plants	Anacardiaceae	*Schinus terebinthifolius*		Y			1/1
plants	land plants	Apocynaceae	*Alstonia constricta*	bitterbark		C		8
plants	land plants	Apocynaceae	*Carissa ovata*	currantbush		C		6
plants	land plants	Apocynaceae	*Gomphocarpus*			C		1
plants	land plants	Apocynaceae	*Gomphocarpus physocarpus*	balloon cottonbush	Y			1
plants	land plants	Apocynaceae	*Leichhardtia micradenia*			C		3
plants	land plants	Apocynaceae	*Leichhardtia viridiflora subsp. viridiflora*			C		1
plants	land plants	Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo		C		3/1
plants	land plants	Apocynaceae	*Parsonsia rotata*	veinless silkpod		C		4/2
plants	land plants	Araliaceae	*Astrotricha longifolia*	star hair bush		C		1
plants	land plants	Araliaceae	*Hydrocotyle acutiloba*			C		3/3
plants	land plants	Asteraceae	*Apowollastonia spilanthoides*			C		1/1
plants	land plants	Asteraceae	*Bidens biternata*		Y			1/1
plants	land plants	Asteraceae	*Brachyscome dalbyensis*			C		1/1
plants	land plants	Asteraceae	*Brachyscome microcarpa subsp. darlingensis*			C		2/2
plants	land plants	Asteraceae	*Brachyscome multifida*			C		1/1
plants	land plants	Asteraceae	*Calyptocarpus vialis*	creeping cinderella weed	Y			1
plants	land plants	Asteraceae	*Camptacra barbata*			C		1/1
plants	land plants	Asteraceae	*Cassinia laevis*			C		1
plants	land plants	Asteraceae	*Centaurea solstitialis*	St. Barnaby's thistle	Y			1/1
plants	land plants	Asteraceae	*Chrysocephalum apiculatum*	yellow buttons		C		2
plants	land plants	Asteraceae	*Cirsium vulgare*	spear thistle	Y			2
plants	land plants	Asteraceae	*Cyanthillium cinereum*			C		1
plants	land plants	Asteraceae	*Eclipta prostrata*	white eclipta	Y			1/1
plants	land plants	Asteraceae	*Flaveria trinervia*		Y			1/1
plants	land plants	Asteraceae	*Olearia*					1
plants	land plants	Asteraceae	*Olearia canescens*			C		1
plants	land plants	Asteraceae	*Olearia canescens subsp. discolor*			C		1/1
plants	land plants	Asteraceae	*Parthenium hysterophorus*	parthenium weed	Y			1/1
plants	land plants	Asteraceae	*Pluchea dentex*	bowl daisy		C		1/1
plants	land plants	Asteraceae	*Podolepis longipedata*	tall copper-wire daisy		C		1/1
plants	land plants	Asteraceae	*Pterocaulon sphacelatum*	applebush		C		1
plants	land plants	Asteraceae	*Pycnosorus globosus*			C		1
plants	land plants	Asteraceae	*Rutidosis murchisonii*			C		3/3
plants	land plants	Asteraceae	*Senecio brigalowensis*			C		1/1
plants	land plants	Asteraceae	*Senecio madagascariensis*	fireweed	Y			1
plants	land plants	Asteraceae	*Sigesbeckia orientalis*	Indian weed		C		1
plants	land plants	Asteraceae	*Sonchus oleraceus*	common sowthistle	Y			1
plants	land plants	Asteraceae	*Vittadinia sulcata*	native daisy		C		3/1
plants	land plants	Asteraceae	*Xanthium occidentale*		Y			1
plants	land plants	Asteraceae	*Xanthium spinosum*	Bathurst burr	Y			1
plants	land plants	Asteraceae	*Zinnia peruviana*	wild zinnia	Y			1/1
plants	land plants	Basellaceae	*Anredera cordifolia*	Madeira vine	Y			1

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plants	land plants	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		5
plants	land plants	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		1
plants	land plants	Brassicaceae	*Lepidium bonariense*	Argentine peppercress	Y			1
plants	land plants	Brassicaceae	*Rorippa laciniata*			C		1/1
plants	land plants	Brassicaceae	*Sisymbrium*					1
plants	land plants	Brassicaceae	*Sisymbrium thellungii*	African turnip-weed	Y			1/1
plants	land plants	Byttneriaceae	*Commersonia pedleyi*			C		7/7
plants	land plants	Cactaceae	*Opuntia tomentosa*	velvety tree pear	Y			19
plants	land plants	Campanulaceae	*Wahlenbergia capillaris*			SL		1
plants	land plants	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell		SL		1
plants	land plants	Campanulaceae	*Wahlenbergia graniticola*	granite bluebell		SL		1/1
plants	land plants	Capparaceae	*Capparis anomala*			C		6
plants	land plants	Capparaceae	*Capparis arborea*	brush caper berry		C		6
plants	land plants	Capparaceae	*Capparis canescens*			C		4
plants	land plants	Capparaceae	*Capparis lasiantha*	nipan		C		8
plants	land plants	Capparaceae	*Capparis loranthifolia var. loranthifolia*			C		1
plants	land plants	Capparaceae	*Capparis mitchellii*			C		1/1
plants	land plants	Casuarinaceae	*Allocasuarina inophloia*			C		25/1
plants	land plants	Casuarinaceae	*Allocasuarina luehmannii*	bull oak		C		6
plants	land plants	Casuarinaceae	*Casuarina cristata*	belah		C		7
plants	land plants	Casuarinaceae	*Casuarina cunninghamiana subsp. cunninghamiana*			C		1
plants	land plants	Celastraceae	*Denhamia cunninghamii*			C		5/1
plants	land plants	Celastraceae	*Denhamia disperma*			C		2
plants	land plants	Celastraceae	*Denhamia silvestris*			C		3
plants	land plants	Celastraceae	*Elaeodendron australe*			C		2
plants	land plants	Celastraceae	*Elaeodendron australe var. integrifolium*			C		1
plants	land plants	Celastraceae	*Siphonodon australis*	ivorywood		C		1
plants	land plants	Chenopodiaceae	*Atriplex muelleri*	lagoon saltbush		C		2/1
plants	land plants	Chenopodiaceae	*Atriplex semibaccata*	creeping saltbush		C		1/1
plants	land plants	Chenopodiaceae	*Chenopodium desertorum*			C		1
plants	land plants	Chenopodiaceae	*Dysphania carinata*			C		1
plants	land plants	Chenopodiaceae	*Einadia hastata*			C		2
plants	land plants	Chenopodiaceae	*Einadia nutans subsp. nutans*			C		1
plants	land plants	Chenopodiaceae	*Enchylaena tomentosa*			C		3
plants	land plants	Chenopodiaceae	*Maireana microphylla*			C		5
plants	land plants	Chenopodiaceae	*Salsola australis*			C		2
plants	land plants	Chenopodiaceae	*Sclerolaena bicornis var. horrida*			C		1
plants	land plants	Chenopodiaceae	*Sclerolaena birchii*	galvanised burr		C		2
plants	land plants	Chenopodiaceae	*Sclerolaena lanicuspis*			C		1
plants	land plants	Chenopodiaceae	*Sclerolaena muricata var. muricata*			C		1/1
plants	land plants	Commelinaceae	*Commelina diffusa*	wandering jew		C		1
plants	land plants	Commelinaceae	*Commelina ensifolia*	scurvy grass		C		1
plants	land plants	Convolvulaceae	*Convolvulus arvensis*		Y			2/1
plants	land plants	Convolvulaceae	*Convolvulus graminetinus*			C		1/1
plants	land plants	Convolvulaceae	*Evolvulus alsinoides var. decumbens*			C		1
plants	land plants	Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*			C		1

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plants	land plants	Crassulaceae	*Bryophyllum delagoense*		Y			6
plants	land plants	Crassulaceae	*Bryophyllum x houghtonii*		Y			3
plants	land plants	Cucurbitaceae	*Citrullus amarus*		Y			1/1
plants	land plants	Cupressaceae	*Callitris endlicheri*	black cypress pine		C		9
plants	land plants	Cupressaceae	*Callitris glaucophylla*	white cypress pine		C		8
plants	land plants	Cyperaceae	*Abildgaardia ovata*			C		1/1
plants	land plants	Cyperaceae	*Bulbostylis barbata*			C		2
plants	land plants	Cyperaceae	*Bulbostylis pyriformis*			C		1/1
plants	land plants	Cyperaceae	*Carex appressa*			C		1
plants	land plants	Cyperaceae	*Carex inversa*	knob sedge		C		1/1
plants	land plants	Cyperaceae	*Cyperus*					1
plants	land plants	Cyperaceae	*Cyperus betchei subsp. betchei*			C		1/1
plants	land plants	Cyperaceae	*Cyperus bowmanni*			C		1/1
plants	land plants	Cyperaceae	*Cyperus flaccidus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus fulvus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus gracilis*			C		2/1
plants	land plants	Cyperaceae	*Cyperus leptocarpus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus squarrosus*	bearded flatsedge		C		1/1
plants	land plants	Cyperaceae	*Eleocharis cylindrostachys*			C		3/3
plants	land plants	Cyperaceae	*Eleocharis pallens*	pale spikerush		C		1
plants	land plants	Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush		C		1
plants	land plants	Cyperaceae	*Gahnia aspera*			C		12/1
plants	land plants	Cyperaceae	*Schoenus kennyi*			C		4
plants	land plants	Cyperaceae	*Scleria mackaviensis*			C		4/1
plants	land plants	Cyperaceae	*Scleria sphacelata*			C		6/1
plants	land plants	Dicranaceae	*Sclerodontium clavinerve*			C		1/1
plants	land plants	Dilleniaceae	*Hibbertia cistoidea*			C		3/3
plants	land plants	Dilleniaceae	*Hibbertia stricta var. stricta*			C		1
plants	land plants	Droseraceae	*Drosera hookeri*			SL		2/2
plants	land plants	Droseraceae	*Drosera lunata*			SL		1/1
plants	land plants	Ebenaceae	*Diospyros humilis*	small-leaved ebony		C		2
plants	land plants	Elatinaceae	*Elatine gratioloides*	waterwort		C		1/1
plants	land plants	Ericaceae	*Agiortia pleiosperma*			C		3/3
plants	land plants	Ericaceae	*Lissanthe pluriloculata*			C		6/5
plants	land plants	Ericaceae	*Melichrus adpressus*			C		1/1
plants	land plants	Ericaceae	*Melichrus sp. (Isla Gorge P.Sharpe+ 601)*			C		4/2
plants	land plants	Ericaceae	*Melichrus urceolatus*	honey gorse		C		6/4
plants	land plants	Ericaceae	*Styphelia blakei*			C		2/2
plants	land plants	Ericaceae	*Styphelia mitchellii*			C		5/3
plants	land plants	Ericaceae	*Styphelia mutica*			C		1
plants	land plants	Euphorbiaceae	*Acalypha capillipes*	small-leaved acalypha		C		3
plants	land plants	Euphorbiaceae	*Acalypha eremorum*	soft acalypha		C		2/1
plants	land plants	Euphorbiaceae	*Bertya oleifolia*			C		1/1
plants	land plants	Euphorbiaceae	*Croton insularis*	Queensland cascarilla		C		10
plants	land plants	Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton		C		2
plants	land plants	Euphorbiaceae	*Euphorbia dallachyana*			C		1/1

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plants	land plants	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		1/1
plants	land plants	Goodeniaceae	*Brunonia australis*	blue pincushion		SL		1/1
plants	land plants	Goodeniaceae	*Dampiera adpressa*			C		6/4
plants	land plants	Goodeniaceae	*Dampiera discolor*			C		5/1
plants	land plants	Goodeniaceae	*Goodenia bellidifolia subsp. argentea*			C		1
plants	land plants	Goodeniaceae	*Goodenia caroliniana*			C		2/2
plants	land plants	Goodeniaceae	*Goodenia glabra*			C		3
plants	land plants	Goodeniaceae	*Scaevola spinescens*	prickly fan flower		C		1/1
plants	land plants	Haloragaceae	*Gonocarpus urceolatus*			C		2/2
plants	land plants	Haloragaceae	*Myriophyllum verrucosum*	water milfoil		C		1/1
plants	land plants	Hemerocallidaceae	*Dianella caerulea*			C		2/1
plants	land plants	Hemerocallidaceae	*Dianella caerulea var. protensa*			C		1
plants	land plants	Hemerocallidaceae	*Dianella longifolia*			C		2
plants	land plants	Hemerocallidaceae	*Dianella longifolia var. longifolia*			C		2
plants	land plants	Hemerocallidaceae	*Dianella rara*			C		6/1
plants	land plants	Hemerocallidaceae	*Dianella revoluta var. revoluta*			C		5
plants	land plants	Hypoxidaceae	*Hypoxis pratensis var. tuberculata*			C		1/1
plants	land plants	Isoetaceae	*Isoetes muelleri*	quillwort		C		1/1
plants	land plants	Johnsoniaceae	*Tricoryne anceps subsp. anceps*			C		3
plants	land plants	Johnsoniaceae	*Tricoryne elatior*	yellow autumn lily		C		1
plants	land plants	Juncaceae	*Juncus aridicola*	tussock rush		C		3
plants	land plants	Juncaceae	*Juncus sp. (Nindigully R.Roe AQ139509)*			C		1
plants	land plants	Lamiaceae	*Coleus australis*			C		2
plants	land plants	Lamiaceae	*Prostanthera cryptandroides subsp. euphrasioides*			C		2/2
plants	land plants	Lamiaceae	*Prostanthera ringens*			C		1
plants	land plants	Lamiaceae	*Teucrium junceum*			C		3/1
plants	land plants	Lamiaceae	*Westringia cheelii*			C		6/6
plants	land plants	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		5
plants	land plants	Laxmanniaceae	*Laxmannia gracilis*	slender wire lily		C		2/2
plants	land plants	Laxmanniaceae	*Lomandra confertifolia subsp. pallida*			C		4/1
plants	land plants	Laxmanniaceae	*Lomandra filiformis subsp. filiformis*			C		10
plants	land plants	Laxmanniaceae	*Lomandra longifolia*			C		5
plants	land plants	Laxmanniaceae	*Lomandra multiflora subsp. multiflora*			C		7
plants	land plants	Leguminosae	*Acacia*					5
plants	land plants	Leguminosae	*Acacia blakei subsp. blakei*			C		1/1
plants	land plants	Leguminosae	*Acacia burbidgeae*			C		2/2
plants	land plants	Leguminosae	*Acacia burrowii*			C		3
plants	land plants	Leguminosae	*Acacia buxifolia subsp. pubiflora*			C		3/3
plants	land plants	Leguminosae	*Acacia caroleae*			C		1/1
plants	land plants	Leguminosae	*Acacia complanata*	flatstem wattle		C		1/1
plants	land plants	Leguminosae	*Acacia conferta*			C		2/1
plants	land plants	Leguminosae	*Acacia crassa*			C		1
plants	land plants	Leguminosae	*Acacia crassa subsp. crassa*			C		4/1
plants	land plants	Leguminosae	*Acacia crassa subsp. longicoma*			C		23/2
plants	land plants	Leguminosae	*Acacia curranii*	curly-bark wattle		V	V	9/9
plants	land plants	Leguminosae	*Acacia deanei*			C		1/1

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plants	land plants	Leguminosae	*Acacia decora*	pretty wattle		C		2
plants	land plants	Leguminosae	*Acacia excelsa*			C		1
plants	land plants	Leguminosae	*Acacia excelsa subsp. excelsa*			C		2
plants	land plants	Leguminosae	*Acacia hakeoides*	hakea wattle		C		2
plants	land plants	Leguminosae	*Acacia harpophylla*	brigalow		C		6
plants	land plants	Leguminosae	*Acacia julifera subsp. julifera*			C		1/1
plants	land plants	Leguminosae	*Acacia juncifolia*			C		3/2
plants	land plants	Leguminosae	*Acacia leiocalyx subsp. leiocalyx*			C		3/1
plants	land plants	Leguminosae	*Acacia longispicata*			C		4/2
plants	land plants	Leguminosae	*Acacia neriifolia*	pechey wattle		C		2/2
plants	land plants	Leguminosae	*Acacia oswaldii*	miljee		C		2/1
plants	land plants	Leguminosae	*Acacia penninervis var. penninervis*			C		1/1
plants	land plants	Leguminosae	*Acacia podalyriifolia*	Queensland silver wattle		C		1
plants	land plants	Leguminosae	*Acacia salicina*	doolan		C		2
plants	land plants	Leguminosae	*Acacia shirleyi*	lancewood		C		85
plants	land plants	Leguminosae	*Acacia sparsiflora*			C		12
plants	land plants	Leguminosae	*Acacia triptera*			C		10/4
plants	land plants	Leguminosae	*Acacia wardellii*			NT		2/2
plants	land plants	Leguminosae	*Chorizema parviflorum*	eastern flame pea		C		1
plants	land plants	Leguminosae	*Daviesia genistifolia*	broom bitter pea		C		1/1
plants	land plants	Leguminosae	*Desmodium brachypodum*	large ticktrefoil		C		1/1
plants	land plants	Leguminosae	*Desmodium varians*	slender tick trefoil		C		2
plants	land plants	Leguminosae	*Glycine clandestina*			C		1
plants	land plants	Leguminosae	*Glycine clandestina var. sericea*			C		1
plants	land plants	Leguminosae	*Glycine tabacina*	glycine pea		C		1
plants	land plants	Leguminosae	*Glycine tomentella*	woolly glycine		C		1
plants	land plants	Leguminosae	*Hovea tholiformis*			C		1/1
plants	land plants	Leguminosae	*Indigofera linnaei*	Birdsville indigo		C		1/1
plants	land plants	Leguminosae	*Jacksonia rhadinoclona*	Miles dogwood		C		5/5
plants	land plants	Leguminosae	*Jacksonia scoparia*			C		1/1
plants	land plants	Leguminosae	*Labichea digitata*			C		3/1
plants	land plants	Leguminosae	*Lotus australis*	Australian trefoil		C		1
plants	land plants	Leguminosae	*Lysiphyllum carronii*	ebony tree		C		1
plants	land plants	Leguminosae	*Macroptilium*					1
plants	land plants	Leguminosae	*Melilotus indicus*	hexham scent	Y			1/1
plants	land plants	Leguminosae	*Neptunia gracilis forma gracilis*			C		3/2
plants	land plants	Leguminosae	*Rhynchosia minima var. australis*			C		2/2
plants	land plants	Leguminosae	*Senna acclinis*			C		1/1
plants	land plants	Leguminosae	*Senna artemisioides*			C		1
plants	land plants	Leguminosae	*Senna artemisioides subsp. coriacea*			C		1
plants	land plants	Leguminosae	*Senna barclayana*			C		6
plants	land plants	Leguminosae	*Sesbania cannabina var. cannabina*			C		1/1
plants	land plants	Leguminosae	*Swainsona galegifolia*	smooth Darling pea		C		1
plants	land plants	Leguminosae	*Vachellia bidwillii*			C		1
plants	land plants	Leguminosae	*Vachellia farnesiana*		Y			12
plants	land plants	Linderniaceae	*Lindernia hyssopoides*			C		1/1

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plants	land plants	Loranthaceae	*Amyema*					1
plants	land plants	Loranthaceae	*Amyema biniflora*			C		1/1
plants	land plants	Loranthaceae	*Amyema quandang var. bancroftii*	broad-leaved grey mistletoe		C		1
plants	land plants	Loranthaceae	*Amyema quandang var. quandang*			C		1/1
plants	land plants	Loranthaceae	*Lysiana subfalcata*			C		1/1
plants	land plants	Lythraceae	*Ammannia multiflora*	jerry-jerry		C		2/2
plants	land plants	Lythraceae	*Rotala mexicana*			C		1/1
plants	land plants	Malvaceae	*Abutilon oxycarpum*			C		4
plants	land plants	Malvaceae	*Abutilon oxycarpum var. incanum*			C		1/1
plants	land plants	Malvaceae	*Abutilon oxycarpum var. oxycarpum*			C		3
plants	land plants	Malvaceae	*Hibiscus brachysiphonius*			C		1
plants	land plants	Malvaceae	*Hibiscus sturtii*			C		1
plants	land plants	Malvaceae	*Hibiscus sturtii var. sturtii*			C		4
plants	land plants	Malvaceae	*Malvastrum americanum var. americanum*		Y			1/1
plants	land plants	Malvaceae	*Sida cordifolia*		Y			4/1
plants	land plants	Malvaceae	*Sida hackettiana*			C		2
plants	land plants	Malvaceae	*Sida trichopoda*			C		3
plants	land plants	Marsileaceae	*Marsilea*					1
plants	land plants	Meliaceae	*Owenia acidula*	emu apple		C		8
plants	land plants	Meliaceae	*Owenia venosa*	crow's apple		C		1
plants	land plants	Menispermaceae	*Tinospora smilacina*	snakevine		C		1
plants	land plants	Meteoriaceae	*Papillaria crocea*			C		1/1
plants	land plants	Moraceae	*Ficus virens var. virens*			C		7
plants	land plants	Moraceae	*Trophis scandens*			C		1
plants	land plants	Moraceae	*Trophis scandens subsp. scandens*			C		1
plants	land plants	Myrtaceae	*Angophora floribunda*	rough-barked apple		C		2
plants	land plants	Myrtaceae	*Angophora leiocarpa*	rusty gum		C		4
plants	land plants	Myrtaceae	*Calytrix gurulmundensis*			V	V	22/21
plants	land plants	Myrtaceae	*Calytrix tetragona*	fringe myrtle		C		7/5
plants	land plants	Myrtaceae	*Corymbia bloxsomei*			C		1
plants	land plants	Myrtaceae	*Corymbia citriodora*	spotted gum		C		1
plants	land plants	Myrtaceae	*Corymbia citriodora subsp. variegata*			C		184
plants	land plants	Myrtaceae	*Corymbia clarksoniana*			C		2
plants	land plants	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		1
plants	land plants	Myrtaceae	*Corymbia trachyphloia*			C		2
plants	land plants	Myrtaceae	*Corymbia trachyphloia subsp. trachyphloia*			C		21/1
plants	land plants	Myrtaceae	*Eucalyptus apothalassica*			C		6/4
plants	land plants	Myrtaceae	*Eucalyptus camaldulensis subsp. acuta*			C		1
plants	land plants	Myrtaceae	*Eucalyptus chloroclada*	Baradine red gum		C		1
plants	land plants	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		77/3
plants	land plants	Myrtaceae	*Eucalyptus curtisii*	Plunkett mallee		NT		3/3
plants	land plants	Myrtaceae	*Eucalyptus elegans*			C		1
plants	land plants	Myrtaceae	*Eucalyptus exserta*	Queensland peppermint		C		25/8
plants	land plants	Myrtaceae	*Eucalyptus fibrosa subsp. fibrosa*			C		5
plants	land plants	Myrtaceae	*Eucalyptus fibrosa subsp. nubilis*			C		36
plants	land plants	Myrtaceae	*Eucalyptus longirostrata*			C		6

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plants	land plants	Myrtaceae	*Eucalyptus melanophloia*			C		2
plants	land plants	Myrtaceae	*Eucalyptus melliodora*	yellow box		C		1/1
plants	land plants	Myrtaceae	*Eucalyptus microcarpa*	inland grey box		C		2
plants	land plants	Myrtaceae	*Eucalyptus orgadophila*	mountain coolibah		C		3/2
plants	land plants	Myrtaceae	*Eucalyptus panda*			C		4/4
plants	land plants	Myrtaceae	*Eucalyptus populnea*	poplar box		C		4/2
plants	land plants	Myrtaceae	*Eucalyptus tenuipes*	narrow-leaved white mahogany		C		34/6
plants	land plants	Myrtaceae	*Eucalyptus tereticornis*			C		1
plants	land plants	Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*			C		3/1
plants	land plants	Myrtaceae	*Eucalyptus thozetiana*			C		1/1
plants	land plants	Myrtaceae	*Eucalyptus woollsiana*			C		1
plants	land plants	Myrtaceae	*Harmogia densifolia*			C		3/3
plants	land plants	Myrtaceae	*Homalocalyx polyandrus*			C		11/10
plants	land plants	Myrtaceae	*Homoranthus melanostictus*			C		1/1
plants	land plants	Myrtaceae	*Kardomia jucunda*			C		2/2
plants	land plants	Myrtaceae	*Kunzea opposita*			C		3
plants	land plants	Myrtaceae	*Kunzea opposita var. opposita*			C		3/3
plants	land plants	Myrtaceae	*Leptospermum polygalifolium*	tantoon		C		2
plants	land plants	Myrtaceae	*Lysicarpus angustifolius*	budgeroo		C		6
plants	land plants	Myrtaceae	*Melaleuca nodosa*			C		1/1
plants	land plants	Myrtaceae	*Melaleuca thymifolia*	thyme honeymyrtle		C		1/1
plants	land plants	Myrtaceae	*Melaleuca uncinata*			C		4/1
plants	land plants	Myrtaceae	*Micromyrtus carinata*	Gurulmundi heath-myrtle		E		31/28
plants	land plants	Myrtaceae	*Micromyrtus sessilis*			C		5/3
plants	land plants	Nyctaginaceae	*Boerhavia dominii*			C		1
plants	land plants	Oleaceae	*Jasminum didymum*			C		1
plants	land plants	Oleaceae	*Jasminum didymum subsp. lineare*			C		2
plants	land plants	Oleaceae	*Jasminum simplicifolium subsp. australiense*			C		3
plants	land plants	Oleaceae	*Notelaea microcarpa*			C		9/1
plants	land plants	Orchidaceae	*Cyanicula caerulea*			SL		1/1
plants	land plants	Orchidaceae	*Cymbidium canaliculatum*			SL		4
plants	land plants	Orchidaceae	*Dipodium hamiltonianum*	yellow hyacinth orchid		SL		1/1
plants	land plants	Orchidaceae	*Diuris tricolor*			SL		2/2
plants	land plants	Oxalidaceae	*Oxalis corniculata*		Y			2
plants	land plants	Papaveraceae	*Argemone mexicana*	prickly poppy	Y			1
plants	land plants	Pentapetaceae	*Melhania oblongifolia*			C		1
plants	land plants	Phyllanthaceae	*Breynia oblongifolia*			C		1
plants	land plants	Phyllanthaceae	*Phyllanthus occidentalis*			C		1
plants	land plants	Picrodendraceae	*Petalostigma pachyphyllum*			C		1
plants	land plants	Picrodendraceae	*Petalostigma pubescens*	quinine tree		C		10/1
plants	land plants	Pittosporaceae	*Auranticarpa rhombifolia*			C		2
plants	land plants	Pittosporaceae	*Bursaria spinosa subsp. spinosa*			C		6
plants	land plants	Pittosporaceae	*Pittosporum angustifolium*			C		4/3
plants	land plants	Pittosporaceae	*Pittosporum lancifolium*			C		3
plants	land plants	Pittosporaceae	*Pittosporum spinescens*			C		4
plants	land plants	Plantaginaceae	*Gratiola pedunculata*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		8/2
plants	land plants	Poaceae	*Aristida blakei*			C		1
plants	land plants	Poaceae	*Aristida calycina*			C		1
plants	land plants	Poaceae	*Aristida calycina var. calycina*			C		1/1
plants	land plants	Poaceae	*Aristida caput-medusae*			C		10
plants	land plants	Poaceae	*Aristida holathera var. holathera*			C		1
plants	land plants	Poaceae	*Aristida jerichoensis*			C		1
plants	land plants	Poaceae	*Aristida jerichoensis var. jerichoensis*			C		2/2
plants	land plants	Poaceae	*Aristida jerichoensis var. subspinulifera*			C		3
plants	land plants	Poaceae	*Aristida leichhardtiana*			C		4
plants	land plants	Poaceae	*Aristida personata*			C		6/1
plants	land plants	Poaceae	*Aristida queenslandica var. dissimilis*			C		1
plants	land plants	Poaceae	*Aristida queenslandica var. queenslandica*			C		1
plants	land plants	Poaceae	*Aristida ramosa*	purple wiregrass		C		2
plants	land plants	Poaceae	*Aristida vagans*			C		2
plants	land plants	Poaceae	*Arundinella nepalensis*	reedgrass		C		3
plants	land plants	Poaceae	*Austrostipa ramosissima*	bamboo grass		C		5/1
plants	land plants	Poaceae	*Bothriochloa pertusa*		Y			1
plants	land plants	Poaceae	*Brachyachne convergens*	common native couch		C		1/1
plants	land plants	Poaceae	*Cenchrus ciliaris*		Y			3
plants	land plants	Poaceae	*Cenchrus spinifex*		Y			1/1
plants	land plants	Poaceae	*Chloris divaricata*			C		1
plants	land plants	Poaceae	*Chloris gayana*	rhodes grass	Y			1
plants	land plants	Poaceae	*Chloris ventricosa*	tall chloris		C		3
plants	land plants	Poaceae	*Chloris virgata*	feathertop rhodes grass	Y			1
plants	land plants	Poaceae	*Cymbopogon bombycinus*	silky oilgrass		C		1
plants	land plants	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		5
plants	land plants	Poaceae	*Cynodon dactylon*		Y			1
plants	land plants	Poaceae	*Dactyloctenium radulans*	button grass		C		1
plants	land plants	Poaceae	*Dichanthium sericeum subsp. sericeum*			C		3/1
plants	land plants	Poaceae	*Digitaria breviglumis*			C		1
plants	land plants	Poaceae	*Digitaria didactyla*	Queensland blue couch	Y			1
plants	land plants	Poaceae	*Digitaria divaricatissima*	spreading umbrella grass		C		1/1
plants	land plants	Poaceae	*Digitaria parviflora*			C		2
plants	land plants	Poaceae	*Dimorphochloa rigida*			C		2/2
plants	land plants	Poaceae	*Dinebra decipiens var. asthenes*			C		1/1
plants	land plants	Poaceae	*Dinebra decipiens var. peacockii*			C		2/1
plants	land plants	Poaceae	*Enneapogon*					1
plants	land plants	Poaceae	*Enneapogon lindleyanus*			C		5/1
plants	land plants	Poaceae	*Enneapogon nigricans*	niggerheads		C		1
plants	land plants	Poaceae	*Enteropogon acicularis*	curly windmill grass		C		1
plants	land plants	Poaceae	*Enteropogon unispiceus*			C		2/2
plants	land plants	Poaceae	*Entolasia stricta*	wiry panic		C		5
plants	land plants	Poaceae	*Eragrostis*					3/1
plants	land plants	Poaceae	*Eragrostis curvula*		Y			2/1
plants	land plants	Poaceae	*Eragrostis lacunaria*	purple lovegrass		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	*Eragrostis megalosperma*			C		1/1
plants	land plants	Poaceae	*Eragrostis sororia*			C		4
plants	land plants	Poaceae	*Eragrostis speciosa*			C		1/1
plants	land plants	Poaceae	*Eriachne mucronata forma (Alpha C.E.Hubbard 7882)*			C		3/2
plants	land plants	Poaceae	*Eriachne pallescens*			C		1
plants	land plants	Poaceae	*Eriochloa pseudoacrotricha*			C		1/1
plants	land plants	Poaceae	*Eulalia aurea*	silky browntop		C		1/1
plants	land plants	Poaceae	*Heteropogon contortus*	black speargrass		C		2
plants	land plants	Poaceae	*Homopholis belsonii*	Belson's panic		E	V	1/1
plants	land plants	Poaceae	*Imperata cylindrica*	blady grass		C		1
plants	land plants	Poaceae	*Iseilema macratherum*			C		3
plants	land plants	Poaceae	*Leptochloa digitata*			C		1
plants	land plants	Poaceae	*Megathyrsus maximus*		Y			1
plants	land plants	Poaceae	*Megathyrsus maximus var. pubiglumis*		Y			1
plants	land plants	Poaceae	*Melinis repens*	red natal grass	Y			3
plants	land plants	Poaceae	*Panicum buncei*			C		2/2
plants	land plants	Poaceae	*Panicum decompositum*			C		2
plants	land plants	Poaceae	*Panicum effusum*			C		4
plants	land plants	Poaceae	*Paspalidium caespitosum*	brigalow grass		C		2/1
plants	land plants	Poaceae	*Perotis rara*	comet grass		C		1/1
plants	land plants	Poaceae	*Rytidosperma indutum*			C		1
plants	land plants	Poaceae	*Sarga leiocladum*			C		2
plants	land plants	Poaceae	*Setaria paspalidioides*			C		1/1
plants	land plants	Poaceae	*Setaria surgens*			C		3/2
plants	land plants	Poaceae	*Sorghum arundinaceum*	Rhodesian Sudan grass	Y			1
plants	land plants	Poaceae	*Sporobolus caroli*	fairy grass		C		3/1
plants	land plants	Poaceae	*Sporobolus coromandelianus*		Y			1/1
plants	land plants	Poaceae	*Sporobolus elongatus*			C		3
plants	land plants	Poaceae	*Thellungia advena*	coolibah grass		C		2
plants	land plants	Poaceae	*Themeda intermedia*		Y			1
plants	land plants	Poaceae	*Themeda quadrivalvis*	grader grass	Y			1
plants	land plants	Poaceae	*Themeda triandra*	kangaroo grass		C		3
plants	land plants	Poaceae	*Triodia scariosa*			C		5/3
plants	land plants	Poaceae	*Urochloa mosambicensis*	sabi grass	Y			1
plants	land plants	Portulacaceae	*Calandrinia pickeringii*			C		1/1
plants	land plants	Portulacaceae	*Portulaca oleracea*	pigweed	Y			2
plants	land plants	Proteaceae	*Grevillea floribunda subsp. floribunda*			C		1/1
plants	land plants	Proteaceae	*Grevillea longistyla*			C		2/2
plants	land plants	Proteaceae	*Grevillea striata*	beefwood		C		2
plants	land plants	Proteaceae	*Hakea lorea subsp. lorea*			C		3
plants	land plants	Proteaceae	*Hakea purpurea*			C		3/3
plants	land plants	Proteaceae	*Persoonia sericea*	silky geebung		C		1/1
plants	land plants	Pteridaceae	*Cheilanthes distans*	bristly cloak fern		C		4/1
plants	land plants	Pteridaceae	*Cheilanthes sieberi subsp. sieberi*			C		3
plants	land plants	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		9
plants	land plants	Rhamnaceae	*Cryptandra*					1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Rubiaceae	*Cyclophyllum coprosmoides*			C		1
plants	land plants	Rubiaceae	*Cyclophyllum coprosmoides var. coprosmoides*			C		1
plants	land plants	Rubiaceae	*Pomax umbellata*			C		1
plants	land plants	Rubiaceae	*Psydrax odorata*			C		5
plants	land plants	Rubiaceae	*Psydrax odorata forma buxifolia*			C		2
plants	land plants	Rubiaceae	*Psydrax odorata forma subnitida*			C		1/1
plants	land plants	Rubiaceae	*Psydrax oleifolia*			C		4
plants	land plants	Rubiaceae	*Richardia brasiliensis*	white eye	Y			1
plants	land plants	Rubiaceae	*Scleromitrion galioides*			C		1/1
plants	land plants	Rutaceae	*Acronychia pauciflora*	soft acronychia		C		1
plants	land plants	Rutaceae	*Boronia glabra*			C		5/3
plants	land plants	Rutaceae	*Citrus glauca*			C		4
plants	land plants	Rutaceae	*Cyanothamnus bipinnatus*			C		1
plants	land plants	Rutaceae	*Cyanothamnus occidentalis*			C		5/5
plants	land plants	Rutaceae	*Flindersia australis*	crow's ash		C		3
plants	land plants	Rutaceae	*Geijera parviflora*	wilga		C		11
plants	land plants	Rutaceae	*Geijera salicifolia*	brush wilga		C		2
plants	land plants	Rutaceae	*Phebalium squamulosum subsp. gracile*			C		5/3
plants	land plants	Rutaceae	*Zieria aspalathoides subsp. aspalathoides*			C		1/1
plants	land plants	Santalaceae	*Anthobolus leptomerioides*			C		2/2
plants	land plants	Santalaceae	*Exocarpos cupressiformis*	native cherry		C		1
plants	land plants	Santalaceae	*Exocarpos latifolius*			C		1/1
plants	land plants	Santalaceae	*Santalum lanceolatum*			SL		4
plants	land plants	Sapindaceae	*Alectryon connatus*	grey birds-eye		C		3/1
plants	land plants	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		8/1
plants	land plants	Sapindaceae	*Alectryon oleifolius subsp. elongatus*			C		1
plants	land plants	Sapindaceae	*Atalaya hemiglauca*			C		4
plants	land plants	Sapindaceae	*Dodonaea*					4/4
plants	land plants	Sapindaceae	*Dodonaea filifolia*			C		2/2
plants	land plants	Sapindaceae	*Dodonaea triangularis*			C		6/1
plants	land plants	Sapindaceae	*Dodonaea viscosa*			C		2
plants	land plants	Sapotaceae	*Planchonella cotinifolia*			C		4
plants	land plants	Scrophulariaceae	*Eremophila debilis*	winter apple		C		1
plants	land plants	Scrophulariaceae	*Eremophila deserti*			C		4/2
plants	land plants	Scrophulariaceae	*Eremophila longifolia*	berrigan		C		1
plants	land plants	Scrophulariaceae	*Eremophila mitchellii*			C		4/1
plants	land plants	Solanaceae	*Nicotiana forsteri*			C		1/1
plants	land plants	Solanaceae	*Nicotiana megalosiphon*			C		1/1
plants	land plants	Solanaceae	*Physalis lanceifolia*		Y			1/1
plants	land plants	Solanaceae	*Solanum*					2
plants	land plants	Solanaceae	*Solanum aviculare*	kangaroo apple		C		1
plants	land plants	Solanaceae	*Solanum coracinum*			C		3/3
plants	land plants	Solanaceae	*Solanum ellipticum*	potato bush		C		3/2
plants	land plants	Solanaceae	*Solanum jucundum*			C		3/3
plants	land plants	Solanaceae	*Solanum mitchellianum*			C		4/2
plants	land plants	Solanaceae	*Solanum nemophilum*			C		12/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Solanaceae	*Solanum parvifolium*			C		2
plants	land plants	Solanaceae	*Solanum parvifolium subsp. parvifolium*			C		1/1
plants	land plants	Solanaceae	*Solanum semiarmatum*	prickly nightshade		C		5
plants	land plants	Solanaceae	*Solanum stenopterum*			V		1/1
plants	land plants	Sparrmanniaceae	*Grewia latifolia*	dysentery plant		C		4/1
plants	land plants	Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree		SL		2
plants	land plants	Sterculiaceae	*Brachychiton populneus*			C		2
plants	land plants	Sterculiaceae	*Brachychiton populneus subsp. populneus*			SL		2
plants	land plants	Sterculiaceae	*Brachychiton populneus subsp. trilobus*			SL		3
plants	land plants	Sterculiaceae	*Brachychiton rupestris*			SL		14
plants	land plants	Stylidiaceae	*Stylidium debile*	frail trigger plant		SL		1/1
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	37/10
plants	land plants	Thymelaeaceae	*Pimelea*					1/1
plants	land plants	Verbenaceae	*Glandularia aristigera*		Y			5
plants	land plants	Verbenaceae	*Phyla nodiflora*	carpetweed		C		1
plants	land plants	Verbenaceae	*Verbena halei*		Y			1/1
plants	land plants	Viscaceae	*Viscum articulatum*	flat mistletoe		C		1/1
plants	land plants	Vitaceae	*Causonis clematidea*			C		1
plants	land plants	Xanthorrhoeaceae	*Xanthorrhoea johnsonii*			SL		14
plants	land plants	Zygophyllaceae	*Roepera glauca*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

APPENDIX E MNES SIGNIFICANT IMPACT ASSESSMENT

Threatened Ecological Communities

Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC)

The project in the Project Area is unlikely to result in a significant impact to the Poplar Box TEC.

There is a total of 22.3 ha of Poplar Box TEC within the Project Area. There will be no impact to the areas shown as Poplar Box TEC in Figure 4-2. Senex Environmental Management will further ensure avoidance of direct and indirect impacts to this TEC through implementation of the Protocol as well as the other plans and procedures listed in the Mitigation and Management Measures Section 6. Based on this information, a significant impact assessment in accordance with the SIG 1.1 for a Threatened Ecological Community is in Table 1-1.

Table 1-1: Significant Impact Assessment for the Poplar Box Threatened Ecological Community

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Critically Endangered or Endangered ecological community if there is a real chance or possibility that it will:		
Reduce the extent of an ecological community	No TEC will be cleared to accommodate project infrastructure with avoidance measures to preferentially site infrastructure to be implemented. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence of TEC will be undertaken by a suitably qualified person. Infrastructure will avoid TEC.	No
Fragment or increase fragmentation of an ecological community	No TEC will be cleared to accommodate project infrastructure with avoidance measures to preferentially site infrastructure to be implemented. TEC within the Project Area is already fragmented and as such disturbance in neighbouring areas is unlikely to materially affect the spread of seed and other propagative material throughout the TEC patches.	No
Adversely affect habitat critical to the survival of an ecological community	There will be no disturbance to TEC. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence of TEC will be undertaken by a suitably qualified person. Infrastructure will avoid TEC.	No
Modify or destroy abiotic factors necessary for an ecological community's survival	Based on the implementation of mitigation and management measures described in Section 6 during clearing activities, such as erosion and sediment control measures, the construction of the project infrastructure would be unlikely to substantially modify abiotic factors required for TEC. During operation, the presence of project infrastructure is expected to have negligible impacts on surface water or groundwater flows.	No
Cause a substantial change in the species composition of an occurrence of an ecological community	Impacts to the TEC are expected to be limited. No active disturbance to areas of TEC will be undertaken. Potential impacts to TEC composition related to pest and weed management are negligible and discussed further below. The potential for indirect impacts from weeds and pest are limited due to the existing land uses/disturbed nature of the TEC patches and present ground layer dominance of exotic pasture grasses. Additionally, there will be an implementation Senex management plans and procedures as described in Section 6. This includes a vehicle hygiene procedure to minimise the risk of introducing weed species, and the risk of the species propagating in potential habitat areas adjacent to disturbance.	No

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Critically Endangered or Endangered ecological community if there is a real chance or possibility that it will:		
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community	Vehicle hygiene procedures will be implemented during construction and continue through operation to minimise risk of introduction of weed species propagating in TEC patches. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence of TEC will be undertaken by a suitably qualified person. Infrastructure will avoid TEC.	No
Interfere with the recovery of an ecological community	Given no TEC will be cleared as part of the project, it is unlikely to interfere with the recovery of the TEC. Areas of regrowth Brigalow within the Project Area that do not currently meet the condition threshold have also been mapped and will be preferentially avoided through the development of the final layout using the constraints protocol.	No
Significant Impact: Not Significant		

Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC)

The project in the Project Area is unlikely to result in a significant impact to the Brigalow TEC.

There is a total of 20.7 ha of Brigalow TEC within the Project Area. There will be no impact to Brigalow TEC within the disturbance footprint. Senex will further ensure avoidance of TEC through implementation of the Protocol. Mapping for this TEC is presented in Figure 4-2.

Based on this information, a significant impact assessment in accordance with the SIG 1.1 for the Endangered Brigalow TEC is presented in Table 1-2.

Table 1-2: Significant Impact Assessment for the Brigalow Threatened Ecological Community

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Critically Endangered or Endangered ecological community if there is a real chance or possibility that it will:		
Reduce the extent of an ecological community	No TEC will be cleared to accommodate project infrastructure with avoidance measures to preferentially site infrastructure to be implemented. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence of TEC will be undertaken by a suitably qualified person. Infrastructure will avoid TEC.	No
Fragment or increase fragmentation of an ecological community	No TEC will be cleared to accommodate project infrastructure with avoidance measures to preferentially site infrastructure to be implemented. TEC within the Project Area is already fragmented and as such disturbance in neighbouring areas is unlikely to materially affect the spread of seed and other propagative material throughout the TEC patches.	No
Adversely affect habitat critical to the survival of an ecological community	There will be no disturbance to TEC. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence of TEC will be undertaken by a suitably qualified person. Infrastructure will avoid TEC.	No

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Critically Endangered or Endangered ecological community if there is a real chance or possibility that it will:		
Modify or destroy abiotic factors necessary for an ecological community's survival	Based on the assumption that the environmental management measures will be implemented during clearing activities, such as erosion and sediment control measures, the construction of the project infrastructure would be unlikely to substantially modify abiotic factors required for TEC. During operation, the presence of project infrastructure is expected to have negligible impacts on surface water or groundwater flows.	No
Cause a substantial change in the species composition of an occurrence of an ecological community	Impacts to the TEC are expected to be limited. No active disturbance to areas of TEC will be undertaken. Potential impacts to TEC composition related to pest and weed management are negligible and discussed further below.	No
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community	Vehicle hygiene procedures will be implemented during construction and continue through operation to minimise risk of introduction of weed species propagating in TEC patches. Weed monitoring activities will include assessment of TEC patches nearby construction activities to allow for early detection. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence of TEC will be undertaken by a suitably qualified person. Infrastructure will avoid TEC.	No
Interfere with the recovery of an ecological community	Given no TEC will be cleared as part of the Project, it is unlikely to interfere with the recovery of the TEC. Areas of regrowth Poplar Box Grassy Woodland on Alluvial Plains within the Project Area that do not currently meet the condition threshold have also been mapped and will be preferentially avoided through the development of the final layout using the constraints protocol.	No
Significant Impact: Not Significant		

Threatened Species

Koala (*Phascolarctos cinereus*)

The project in the Project Area is unlikely to result in a significant impact to the Koala.

The Koala is currently listed as Endangered under the EPBC Act, effective 12 February 2022. The Koala is generally found in temperate to tropical forests as well as woodlands and semi-arid communities dominated by Eucalyptus species (Martin and Handasyde, 1999). The species can be found in habitat broadly defined as woodlands and open forests, as long as food trees are present (DOE, 2022). The Koala has one of the broadest distributions of threatened terrestrial species under the EPBC Act with a range extending from north-eastern Queensland to the south-east corner of Southern Australia. The biological species distribution is widespread in coastal and inland areas that extends over approximately one million square kilometres (Martin & Handasyde, 1999).

Under the revised *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022c), released on 12th February 2022, habitat for the koala is described as:

> *Koala habitat includes both coastal and inland areas that are typically characterised by Eucalyptus forests and woodlands. Biophysical habitat attributes for the koala include places that contain the resources necessary for individual foraging, survival (including predator avoidance), growth, reproduction and movement.*

Habitat critical to the survival of the species is defined as those that the species relies on to avoid or halt decline and promote the recovery of the species. Under the EPBC Act, the following factors are considered when identifying habitat that is critical to the survival of the species:

> *(h) Whether the habitat is used during periods of stress (examples: flood, drought or fire);*
>
> *(i) whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes);*
>
> *(j) the extent to which the habitat is used by important populations;*
>
> *(k) whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development;*
>
> *(l) whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements;*
>
> *(m) whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation;*
>
> *(n) any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community.*

Koalas are known to occur within urban and rural landscapes, utilising regrowth and remnant eucalypt dominated vegetation communities for foraging and breeding resources. Targeted searches for the species were conducted in suitable habitat throughout the Project Area. The field investigations conducted throughout 2022 did not directly record an individual Koala but did find evidence of Koalas through indirect signs of scratch marks on riparian Queensland Blue Gum trees in several locations along Wandoan Creek.

A targeted field survey was undertaken in the Project Area in 2022, in accordance with the most recent Commonwealth guidance on Koala survey and habitat mapping. Targeted searches for Koalas were completed, including spotlighting, searches for scats and scratch marks by two ecologists. Despite targeted surveys, no Koalas were observed during the 20 days of field surveys completed from 14–18 March 22–25 March; 30 April–5 May, and 9–13 June. This survey effort is considered sufficient to detect koala presence in the Project Area.

The potential for Koala presence in the Project Area was observed in the form of scratch marks on *Eucalyptus tereticornis* (Forest Red Gum) trees in several locations along Wandoan Creek (but there is uncertainty regarding which species made the scratches). No direct observations of Koalas occurred, nor were any Koala faecal pellets observed. No records or evidence of Koalas occurs elsewhere in the Project Area, despite targeted searches. From this information, it is concluded that there is a general absence of Koalas in the Project Area, and it is considered that koala occurrence in the Project is very rare, however its occurrence has been conservatively assumed as likely to occur.

Due to the indirect observations of Koala in the form of scratch marks in the Project Area, it has been conservatively concluded that habitat critical to the survival of the species does occur within the Project Area. Habitat has been classified and mapped based on recent habitat guidance for the species (Youngentob, K.N, et al, 2022). In this case the vegetated areas of the Project Area containing koala food trees (e.g., *E. tereticornis, E. populnea, E. crebra, E. longirostrata, E. melanophloia, E. exserta and Corymbia citriodora subsp. variegata*) were mapped as Koala foraging and breeding habitat. This habitat mapping method and the corresponding three potential habitat types of foraging and breeding, Table 1-3.

Table 1-3: Koala Habitat Types within the Project Area

	Potential Foraging and Breeding Habitat	Potential Dispersal Habitat	Potential Non-koala Habitat
Description	■ Any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. ■ This includes remnant and regrowth vegetation.	■ Part of the broader landscape that includes grass/bare ground, rural land-uses, dwellings/towns, buildings, farm dams, sealed or unsealed roads and existing rail infrastructure. ■ Contains isolated or scattered foraging or shelter trees. ■ Contains vegetation generally not used frequently for foraging and breeding purposes by the species.	■ Not suitable habitat includes barriers defined in the DCCEEW Guidelines (natural or artificial) that prevent the movement of koalas, such as mountain ranges, water bodies or treeless areas that are greater than 2 km wide.
Presence within the Project Area	■ Eucalypt woodland to open forest; ■ Woodland to open forest associated with stream channels and rivers; and ■ Open regrowth eucalypt woodland vegetation.	■ Cleared areas with occasional regrowth eucalypt woodlands along drainage lines; and ■ Acacia woodlands dominated by Brigalow (Acacia harpophylla).	■ Potential non-habitat presents in the Project Area as waterways and treeless areas greater than 2km wide.
Total in the Project Area	■ **245.4 ha foraging and breeding habitat**	■ **1,602.5 ha dispersal habitat**	■ **0 ha non-koala habitat**
Total in the Disturbance Footprint	■ **0 ha foraging and breeding habitat**	■ **Up to 137 ha dispersal habitat**	■ **0 ha non-koala habitat**

The impact assessment has determined the proportion of Koala habitat that will be impacted compared to the total area of Koala habitat within the Project Area. This is provided in Table 1-4. Habitat mapping for the Koala is presented in Figure 4-5.

Table 1-4: Koala Habitat and Impact Quantification

Factors	Foraging and breeding habitat	Dispersal habitat
Total in the Project Area	245.4 ha	1,602.5 ha
Total in Disturbance Footprint	0 ha	Up to 137 ha
% Impacted Relative to Total in Project Area	0.0%	8.5%

It is noted that the wells for the project will not inhibit Koala dispersal, and that movement opportunities will remain throughout the mapped potential dispersal habitat and potential foraging and breeding habitat. Therefore, the short-term and temporary disturbance to potential koala dispersal habitat will not result in a significant residual impact to the Koala.

It is noted that impacts within Koala dispersal habitat will be minimised using the Protocol but will, at times, require the unavoidable disturbance of open areas and removal of individual juvenile and non-juvenile trees and seedlings which are located within a predominantly cleared landscape. Application of the Protocol means that individual juvenile and non-juvenile trees and seedlings will be avoided unless unavoidable due to other constraints, e.g., environmental features and values, cultural heritage values, geological features, landholder/livestock/agricultural requirements and existing or planned landholder, utility or community infrastructure). Nonetheless, Senex has committed to not clearing any Koala foraging and breeding habitat within the Project Area. However, the Project will disturb up to 137 ha of (previously cleared) Koala dispersal habitat or, 8.5% of the total dispersal habitat within the Project Area. In respect of the impacts to dispersal habitat, the disturbance is short term and temporary with permeability remaining, such that Koalas can still access and move across the Project Area. Additionally, the proposed mitigation measures will ensure continued Koala movement is maintained, and therefore does not impede the ability for Koalas to disperse across the broader landscape.

The minimisation of impact to foraging and breeding habitat in the Project Area as well as the impact to only 0.4% of breeding and foraging habitat and 3.8% of dispersal habitat available in the Project Area has been considered as part of the comprehensive assessment for the Koala against the SIG 1.1 for an Endangered species under the EPBC Act. This is found in Table 1-5 .

Table 1-5: Significant Impact Assessment for the Koala

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an Endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population,	There will be no impact on the total available foraging and breeding habitat in the Project Area. There will be an impact of up to 137 ha, or 8.5% of the total available Koala dispersal habitat within the Project Area. Nonetheless, the impact to habitat will be short-term and will ensure Koala movement is not impeded, as the infrastructure will not impact landscape permeability. Climate change has been identified in the Conservation Advice as a threat to the species in the way that increased frequency and intensity of droughts and high temperatures, increasing prevalence of weather conditions to promote bushfires and shrinking climatically suitable areas will impact the koala (DAWE, 2022c). The project will not contribute to or exacerbate the impacts of climate change. This is because the activities involved with the project will not fragment vegetated corridors or inhibit the Koala's ability to move across the landscape in response to potential climate change induced changes to, temperatures and rainfall and bushfire patterns. Mitigation measures such as preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that both direct and indirect impacts are further minimised to the species. Therefore, it is unlikely that the impacts to Koala habitat will lead to a decrease in the size of a koala population.	No
Reduce the area of occupancy of the species,	The Project will not reduce the Koala foraging and breeding habitat within the Project Area. Therefore, the impact will not lead to a reduced area of occupancy of the species. The area of occupancy for the koala is 19,428 km^2 as of mapping and records from 2000 from state governments and CSIRO (DAWE, 2020). Thus, the clearing of a relatively small area of Koala habitat and the nature of the project infrastructure and activities is unlikely to reduce the area of occupancy for the species.	No

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an Endangered species if there is a real chance or possibility that it will:		
Fragment an existing population into two or more populations,	The Project will not fragment existing populations as the Project will not reduce the Koala foraging and breeding habitat within the Project Area and dispersal function will be maintained across the Project Area. No vegetated corridors will be severed, and HDD of crossings as required. Furthermore, given the infrastructure type, the disbursed layout of wells (averaging 500-750 m apart), burial of gathering pipes and post-construction rehabilitation of disturbed areas, light traffic movements at limited speeds, etc it is expected that the Koala will still be able to disperse across tracks and small cleared areas once construction has been completed in each area.	No
Adversely affect habitat critical to the survival of a species,	The foraging and breeding, and dispersal habitat for Koala, has been mapped to occur within the Project Area, and is regarded as habitat critical to the survival of the species. Senex has committed to not clearing any areas confirmed as Koala individuals or areas confirmed as breeding and foraging habitat for the threatened species, with the exception of Koala dispersal habitat (137 ha) (8.5%). Therefore, the Project will not adversely affect habitat critical to the survival of the species. The vast majority of the Koala foraging, and breeding habitat will be retained within the existing riparian corridors and areas of remnant and regrowth open Eucalypt forest and woodlands. Indirect impacts are also unlikely to result in a significant impact to the species due to the implementation of mitigation measures which will include pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6).	No
Disrupt the breeding cycle of a population,	The impacts of the Project will only result in a short-term disturbance 8.5% of the available (previously cleared) Koala dispersal habitat in the Project Area. The home range for the Koala is highly variable, however evidence suggest it can range from anywhere between 3 to 500 ha (Wilmott, 2020). Evidence of Koalas being present within the Project Area has been found on few occasions (scratch marks), suggests a low-density population. Senex has committed to not clearing any areas confirmed as Koala individuals or areas confirmed as breeding and foraging habitat for the threatened species , and therefore, the Project is unlikely to disrupt the breeding cycle of this species. Furthermore indirect impacts are unlikely to disrupt the breeding cycle of a population due to the implementation of mitigation measures including preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans.	No

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an Endangered species if there is a real chance or possibility that it will:		
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The project will not reduce the Koala foraging and breeding habitat within the Project Area and dispersal function will be maintained. Mitigation measures implemented, as part of the Protocol, will also ensure that the project will not modify, destroy or decrease the availability or quality of potential habitat to the extent that the species will decline. Such measures include preferential use of previously cleared areas, pre-clearance surveys HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that impacts are further minimised to the species. It is also with the implementation of these mitigation measures, that indirect impacts are also unlikely to be significant to the species.	No
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive species such as wild dogs (*Canis lupus familiaris*) feral cats (*Felis catus*) and cane toads (*Rhinella marina*) are common pests encountered in Queensland and are particularly harmful to Koalas. These invasive species are known to occur in the Project Area. Project activities during construction and operation will adopt and follow Biosecurity measures, including adherence to the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) (which includes requirements for weed washdowns, certification and record keeping for all vehicles and machinery), that will ensure that further invasive species are not introduced into the Project Area. Furthermore, it is unlikely that the project will result in any increase in wild dog abundance.	No
Introduce disease that may cause the species to decline, or	Koala populations are known to be impacted by diseases, specifically koala retrovirus (KoRV) and Chlamydia (*Chlamydia pecorum)* and myrtle rust which affects koala habitat. There is no evidence to suggest the construction and/or operational activities would introduce a disease, such as Chlamydia, that would cause the species to be at risk of illness and subsequent population decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur, as detailed in the Biosecurity Management Plan. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by any fauna spotter catcher workers.	No
Interfere with the recovery of the species.	The interim recovery objectives for the Koala are: Protect and conserve the quality and extent of habitat refuges for the persistence of the species during droughts and periods of extreme heat, especially in riparian environments and other areas with reliable soil moisture and fertility; and Maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges. The project will not impact the Koala foraging and breeding habitat within the Project Area , however will disturb previously cleared dispersal habitat within the Project Area (8.5% respectfully). It is noted that the flexibility in spacing of wells and the alignment of the gathering rights-of-way helps ensure that unavoidable clearing of vegetation/habitat is limited to smaller isolated locations rather than being in one contiguous area. Therefore, the project does not interfere with the recovery objectives for the species.	No
Significant Impact: Not Significant		

Greater Glider (central and southern) (*Petauroides volans)*

The project in the Project Area is unlikely to result in a significant impact to the Greater Glider.

The Greater Glider was upgraded from a listing of Vulnerable to Endangered under the EPBC Act, effective 5 July 2022. This species has been concluded as known to occur within the Project Area as the species was detected during spotlighting surveys of riparian woodland along Wandoan Creek (BOOBOOK, 2022). The updated Conservation Advice for *Petauroides volans* (Greater Glider (southern and central)) has been considered for this analysis (DCCEEW, 2022a).

Greater Glider habitat consists of tall, montane Eucalypt forests with mature hollow-bearing trees (Eyre, 2004). Eyre et al., 2022 has listed habitat for the species that are REs with confirmed Greater Glider records that contain habitat attributes such as live and dead-hollowing bearing denning trees, feed and large trees and habitat connectivity. Habitat critical to survival for the Greater Glider has been defined in *Conservation Advice for Petauroides volans (Greater Glider (southern and central))* (DCCEEW, 2022a). Greater Glider habitat within the Project Area aligns with the conservation advice description of "*large contiguous areas of Eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species*". Suitable Greater Glider foraging habitat has been identified within the Project Area based on ground-truthing of REs listed in Eyre et al., is mapped on Figure 4-6. Therefore, Greater Glider habitat within the Project Area is considered habitat critical to survival of the species.

The Greater Glider was observed during spotlighting in the 2022 field investigation within mature forests with hollow bearing trees. Reviews of ALA shows only one recent record in the locality, located in the Cherwondah State Forest from 2002. Thus, species density is likely to be low in the Project Area. While there was generally a low number of records and observations of the species following, it was conservatively concluded that an important population occurs in the Project Area and the surrounding landscape.

The project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 174.5 ha of Greater Glider foraging habitat within the Project Area. The mapped Greater Glider foraging habitat includes mature Eucalypt woodland to open forests and woodlands to open forest associated with stream channels and rivers. From this, the first component of the layout design phase will be to avoid remnant vegetation identified as Greater Glider foraging habitat. The second component of the layout design will involve on the ground micro-siting that may result in infrastructure locations being adjusted if necessary to avoid suitable hollow bearing trees that act as potential roosting and denning sites for the Greater Glider. This ensures that maximum avoidance of impact is assured for this species within the Project Area.

It must be noted that other areas currently not mapped as Greater Glider foraging habitat, may be used for movement and dispersal purposes. It is also noted that areas of foraging habitat will contain occasional hollow bearing trees that can be used for denning purposes.

Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. A significant impact assessment based on guidance provided in the SIG 1.1 for a listed Endangered species, is presented in Table 1-6.

Table 1-6: Significant Impact Assessment for the Greater Glider

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an Endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population,	There will be no impact to Greater Glider foraging habitat within the Project Area. Additionally, surveys will be undertaken prior to construction at proposed infrastructure locations, further avoiding any hollow-bearing trees where practicable. The Project Area is largely cleared however the avoidance of impact ensures that it will remain connected to adjacent, larger remnant forests, like Hinchley SF. Climate change has been identified in the Conservation Advice as a threat to this species in the way that high temperatures and low rainfall affect the species (DCCEEW, 2022a). This includes increased night temperatures resulting in the decline of the Greater Glider. The project will not contribute to, or exacerbate the impacts of climate change. This is because the project will not fragment vegetated corridors or inhibit the Greater Glider's ability to move across the landscape in response to potential climate change induced changes to rainfall patterns and temperatures. Mitigation measures such as preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that both direct and indirect impacts are further minimised to the species. Therefore, the project is unlikely to lead to a long-term decrease in the size of the population.	No
Reduce the area of occupancy of the species,	This species is predicated to have an area of occupancy of 15,960 km^2 (Woinarski *et al.,* 2014). Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. Furthermore, indirect impacts will be avoided through the application of environmental management measures such as the designation of 'no go' areas and implementation of weed and pest procedures. Therefore, the project will not reduce the area of occupancy of the species.	No
Fragment an existing population into two or more populations,	Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. No vegetated corridors will be severed and HDD will be used for crossing as required. Furthermore, given the infrastructure type, the disbursed layout of wells (averaging 500-750 m apart), burial of gathering pipes and post-construction rehabilitation of disturbed areas, light traffic movements at limited speeds, etc. will ensure that Greater Glider foraging habitat remains connected, both within and outside of the Project Area.	No

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an Endangered species if there is a real chance or possibility that it will:		
Adversely affect habitat critical to the survival of a species,	The habitat for Greater Gliders within the Project Area has been concluded to be habitat critical to the survival of the species. This is because the presence of tall, mature Eucalyptus forests with hollow bearing trees, meets the criterion of being habitat necessary for foraging, breeding, roosting or dispersal of the species. Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. Therefore, the Project will not result in an adverse impact to habitat critical to the survival of the species. Indirect impacts are also unlikely to result in a significant impact to the species due to the implementation of mitigation measures which will include pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6).	No
Disrupt the breeding cycle of a population,	Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. Furthermore, the design phase as well as micro siting will avoid hollow-bearing trees that are necessary for the successful breeding cycle of the species. Greater Gliders generally have a home range of 1-4 ha or up to 16 ha in more open forests (Henry, 1984; Eyre, 2004). Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species, and therefore, will not reduce the home ranges of the species. Thus, the species will still be able to successfully breed in the Project Area. Furthermore indirect impacts are unlikely to disrupt the breeding cycle of a population due to the implementation of mitigation measures including preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans.	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. The habitat within the Project Area will therefore remain connected to larger remnant patches outside of the Project Area. Therefore, the avoidance of impact to Greater Glider foraging habitat will not remove/isolate or decrease the quality of habitat that would result in species decline.	No
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive species such as feral cats (*Felis catus*) and cane toads (*Rhinella marina*) are common pests encountered in Queensland and are particularly harmful to native, threatened mammals. Both of these invasive species are known to occur in the Project Area. Project activities during construction and operation will adopt and follow Biosecurity measures, including adherence to the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) (which includes requirements for weed washdowns, certification and record keeping for all vehicles and machinery), that will ensure that further invasive species are not introduced into the Project Area.	No

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an Endangered species if there is a real chance or possibility that it will:		
Introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Greater Glider populations in Queensland. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by any fauna spotter catcher workers.	No
Interfere with the recovery of the species.	There is no formal adopted, or made, Recovery Plan for this species. Senex has committed to not clearing any areas known to be occupied by Greater Glider (southern and central) individuals or areas confirmed as habitat for the species. Additionally, the Project Area will remain connected to adjacent State Forests, which are known to be habitat for Greater Gliders. This will enable the species to be able to continually traverse the landscape, ensuring genetic viability of the population.	No
Significant Impact: Not Significant		

Dulacca Woodland Snail (*Adclarkia dulacca*)

The project in the Project Area is unlikely to result in a significant impact to the Dulacca woodland Snail.

The Dulacca Woodland Snail is currently listed as Endangered under the EPBC Act, effective 7 December 2016 (TSSC, 2016). The likelihood of occurrence has concluded this species as known to occur within the Project Area due to the presence of suitable habitat and previous records within the Project Area (Figure 4-8).

The Dulacca Woodland Snail inhabits vine thicket, Brigalow (*Acacia harpophylla*) woodland/open forest, Ironbark (Eucalyptus spp.) woodland, Lancewood (*Acacia shirleyi*) woodland and Gum-topped Box (*E. woollsiana*) woodland (TSSC, 2016). It is largely confined to the Dulacca Downs subregion where it is found in a highly fragmented landscape, living in patches or strips of habitat retained on roadsides, shade lines and/or ridges (Stanisic et al. 2010; ALA 2022). The Dulacca Woodland Snail is also able to exist in areas of Brigalow regrowth and even in cleared paddocks but only where logs, woody debris or other suitable microhabitat sites remain (TSSC, 2016).

The Project Area includes several small patches of suitable habitat for the Dulacca Woodland Snail (Brigalow woodland), and the species has previously been collected from an area of RE 11.9.5a and 11.7.2 in the south of the Project Area (ALA, 2022). The total amount of Dulacca Woodland Snail habitat within the Project Area is 236.2 ha. This is presented on Figure 4-8.

Senex has committed to not clearing any areas known to be occupied by Dulacca Woodland Snail individuals or areas confirmed as habitat for the species. A significant impact assessment based on guidance provided in the SIG 1.1 for a listed Endangered species, is presented in Table 1-7.

Table 1-7: Significant Impact Assessment for the Dulacca Woodland Snail

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population	Senex has committed to not clearing any areas confirmed as Dulacca Woodland Snail or areas confirmed as habitat for the species. The species occurs mostly in small remnant vegetation patches (TSSC, 2016). Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence/absence of threatened species will be undertaken by a suitably qualified person. This will include searches for snails in microhabitat (logs and timber). Using this approach, a long-term decrease in the size of the population, reduced area of occupancy, or fragmentation of populations is unlikely. Mitigation measures such as preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that both direct and indirect impacts are further minimised to the species.	No
Reduce the area of occupancy of the species		No
Fragment an existing population into two or more populations		No
Adversely affect habitat critical to the survival of a species	Habitat with tree cover and ground debris is critical to the survival of native land snails and increases the species ability to disperse and recolonise (Stanisic, 2011, cited in TSSC, 2016). The Project Area is majority cleared and the aim will be to locate infrastructure in already disturbed areas. Prior to undertaking activities that result in significant disturbance to land, an ecological survey to confirm presence/absence of threatened species will be undertaken by a suitably qualified person. Infrastructure will preferentially avoid threatened species locations. Mitigation measures such as preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that both direct and indirect impacts are further minimised to the species. Therefore, it is unlikely that the impacts to Dulacca Woodland Snail habitat will lead to a decrease in the size of the species population. Thus, the project is unlikely to adversely affect habitat critical to the survival of the species.	No
Disrupt the breeding cycle of a population	Senex has committed to not clearing any areas confirmed as Dulacca Woodland Snail or areas confirmed as habitat for the species. Therefore, the ecological functions and extent of the habitat for the species will remain and ensure it is able to breed.	No
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline		No

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:		
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Buffel Grass is a known threat to the species as it has replaced native grasses and increases fuel loads. This weed has been found to occur within the disturbed northern area of the Project Area. The construction and operation of the infrastructure is unlikely to increase the establishment of Buffel Grass. Project activities during construction and operation will adopt and follow Biosecurity measures, including adherence to the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) (which includes requirements for weed washdowns, certification and record keeping for all vehicles and machinery), that will ensure that further invasive species are not introduced into the Project Area.	No
Introduce disease that may cause the species to decline, or	The construction and operation of the infrastructure is unlikely to lead to introduction of a disease relevant to the species.	No
Interfere substantially with the recovery of the species.	Key threats to the species relate to habitat loss, predation by rats, mice and pigs, invasion of Buffel Grass, trampling by cattle and horses and an increase in fire intensity. Project infrastructure will preferentially avoid Dulacca Woodland Snail habitat locations and the construction and operation of the infrastructure is not expected to change the occurrence or prevalence of pest species.	No
Significant Impact: Not Significant		

White-throated Needletail (*Hirundapus caudacutus)*

The project in the Project Area is unlikely to result in a significant impact to the White-throated Needletail.

The White-throated Needletail (*Hirundapus caudacutus*) is currently listed as Vulnerable, Marine and Migratory under the EPBC Act, and as such, has been discussed outside of the migratory section due to its additional listing as Vulnerable. The White-throated Needletail has been identified as known to occur within the Project Area. The white-throated needletail was observed within the Project Area during subsequent field surveys for Senex on 24 November 2022 (Cunningham, M pers. comm.), as shown on Figure 4-7. Additionally, there is one recent record within the Cherwondah SF from 2002.

This species is predominantly aerial when on migration in Australia, occasionally stopping to roost in large patches of rainforest, wooded vegetation and open Eucalypt forests (Coventry, 1989; Higgins, 1999), generally associated with elevated areas. While occasional aerial observations occur for this species, the Project Area is unlikely to contain important foraging habitat for the species. Additionally, no threshold area for important habitat for this species can be determined at present and has not been identified (TSSC, 2019). The Project Area contains no rainforests and no elevated open forests with dense foliage that could be used for occasional roosting. While potential flights over the Project Area may occur from time to time, only elevated areas regarded as roosting habitat. Thus, potential habitat has not been mapped for this species, and so no impact area has been calculated.

The significant impact guidance for Vulnerable species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). Important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species' range (DoE, 2013).

This species was conservatively concluded to be an important population in the Project Area and the surrounding landscape due to the following reasons. Firstly, there is an absence of detailed population data for the Project Area and even though the species was not sighted in the field investigations, a record from 2002 exists within the adjoining areas (10 km buffer area). However, as the White-throated Needletail is a largely aerial species, and the lack of habitat in the Project Area, a significant impact to this species is considered unlikely.

Based on this information, a significant impact assessment in accordance with the SIG 1.1 for a Vulnerable species is presented in Table 1-8.

Table 1-8: Significant Impact Assessment for the White-throated Needletail

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species	The Project Area is unlikely to support an important population of the White-throated Needletail. This is because there is no roosting habitat available, it is likely to be an occasional flyover, and the Project Area is not an important stopover point supporting an ecologically important number of migrating birds. There will be no impact to White-throated Needletail foraging or roosting habitat within the Project Area. Additionally, this species is almost exclusively aerial when on migration in Australia. It is unlikely that the project will lead to a long-term decrease in the size, reduce the area of occupancy, or fragment an important population. Mitigation measures such as preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, at least daily inspections of open trenches and measures to prevent entrapment and facilitate escape from open trenches, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that both direct and indirect impacts are further minimised to the species.	No
Reduce the area of occupancy of an important population		No
Fragment an existing important population into two or more populations		No
Adversely affect habitat critical to the survival of a species	There is no evidence that the Project Area supports habitat critical to the survival of these species. There will be no impact to White-throated Needletail foraging or roosting habitat within the Project Area. Additionally, this species exhibits highly aerial behaviours when on migration in Australia, stopping only occasionally to roost in elevated wooded areas, and so is unlikely to settle in the Project Area. It is unlikely that habitat critical to the survival of this species will be adversely affected.	No
Disrupt the breeding cycle of an important population	There is no evidence that the Project Area supports an important population of this species. Additionally, this species is almost exclusively aerial when on migration in Australia and so is unlikely to settle in the Project Area. This Project is unlikely to disrupt the breeding cycle of an important population, modify or decrease the availability or quality of habitat to the extent that it will cause species decline.	No
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline		No

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:		
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species such as feral cats (*Felis catus*) and cane toads (*Rhinella marina*) are common pests encountered in Queensland and are particularly harmful to native, threatened birds such as the White-throated Needletail. Both of these invasive species are known to occur in the Project Area. Project activities during construction and operation will adopt and follow Biosecurity measures, including adherence to the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) (which includes requirements for weed washdowns, certification and record keeping for all vehicles and machinery), that will ensure that further invasive species are not introduced into the Project Area.	No
Introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on White-throated Needletail populations in Queensland. There is also no evidence to suggest the Project would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by any fauna spotter catcher workers.	No
Interfere substantially with the recovery of the species.	There is no formal adopted, or made, Recovery Plans for this species. However, small and spread amount of clearing of remnant patches and linear areas, will not affect the recovery of this species. Additionally, the Project Area will remain connected to adjacent State Forests. While this species is predominately aerial, project activities will still enable habitat to remain connected between the network of State Forests and remnant vegetation in the adjoining areas and the Project Area, ensuring the species will not be substantially interfered with if they were to land and roost within the Project Area.	No
Significant Impact: Not Significant		

Glossy Black-cockatoo (south-eastern subspecies) (*Calyptorhynchus lathami lathami)*

The project in the Project Area is unlikely to result in a significant impact to the Glossy Black-cockatoo.

The Glossy Black-cockatoo (south-eastern subspecies), listed as Vulnerable under the EPBC Act, has previously been recorded within the Project Area (BOOBOOK, 2021a, DES, 2022a), and two recent sightings (2009) have been reported within the adjoined areas (10 km buffer area) of the Project Area (ALA, 2022).

This is a specialised feeder dependent on seeds of Casuarinaceae (She-oak) trees. Breeding pairs nest in large hollows generally high up in large eucalypt trees or stags near water and food sources (Pavey et al., 2016). The species is capable of moving among isolated trees and small habitat patches within fragmented landscapes (Pavey et al., 2016; Holmes, 2012). Casuarinaceae food trees are abundant within the Project Area including Belah (*Casuarina cristata*), which occurs throughout the Project Area and Bull Oak (*Allocasuarina luehmannii*), which occurs in scattered woodland patches on sandy soils, however no evidence of feeding (chewed cones) was observed during field surveys. Potential nest trees also occur in remnant Eucalypt woodland and forest and in well-developed riparian corridors across the Project Area (BOOBOOK, 2022).

The total amount of habitat for this species within the Project Area 236.2 ha and is mapped on Figure 4-7. Senex has committed to not clearing any areas known to be occupied by Glossy Black-cockatoo individuals or areas confirmed as habitat for the species. A significant impact assessment based on guidance provided in the SIG 1.1 for a listed Endangered species, is presented in Table 1-9.

Table 1-9: Significant Impact Assessment for the Glossy Black-cockatoo

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species	The Project Area is unlikely to support an important population of the Glossy Black-cockatoo in the sense that there are currently no records of the species within the Project Area and there are large expanses of habitat available for the species in the network of remnant vegetation (including State Forests) outside of the Project Area. Senex has committed to not clearing any areas known to be occupied by Glossy Black-cockatoo (south-eastern) individuals or areas confirmed as habitat for the species. It is therefore unlikely that the project will lead to a long-term decrease in the size, reduce the area of occupancy, or fragment an important population. Climate change is a threat for the species based on the Conservation Advice in the form that rainfall is correlated with the breeding success for the species (DCCEEW, 2022b). The project will not contribute to or exacerbate the impacts of climate change. This is because the project will not fragment vegetated corridors or inhibit the Glossy Black-cockatoo's ability to move across the landscape in response to potential climate change induced changes to rainfall patterns. Mitigation measures such as preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, weed washdowns, certification and recordkeeping and the implementation of Senex's suite of management plans (as detailed in Section 6) will ensure that both direct and indirect impacts are further minimised to the species.	No
Reduce the area of occupancy of an important population		No
Fragment an existing important population into two or more populations		No
Adversely affect habitat critical to the survival of a species	The Project Area is unlikely to support an important population of the Glossy Black-cockatoo in the sense that there are currently no records of the species within the Project Area and there is large expanses of habitat available for the species in the network of remnant vegetation (including State Forests) outside of the Project Area. Senex has committed to not clearing any areas known to be occupied by Glossy Black-cockatoo (south-eastern) individuals or areas confirmed as habitat for the species. It is therefore unlikely that habitat critical to the survival of this species will be adversely affected. Indirect impacts are also unlikely to result in a significant impact to the species due to the implementation of mitigation measures which will include pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers, vehicle speed limits and limited vehicle movements, and the implementation of Senex's suite of management plans (as detailed in Section 6).	No
Disrupt the breeding cycle of an important population	There is no evidence that the Project Area supports an important population of this species. Senex has committed to not clearing	No

Criteria	Discussion	Criteria Triggered?
An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:		
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	any areas known to be occupied by Glossy Black-cockatoo (south-eastern) individuals or areas confirmed as habitat for the species. This project is therefore unlikely to disrupt the breeding cycle of an important population, modify or decrease the availability or quality of habitat to the extent that it will cause species decline. Further, mitigation measures to reduce impacts to the breeding cycle of the species as well as no impact the quality or availability of habitat include preferential use of previously cleared areas, pre-clearance surveys, HDD of crossings as required, burial of gathering pipes, RoW rehabilitation, use of spotter-catchers and the implementation of Senex's suite of management plans (as detailed in Section 6). It is also with the implementation of these mitigation measures, that indirect impacts are also unlikely to be significant to the species.	No
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species such as feral cats (*Felis catus*) are common pests encountered Queensland and are particularly harmful to native, threatened birds. This invasive species is known to occur in the Project Area. The Project activities during construction and operation will adopt and follow biosecurity measures that ensure that further invasive species are not introduced into the Project Area.	No
Introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Glossy Black-cockatoo populations in Queensland. There is also no evidence to suggest the project would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. Project activities during construction and operation will adopt and follow Biosecurity measures, including adherence to the Senex Biosecurity Management Plan Queensland Operations (SENEX-QLDS-EN-PLN-001) and Senex Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) (which includes requirements for weed washdowns, certification and record keeping for all vehicles and machinery), that will ensure that further invasive species are not introduced into the Project Area.	No
Interfere substantially with the recovery of the species.	There is no formal adopted, or made, Recovery Plan for this species. Additionally, Project activities will still enable habitat to remain connected between the network of State Forests and remnant vegetation in the adjoining areas and the Project Area, ensuring the species will not be substantially interfered with if they were to land and roost within the Project Area.	No
Significant Impact: Not Significant		

Migratory Only Species

Although White-throated Needletail are listed as Marine and Migratory under the EPBC Act, the species is also considered Vulnerable under the Act. Therefore, the White-throated Needletail has been assessed under the 'Threatened Species' section above, rather than the 'Migratory Only' species section.

Fork-tailed Swift (*Apus pacificus*)

The project in the Project Area is unlikely to lead to a significant impact to the Fork-tailed Swift.

The Fork-tailed Swift is listed as Marine and Migratory under the EPBC Act, under this Act, the species is not listed as threatened. The Fork-tailed Swift is almost exclusively aerial and occur mostly over inland plans and sometimes above foothills and coastal areas (Higgins, 1999). The Fork-tailed Swift was not observed during field surveys, and potential foraging habitat was assessed to occur over dry open habitats, where it would fly aerially over. Therefore, no habitat mapping was mapped on the ground.

The SIG 1.1 state that actions likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Important habitat for migratory species is explained as:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- Habitat that is of critical importance to the species at particular life-cycle stages, and/or
- Habitat utilised by a migratory species which is at the limit of the species range, and/or
- Habitat within an area where the species is declining.

An ecologically significant proportion of the population can be characterised by species population status, genetic distinctiveness and species-specific behavioural patterns.

The Fork-tailed Swift occurs across a large array of inland plans and foothills and is almost exclusively aerial in Australia. For this reason, the Project Area is not regarded as important habitat for this species and is unlikely to contain an ecologically significant proportion of the population. Additionally, as it is almost exclusively aerial, project activities are not predicted to cause any impacts to the species.

As this migratory species has been concluded not be an important population, and/or ecologically significant proportion of a population, an assessment against the SIG 1.1 has not been undertaken. Overall, the project in the Project Area is unlikely to lead to a significant impact to the migratory species.

APPENDIX F MSES SIGNIFICANT IMPACT ASSESSMENTS

Species Name	NC Act Status	Lead to long term decrease *	Extent of occurrence*	Fragmentation*	Habitat isolation*	Invasive species	Disease	Species recovery	Disruption*	Comment
Dulacca Woodland Snail (*Adclarkia dulacca*)	VU	✗	✗	✗	✗	✗	✗	✗	✗	■ This species was listed as likely to occur within the Project Area due to records existing in the 10 km buffer (adjoining areas). No species were recorded in field surveys from 2022. ■ Habitat was mapped for this species in the Project Area and included Acacia woodlands dominated by Brigalow (Acacia harpophylla) and Eucalypt dominated woodlands mainly with E. crebra and E. populnea. ■ A total of 52.6 ha of habitat is mapped in the Project Area, which will be avoided. Therefore, no SRI for this species.
Glossy Black-cockatoo (*Calyptorhynchus lathami lathami*)	VU	✗	✗	✗	✗	✗	✗	✗	✗	■ This species was listed as likely to occur within the Project Area due to records existing in the 10 km buffer (adjoining areas). No species were recorded in field surveys from 2022. ■ Habitat was mapped for this species in the Project Area and included all remnant and regrowth vegetation of most broad terrestrial broad habitat types particularly those dominated by Eucalypt species with large hollow bearing trees, along with remnant and regrowth RE with potential feed trees (Casuarinaceae spp.). ■ A total of 236.2 ha of habitat is mapped in the Project Area, which will be avoided. Therefore, no SRI for this species.
Greater Glider *(Petauroides volans*)	EN	✗	✗	✗	✗	✗	✗	✗	✗	■ This species was confirmed to be present based on being recorded in the Project Area in field surveys in 2022. ■ Habitat was mapped for this species and included all remnant vegetation of most broad terrestrial broad habitat types particularly those dominated by Eucalypt species wherever large trees with hollows occur in woodland connected with these corridors and also in the extensively wooded in the south of the Project Area. ■ A total of 174.5 ha of habitat is mapped in the Project Area, which will be avoided. Therefore, no SRI for this species.

Species Name	NC Act Status	Lead to long term decrease*	Extent of occurrence*	Fragmentation*	Habitat isolation*	Invasive species	Disease	Species recovery	Disruption*	Comment
Koala (*Phascolarctos cinereus*)	EN	✗	✗	✗	✗	✗	✗	✗	✗	■ The Koala was concluded as known to occur based on evidence of the species (scratch marks) identified in suitable habitat in the Project Area. ■ Habitat was mapped for the koala in terms of foraging and breeding habitat and dispersal habitat. Foraging and breeding habitat included all Eucalypt dominated woodlands and open forests, including riparian vegetation. Dispersal habitat included any cleared areas and Acacia dominated woodlands. ■ A total of 245.4 ha of foraging and breeding habitat and 1,602.5 ha of dispersal habitat is mapped in the Project Area, of which foraging and breeding habitat will be avoided, and up to 137 ha of previously cleared dispersal habitat will be disturbed (0.4% of total foraging and breeding habitat, and 8.5% of total dispersal habitat disturbed). This is unlikely to result in a SRI for this species.
Pale Imperial Hairstreak (*Jalmenus eubulus*)	VU	✗	✗	✗	✗	✗	✗	✗	✗	■ The Pale Imperial Hairstreak was concluded as likely to occur within the Project Area based on the presence of suitable habitat, in the absence of any records in the Project Area or greater adjoined areas. ■ A total of 48.1 ha of habitat is mapped in the Project Area, which will be avoided. Therefore, no SRI for this species.
Short-beaked Echidna (*Tachyglossus aculeatus*)	SLC	✗	✗	✗	✗	✗	✗	✗	✗	■ Recent records present within the Study Area from 2014, and there are various recent records within the locality for this species. ■ The species is a generalist and occurs across a variety of habitats throughout the Project Area, which includes open woodland, semi-arid and arid areas (Aplin et al., 2016). ■ This species is likely to occur at low densities. The Project Area contains 1,847.9 ha of potential general habitat (and up to 137 ha or 7.4% will be potentially disturbed as a result of the project).

Species Name	NC Act Status	Lead to long term decrease *	Extent of occurrence*	Fragmentation*	Habitat isolation*	Invasive species	Disease	Species recovery	Disruption*	Comment
White-throated Needletail (*Hirundapus caudacutus*)	VU	✘	✘	✘	✘	✘	✘	✘	✘	■ The White-throated Needletail was recorded in the Project Area. ■ Species likely only to fly aerially over the Project Area (through September to April on its migration), which contains no rainforest vegetation. The Project Area does not contain habitat in the form of elevated Eucalypt forests or wooded ridges to act as foraging and roosting habitat for the species. ■ Habitat mapping has therefore not been undertaken for this species as it is only likely to fly aerially over the Project Area. ■ The project is unlikely to impact the species based on no indirect or direct impacts to habitat.

NC Act listing status: EN = Endangered, VU= Vulnerable, NT = Near Threatened, SLC = Special Least Concern.

□ Indicates it is unlikely that a significant residual impact will occur.

□ Indicates there is potential for a significant residual impact

APPENDIX G KEY PERSONNEL CVS

Dr David Dique

Partner

David is a Brisbane based Partner that has held state government and private consultancy roles throughout his 25 year career. David has extensive experience in Queensland's resources sector, having provided approvals leadership and technical support for a number of Tier 1 and 2 mining and oil and gas clients. David's resource sector experience includes leading EPBC Act, EIS and EA amendment approvals and delivering operational support aligned with EA and EPBC Act condition requirements. David is currently a DAWE approved Principal Ecologist.

From an academic and research background, David has a detailed understanding of principles that underpin biodiversity research, survey and assessment, management, monitoring, rehabilitation and offsetting. This, coupled with experience in biodiversity conservation planning and policy development from state government, has enabled David to provide high-level strategic approvals advice for major projects in the resources sector. David has recently provided technical oversight for projects being undertaken against IFC Principles in south-east Asia and PNG. This has included baseline surveys and impact assessments, referral preparation, MNES reporting, World Bank Guidelines and IFC PS6 assessments and regulator and financier liaison for geothermal and other resource projects.

Experience: 25 years' experience, including providing compliance and approvals advice to the Oil and Gas Sector

Email: David.Dique@erm.com

Education

- 2004 – Doctor of Philosophy: University of Queensland, Brisbane Qld
- 1994 – Bachelor of Natural Resources (Hons 1): UNE, Armidale NSW
- EIANZ Certified Environmental Practitioner (Ecology Specialist)
- Department of Agriculture, Water and the Environment (DAWE) Suitably qualified ecologist

Languages

- English, native speaker

Fields of Competence

- Contract Management
- Major project delivery
- State and Federal strategic approvals
- Environmental due diligence
- EA compliance and auditing
- Ecological survey design and assessment
- Biodiversity impact assessment/EIA
- Biodiversity policy and legislation
- Rehabilitation Management
- Threatened Species habitat mapping
- Biodiversity Offsets
- EPBC Act referral and MNES reporting
- IFC and World Bank Biodiversity assessments

Key Industry Sectors

- Oil & Gas
- Mining
- Government
- Infrastructure
- Renewables

Key Projects

Oil and Gas

- Project Director for Western Surat Gas Project EA amendment application and Public Environment Report, supporting State and Commonwealth approvals, Senex Energy, Surat Basin
- Project Director for ecological assessment for Project Atlas supporting development of approvals documentation, Senex Energy, Surat Basin
- Project Director for ecological assessments for Reid's Dome Project, State Gas, Surat Basin
- Project Director Receiving Environment Monitoring Plan 2019 Review APLNG facility, ConocoPhillips, Gladstone
- Project Director Weed and rehabilitation monitoring on Curtis Island, APLNG facility, ConocoPhillips, Gladstone
- Project Director Shorebird Monitoring 2018-2021, APLNG facility, ConocoPhillips, Gladstone
- Project Director for North Surat EA amendment and EPBC Act Referral for expansion of gasfields and associated infrastructure, Shell (QGC), Surat Basin
- Project Director for confidential gas field expansion, EA amendment and Commonwealth approvals documentation, Confidential Client
- Project Director for ATP 852 gas field, EA amendment and supporting EPBC Act referral and MNES report, QCLNG Project
- Independent Peer Reviewer for Rehabilitation Management Plan Audit for Surat Basin Acreage, QCLNG, Surat Basin
- Project Director for pre-clearance surveys and threatened species surveys for 420km gas pipeline, Santos GLNG, Roma to Gladstone
- Project Director for Rehabilitation Management Plan and analogue site assessment for 420km gas pipeline, Santos GLNG, Roma to Gladstone
- Project Director for the Western High Pressure Gas Network (WHPGN) ex. Combabula Spur Pipeline Construction Audit, Origin, APLNG, Surat Basin
- Project Director for a Third Party Environmental Compliance Audit (EA conditions, pipeline construction) for Origin, APLNG, Surat Basin
- Project Director for two Third Party Environmental Compliance Audits pipeline construction for Santos, GLNG, Surat Basin
- Project Director for analogue site identification, assessment for gas fields and pipeline for QGC, QCLNG, Roma
- Project Director for the development of the QCLNG Project offset plan under State and Federal statutory approvals, QGC Surat Basin
- Project Director for MNES reporting and Referral preparation for expansion of operations in Spring Gully, APLNG, Surat Basin
- Project Director for pre-clearance surveys and ecological investigations associated with gas field expansion and related infrastructure for Origin, APLNG, Roma
- Project Director for a Third Party Environmental Compliance Audit (MCU, CISDA, GSD) for Origin, APLNG, Surat Basin
- Project Director for EPBC Act Compliance Audit for QGC, QCLNG, Surat Basin
- Project Director for a variety of Tier 2 approvals and permits (e.g. water way barrier works, vegetation clearing permits) for Origin and QGC, APLNG and QCLNG, Surat Basin
- Project Director for water mouse surveys (over 12 month period) and preparation of water mouse management plan at the Narrows for QGC, GCLNG, Gladstone
- Project Director for ecological investigations for Spring Gully gas field expansion to support EA amendment for Origin, APLNG, Surat Basin
- Project Director for Wildlife Management Plan, pipeline construction team, QGC, QCLNG, Roma
- Project Director for *Nature Conservation Act* 1992 Vegetation Clearing permits and approvals, Santos, GLNG, Roma

Other Relevant Projects

- Project Director for EPBC Act referral preparation, provision of strategic approvals advice and ecological assessment for 250km pipeline from Moranbah to Alpha, Sunwater
- Project Director for Ecology Impact Assessment and MNES reporting for Bruce Highway Upgrade (Cooroy to Curra Stage D), DTMR, Gympie
- Technical Biodiversity Lead for Confidential Rail assessment in South-east Qld for DFRC project, Port of Brisbane
- Technical lead for Alpha Rail EIS, ecology, for a 500km proposed rail alignment, strategic approvals advice for the Alpha mine and rail component of the project through federal approvals process, Hancock/GVK
- Technical lead for Carmichael Coal mine, ecology and threatened species management and strategic approvals advice for mine and rail for Carmichael Coal Mine, Adani, Galilee Basin

Matt Davis

Principal Ecologist

Matt has experience advising clients from a variety of sectors and markets. He has considerable expertise in the transport sector, having managed biodiversity and environmental approvals for major road, rail and port projects for government and private clients. This includes leading multidisciplinary teams of ecology specialists from a variety of technical backgrounds, including zoologists, botanists, aquatic and marine ecologists whilst working with planners, engineers, project managers and designers.

Matt has also worked in renewables projects across Australia, including onshore and offshore wind projects in NSW, Victoria, South Australia and Western Australia, pumped hydro storage approvals and feasibility, energy

Experience: 14 years' experience

LinkedIn: https://www.linkedin.com/in/matt-davis-84545854/

Email: matt.davis@erm.com

Education

- BSc – Ecology (Griffith University, 2007)
- MEnvMan – Conservation Biology (UQ, 2017)

Professional Affiliations and Registrations

- Biodiversity Assessment Method Accredited Assessor (BAAS18090) – delivered BDARs for road, ferry terminal, wind farm and energy from waste major projects
- Certified Environmental Practitioner (CEnvP 582)
- Suitably Qualified Person under Queensland Flora Survey Guidelines
- Member Environment Institute of Australia and New Zealand)

Languages

- English, native speaker

Fields of Competence

- Biodiversity and infrastructure
- Biodiversity impact assessment
- State legislation and approvals strategies
- EPBC Act approvals, reporting and strategies
- Biodiversity offsets
- Vegetation management
- Botany and threatened flora
- Ecological restoration
- Threatened species habitat assessment and mapping
- GIS applications for ecological information
- Due diligence assessments for biodiversti

Key Industry Sectors

- Government
- Renewables
- Infrastructure
- Water
- Property development

Key Projects

Dawsonvale Offsets Review
Matt led a field team undertaking biocondition assessments and review of requirements for a potential offset site against the EPBC Act Offsets Policy.

RMA 1 Ecology Assessment
Matt is leading ecological field assessment and reporting to support EPBC Act approval variation for a residual management area for aluminium refinery.

Wambo Wind Farm
Matt is currently providing technical review and oversight finalising the EPBC Act preliminary documentation and bird and bat management plan to support Commonwealth and State approvals

HyEnergy Project
Matt is the biodiversity lead, currently scoping and implementing fieldwork to contribute to Western Australia and EPBC Act approvals, as well as to inform design layouts.

Australis Offshore Wind Farms
Matt was the biodiversity lead, providing ecological input into State and EPBC Act referrals for sites in Western Australia, South Australia and Victoria.

Hills of Gold Wind Farm
Matt was the biodiversity lead for 420MW wind far project completing the EPBC Act referral and EIS for the State Significant Development. He coordinated fieldwork, reviewed and authored reports

Cultana Pumped Hydro Storage
Matt was the ecology lead for the project and provided ecology to the project Ecological Assessment Report and Terrestrial Study Report, including assessment of impacts to all environmental values on site as well as EPBC Act referral

Darlington Point Solar Farm
Matt provided technical reviews for the biodiversity assessments of this 275MW solar farm. He prepared the EIS chapter for biodiversity and managed the field team completing surveys and assessment.

Western Sydney Energy and Resource Recovery Centre
Matt was the biodiversity lead for the State Significant Development EIS coordinating terrestrial and aquatic components. He reviewed and authored the technical reports and EIS chapter.

Newcastle GasDock
Matt provided early marine and terrestrial biodiversity assessments to inform siting decisions. This included fieldwork for threatened frogs and review of marine and benthic habitats, including sections within Commonwealth waters.

Kamay Ferry Terminals
Matt was the biodiversity lead for this State Significant Infrastructure project, coordinating teams of terrestrial and marine ecologists. He reviewed the reporting, including EIS technical reports, as well as NSW and EPBC Act offset strategies.

Beerburrum to Nambour Rail Upgrade
Matt provide technical reviews for fieldwork and reporting to support Qld approvals and an EPBC Act referral. Design advice was also provided for fauna structures to be included in the reference design.

ARTC Inland Rail Environmental Assessment and Technical Advisor
Matt was the Arup ecological lead for the Inland Rail Phase 1 environmental assessment for the G2C project. Matt continued to work with ARTC as an ecology subject matter expert, providing technical advice to ARTC during the delivery of the project

Canberra Light Rail, Stage 2a and 2b
Matt led technical reviews and coordination for ecology components of the project, which included field surveys and preparation of Preliminary Documentation under the EPBC Act

Amelia James

Ecologist

Amelia is an Ecologist at ERM, based in Brisbane, Queensland. Amelia holds a Bachelor of Science, majoring in Ecology, from the University of Queensland (2016) and Graduate Certificate in Environmental Management from the University of Queensland (2019). Amelia joined ERM in November 2019.

Amelia has experience which includes biodiversity assessments (flora and fauna surveys), vegetation community mapping and environmental due diligence assessments. Amelia statistically analyses and interprets field data to prepare a variety of technical reports and deliverables in the areas of ecology, contaminated land, environmental monitoring and environmental licensing.

Experience: 3 years' experience in Environmental Consulting

LinkedIn: www.linkedin.com/in/ameliajames11019996

Email: amelia.james@erm.com

Education

- Graduate Certificate of Environmental Management, University of Queensland, Australia, 2019
- Bachelor of Science (majoring in Ecology), University of Queensland, Australia, 2016

Professional Affiliations and Registrations

- Environmental Institute of Australia and New Zealand (EIANZ) member of the Professional Development, Student and Early Career Professionals and SEQ Committees

Languages

- English, native speaker

Fields of Competence

- Flora and Fauna Surveys (targeted and ad hoc)
- Threatened Matters Desktop Reviews
- Environmental Impact Assessments
- Ecological Reporting
- Federal, state and local biodiversity legislation and policies
- Due Diligence Assessments (Ecological)
- Client and Stakeholder Engagement
- Natural Heritage Assessments

Key Industry Sectors

- Renewable Energy
- Resources
- Community and Stakeholder Engagement

Key Projects

ARTC Inland Rail Management Plans and Impact Assessments (QLD and NSW), 2022
Preparation of impact assessments and management plans for a suite of documentation relating to the Inland Rail Program.

Multiple EPBC Act Referral Preparations (QLD and NSW) (2020-2022)
Amelia has assisted in the preparation of over 10 EPBC Act referral submissions, including those which are now in the approvals stages. This includes renewable energy projects and linear infrastructure.

Wambo Windfarm Preliminary Documentation (2021)
Amelia assisted in the preparation of the Wambo Wind Farm PD preparation and approvals process. This included the development of an Offsets Strategy for impacted MNES.

Bushfire Management Plan Preparation, Hayman Island InterContinental Resort (QLD), 2021
Involved fieldwork to identify flora species, slope and potential dangers present in order to determine the bushfire rating of the proposed development.

Shorebird monitoring and report preparation, ConocoPhillips, Gladstone (QLD), 2021
Involved shorebird surveys from a vessel and data analysis to identify trends and relationships with shorebird frequency and density over time. This also involved the development of recommendations to ensure species management and protection in the future.

Ecological Surveys, Windfarms across NSW and Qld
Involved bird utilisation surveys and harp trapping for birds and bats in a potential windfarm site in western Queensland, as well as detailed ecological surveys (including targeted flora surveys) in locations across NSW and QLD.

EPBC Referral Preparation, ARTC K2ARB Inland Rail and Wambo Wind Farm (QLD), 2020
Involved the preparation of the EPBC referral documentation, including MNES significant impact assessments, from information reported in the Ecological Baseline Assessments.

EPBC Referral Preparation, ARTC K2ARB Inland Rail and Wambo Wind Farm (QLD), 2020
Involved the preparation of the EPBC referral documentation, including MNES significant impact assessments, from information reported in the Ecological Baseline Assessments.

ARTC K2ARB Inland Rail EIS Document Preparation (QLD), 2020
Involved in a specialised team to write specific technical reports for the K2ARB Project. This involved extracting and condensing information from technical reports and then undertaking impact assessments with this information. EIS Chapters prepared included Flora and Fauna, Noise and Vibration, Cultural Heritage, Cumulative Impacts, Biosecurity, MNES and Hazard and Risk.

ARTC K2ARB Inland Rail Ecological Assessment and Report (QLD), 2020
Undertook a two day ecological survey, involving habitat assessments, spotlighting and targeted frog calls, to identified ecological values. This information was used in compilation with other reports on the area, to determine the ecological values and constraints for the K2ARB Project section of the Inland Rail Program.

Wambo Wind Farm: Noise and Visual Landscape Assessments (QLD), 2020

ARTC Environmental Constraints Management Options Review (QLD), 2020
Involved the compilation of management/design options that best mitigate environmental constraints/risks identified during the baseline reporting phase.

Dr Timothy Howell

Aquatic Ecologist

PhD (Research), Aquatic Science,
Griffith University, 2008

Bachelor of Science (Aquatic Science) (Hons),
Deakin University, 1999

Tim is a career aquatic ecologist with 20 years' professional experience. He holds a degree with honours in Aquatic Science and a PhD (research) in fish ecology and river rehabilitation. Tim has worked on a broad range of projects for the industry, government agencies, universities, and in collaboration with multiple organisations. Clients include industries such as mining, energy, water supply, aviation, transport, state government, city and regional councils, as well as local business.

Tim is knowledgeable at designing, leading and completing scientific investigations for a range of purposes, such as environmental impact assessment, compliance monitoring, receiving environment monitoring programs (REMP), biological impact monitoring, targeted species monitoring programs, baseline surveys, management plans (species specific, general aquatic values and water quality), research and development and desktop/literature reviews.

Professional career history

2014 – Present	Principal Aquatic Ecologist	Freshwater Ecology Consulting
2012 – 2014	Aquatic Ecology Coordinator	AMEC Environment & Infrastructure Pty Ltd
2011 – 2012	Senior Aquatic Ecologist	Ecosure Pty Ltd
2009 – 2011	Senior Environmental Scientist	Aquateco Pty Ltd
2008 – 2009	Research Assistant	Australian Rivers Institute, Griffith University
2003 – 2006	Research Assistant	NSW DPI Fisheries
2003 – 2008	PhD Candidate	Australian Rivers Institute, Griffith University
2002 – 2003	English Teacher	Various companies (Japan)
1999 – 2000	Supervisor / Manager	Gulf Pearls (Sudan)

About Freshwater Ecology Consulting

Freshwater Ecology is a specialist consultancy that:

- Provides highly respected and experienced aquatic scientists
- Offers practical and scientifically defensible solutions
- Delivers projects within agreed timeframes and budgets
- Guarantees high quality outputs delivered cost-competitively

Selected Project Experience

Environmental Impact Assessment - EIA / EIS / ESIA

Mining & Gas

- **Atlas Gas Project - aquatic ecology baseline assessment (2022-ongoing),** central Queensland. ERM / Senex.
  Role: Project manager, Field operator, Data analysis, Author.
- **Eva Copper Project - aquatic ecology baseline assessment (2021-ongoing),** Gulf Country Queensland. EMM / Copper Mountain Mining Corporation.
  Role: Project manager, Field operator, Data analysis, Author.
- **Reid's Dome Project - aquatic ecology baseline assessment (2021-ongoing),** central Queensland. ERM / State Gas.
  Role: Project manager, Field operator, Data analysis, Author.
- **Commodore Coal - aquatic ecology baseline assessment (2020-2022),** Darling Downs, Queensland. E2M / SLR.
  Role: Project manager, Field operator, Data analysis, Author.
- **Jericho Project - preliminary aquatic ecology baseline assessment (2019),** Gulf Country, Queensland. Golder Associates / Oz Minerals.
  Role: Project manager, Technical reviewer.
- **Bauxite Hills Project (2014-2016),** Cape York, Queensland. MetroCoal / AMEC.
  Role: Project manager, Field operator, Data analysis, Author.
- **Bowen Gas Project - Supplementary EIS (2015)**, central Queensland. Environment and Heritage Partners/ Arrow Energy.
  Role: Field operator.
- **Comet Ridge Coal Project EIS (2014),** central Queensland. Tecsol.
  Role: Project manager, Field operator, Data analysis, Author.
- **Surat Gas Project - Supplementary EIS (2012-2013)**, south Queensland. Coffey Environments/ Arrow Energy.
  Role: Project manager, Field operator, Data analysis, Primary co-author.
- **Byerwen Coal Project - Supporting REMP desktop assessments for supplementary aquatic ecology EIS (2013-2014)**, central Queensland. QCoal.
  Role: Project Manager, Author.
- **Byerwen Coal Project EIS (2013),** central Queensland. QCoal.
  Role: Project manager, Field operator, Data analysis, Co-author.
- **Bowen Gas Project EIS (2010-2012)**, central Queensland. Arrow Energy.
  Role: Project manager, Field operator, Data analysis, Primary co-author.
- **Ravenswood Mine (2011-2012)**, north Queensland. Resolute Mining Limited / Coffey Environments.
  Role: Project manager, Field operator, Data analysis, Primary co-author.
- **Wilton Coal Project (2012),** central Queensland. Northern Resource Consultants.
  Role: Field operator.
- **Belvedere Coal Project (2010-2011),** central Queensland. Ecological Survey and Management.
  Role: Field operator, Data analysis, Co-author.
- **New Ensham Coal Project (2010),** central Queensland. MatrixPlus.
  Role: Project manager, Field operator, Data analysis, Co-author.
- **Surat Gas Project (2009-2010)**, south Queensland. Coffey Environments/ Arrow Energy.
  Role: Field operator, Data analysis, Co-author.
- **Sarum Mine (2009-2010)**, north Queensland. Xstrata Coal.
  Role: Field operator, Data analysis, Co-author.

- **Millennium Mine Expansion (2009-2010)**, central Queensland. Peabody Energy.
  Role: Data analysis, Co-author.

Infrastructure

- **Mt Rawdon Pumped Hydro Project (2021-ongoing),** central Queensland. 3D Environmental, ERIAS Group.
  Role: Project manager, Field operator, Data analysis, Author.
- **Inland Rail. Gowrie to Helidon, Helidon to Calvert, Calvert to Kagaru sections (2020-ongoing),** south-east Queensland. EMM / ARTC.
  Role: Project manager, Field operator, Data analysis, Author.
- **Urannah Dam (2020),** north Queensland. GHD / Bowen River Utilities.
  Role: Field operator.
- **Toowoombah Dam upgrades (2020),** south-east Queensland. GHD / Toowoomba Regional Council.
  Role: Field operator.
- **Tiaro Flood Immunity Upgrade, Bruce Highway (2020),** south-east Queensland. Red Ash / Jacobs / TMR.
  Role: Project manager, Field operator, Data analysis, Author.
- **Cammura to Moree Inland Rail Upgrade (2020)**, NSW. Golder Associates / ARTC.
  Role: Project manager, Author.
- **Mt Lindsey Highway Jimboomba Creek crossing upgrade (2018),** south-east Queensland. E2M / Jacobs / TMR.
  Role: Project manager, Author.
- **Woolgoolga to Ballina Pacific Highway Upgrade Threatened Fish Management Plan (2014 – 2015)**, NSW. AMEC Foster Wheeler / NSW Roads and Maritime Services.
  Role: Final Technical Review.
- **Sunshine Coast Airport Expansion (2012-2014),** south-east Queensland. The Longview Group/ Sunshine Coast Council.
  Role: Project manager, Field operator, Data analysis, Co-author.
- **Noosa Sewage Plant Upgrade (2012)**, south-east Queensland. ARUP / Unity Water.
  Role: Project manager, Field operator, Data analysis.
- **Caloundra South Urban Development (2010-2011)**, south-east Queensland. ARUP / Stocklands.
  Role: Project manager, Field operator, Data analysis, Author.
- **Sydney Airport Runway Extension (2009)**, NSW. Sydney Airport.
  Role: Data analysis, Co-author.
- **APLNG western high pressure gas network - Aquatic values survey report and environmental management (2012),** south-east Queensland. Origin Energy.
  Role: Technical review.
- **Sarina Rail Upgrade (2010)**, central Queensland. Boyds Bay Environmental Services / Aurizon (formerly QR National).
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Wembley Road Upgrade (2010)**, south-east Queensland. Dept. Transport and Main Roads.
  Role: Field operator, Data analysis, Co-author.
- **Sydney Airport Runway Extension (2009)**, NSW. Sydney Airport.
  Role: Data analysis, Co-author.
- **Jabiru Island Road Upgrade (2009)**, south-east Queensland. Dept. Transport and Main Roads.
  Role: Data analysis, Co-author.

Receiving Environment Monitoring Program - REMP (Water Quality and Biological)

- **Mt Garnet Dalcouth REMP (2022-ongoing)**, north Queensland. MGT Minerals.
  Role: Project Manager, Primary Author.
- **Cook Colliery – REMP design and sampling (2021-ongoing)**, central Queensland. QCoal.
  Role: Project Manager, Primary Author.
- **QCoal Northern Hub Mines (Sonoma, Cows, Jax and Drake Mines) – REMP design and sampling (2015-ongoing)**, central Queensland. QCoal.
  Role: Project Manager, Field operator, Data analysis, Author.
- **Byerwen Coal Project – REMP design and sampling (2015-ongoing)**, central Queensland. QCoal.
  Role: Project Manager, Author.
- **Macarthur River Mine REMP Independent Monitor (2021-ongoing)**, Northern Territory. Advisian.
  Role: Project Manager, Author.
- **Nathan River Mine (2021-ongoing)**, Northern Territory. Nathan River Resources.
  Role: Project Manager, Data analysis, Author.
- **Lady Annie Mine (2020-ongoing)**, north Queensland. SGM Environmental / CST Mining.
  Role: Project Manager, Field Operator.
- **Foxleigh Coal Mine (2021)**, central Queensland. Nitro Solutions.
  Role: Field operator, Data analysis, Co-author.
- **Eagle Downs REMP (2015-2018),** central Queensland. MetroCoal / AMEC.
  Role: Project manager, Field operator, Data analysis, Author.
- **Stanwell Power Station REMP Monitoring & Reporting (2014-2019)**, central Queensland.
  Role: Field Operator, Technical Review.
- **Bundaberg regional Council sewage REMP (2019)**, central Queensland. Blue Earth Environmental / GHD / Bundaberg Regional Council.
  Role: Field Operator.
- **Bauxite Hills Project REMP (2017-2018),** Cape York, Queensland. MetroCoal/ AMEC.
  Role: Project manager, Field operator, Data analysis, Author.
- **Curragh Coal Mine (2014)**, central Queensland. AECOM/ Wesfarmers Resources
  Role: Data Analysis.

- **Ravenswood Mine (2011-2012)**, north Queensland. Resolute Mining Limited / Coffey Environments.
  Role: Project manager, Field operator, Data analysis, Primary co-author.
- **Fosterville Gold Mine (2011-2012)**, central Victoria. Crocodile Gold (formerly AuRico Gold).
  Role: Field Operator, Data Analysis, Co-author.

Compliance Monitoring (Water Quality and Biological)

- **Tweed Sands Plant fish and aquatic macroinvertebrate assessment (2020)**, northern NSW. Hanson Pty Ltd.
  Role: Project manager, Field operator, Data analysis, Author.
- **Tumbulgum Quarry aquatic ecology assessment (2020)**, northern NSW. Golder Associates.
  Role: Project manager, Field operator, Data analysis, Author.
- **Condamine River gas seeps measurements (2016 - 2020)**, south-east Queensland. Origin Energy.
  Role: Field operator.
- **APLNG pipeline waterway crossing assessment (2015)**, south-east Queensland / central Queensland. Origin Energy / E2M.

Role: Project manager, Field operator, Data analysis, Author.

- **Defence base water quality monitoring program (2012)**, south-east Queensland / Northern NSW. Department of Defence / Spotless.
  Role: Field operator, Technical reviewer.
- **Monslatt surface and groundwater baseline monitoring (2010-2012)**, central Queensland. Blue Energy.
  Role: Project manager, Field operator, Data analysis, Co-author.
- **Forsaythe surface and groundwater baseline monitoring (2012)**, north Queensland. Altius Mining.
  Role: Technical review.
- **Townsville Airport water quality monitoring program (2012)**, central Queensland. Townsville Airport.
  Role: Field Operator.
- **Cobaki Broadwater – ecosystem health and habitat monitoring (2009-2010)**, south-east Queensland. Gold Coast Airport.
  Role: Data analysis, Co-author.

Groundwater Dependant Ecosystem / Stygofauna Survey

- **Atlas Gas Project (2022-ongoing),** central Queensland. ERM / Senex.
  Role: Project manager, Field operator, Data analysis, Author.
- **Eva Copper Project (2022-ongoing),** Gulf Country Queensland. EMM / Copper Mountain Mining Corporation.
  Role: Project manager, Field operator, Data analysis, Author.
- **Urannah Project (2022),** central Queensland. Bowen River Utilities.
  Role: Project manager, Field operator, Technical Reviewer.
- **Blackwater Coal Mine (2020-2021),** central Queensland. BMA.
  Role: Project manager, Field operator, Technical Reviewer.
- **Newlands Girrah Project (2019),** central Queensland. Newlands Coal.
  Role: Project manager, Technical Reviewer.
- **Western Surat Gas Project (2017),** central Queensland. ERM / Senex.
  Role: Project manager, Co-author.
- **Drake Coal Project (2015),** central Queensland. QCoal.
  Role: Project manager, Field operator, Data analysis, Co-author.
- **Byerwen Coal Project (2013),** central Queensland. QCoal.
  Role: Project manager, Field operator, Data analysis, Co-author.
- **Ravenswood Mine (2011-2012)**, north Queensland. Resolute Mining Limited / Coffey Environments.
  Role: Project manager, Field operator, Data analysis, Co-author.

Ecotoxicology

- **Ross River PFAS investigations (2018)**, north-east Queensland. Department of Defence.
  Role: Project manager, Data analysis, Field operator, Author.
- **Stanwell Power Station – potential impacts** of **copper and zinc in water and sediments (2017)**, central Queensland. AECOM / Stanwell Corporation Ltd.
  Role: Project manager, Data analysis, Author.
- **Cobaki Broadwater – oyster bioaccumulation study (2009-2010)**, south-east Queensland. Gold Coast Airport.
  Role: Data analysis, Co-author.

- **Sydney Airport runway extension – oyster bioaccumulation study (2009)**, NSW. Sydney Airport.
  Role: Data analysis, Co-author.
- **Co Dinh chromite mine - aquatic resources scoping and ecotoxicology preliminary assessment (2010),** Vietnam. Archipelago Resources.
  Role: Project manager, Field operator, Data analysis, Author.

Biodiversity Surveys

- **Local Waterway Health Assessment (2016-ongoing)**, south-east Queensland. Queensland Urban Utilities / Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Freshwater fish biodiversity assessment of the Mandingalby-Yidinji country (2014-ongoing)**, Queensland wet tropics, Australia. 3D Environmental.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Scrubby Creek catchment fish assemblage assessment (2021)**, south-east Queensland. Redfin AquaSciences / Logan City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Slacks Creek catchment fish assemblage assessment (2021)**, south-east Queensland. Redfin AquaSciences / Logan City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Sherwood Arboretum Park Lake aquatic macroinvertebrate and macrophyte assessment (2021)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Forest Lake aquatic ecology assessment (2019-2020)**, south-east Queensland. Queensland Urban Utilities / Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Biami Yumba Lake aquatic macrophyte and fauna assessment (2020)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Edenbrooke Park Lake aquatic macrophyte assessment (2020)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Aquatic fauna assessment of 7th Brigade Park (2019-2020)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Freshwater fish and aquatic macrophytes of Drewvale Dam (2019)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Freshwater fish and aquatic macrophytes of Einbunpin Lagoon (2019)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Aquatic ecology assessment of Cannery Creek (2018)**, south-east Queensland. Queensland Urban Utilities.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Aquatic ecology baseline assessment for Caloundra development (2018)**, south-east Queensland. Blue Earth Environmental/ NGH Environmental / Sunshine Coast Council.
  Role: Field Operator.
- **Freshwater fish and aquatic macrophytes of Dan Stiller Reserve (2018)**, South-East Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.

- **Freshwater fish of Moggill Creek (2017)**, south-east Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Freshwater fish of Enoggera Creek (2017)**, central Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Freshwater fish of Ithaca Creek (2017)**, central Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Freshwater fish of Spring Creek (2016)**, central Queensland. Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Townsville Airport biodiversity assessment (2012)**, central Queensland. Townsville Airport.
  Role: Field operator.
- **Robina Lakes - Aquatic ecology audit and macrophyte harvesting program assessment (2010)**, south-east Queensland. Gold Coast City Council.
  Role: Data analysis, co-author.
- **Cobourg Peninsular biodiversity assessment (2010)**, Northern Territory. AECOM / Department of Sustainability, Environment, Water, Population and Communities.
  Role: Macroinvertebrate data analysis and interpretation.
- **Assessment of fish communities of the Hunter, Manning, Karuah and Macquarie Tuggerah catchments (2003-2004)**, Hunter and Central Rivers Catchment Management Authority.
  Role: Project manager, Field operator, Data analysis, Author.

Targeted Species Investigations

- **England Creek Riverbank Stabilisation Project Fernvale threatened fish and platypus assessment (2019)**, south-east Queensland. SEQ Water.
  Role: Project manager, Field Operator, Data Analysis, Author.
- **Targeted EVNT species (Oxleyan Pygmy Perch and Honey blue-eye) (2019),** South-east Queensland. Blue Earth Environmental / NGH Environmental / Sunshine Coast Council.
  Role: Field Operator.
- **Oxleyan Pygmy Perch surveys (2014-ongoing)**, south-east Queensland. Volunteer collaboration.
  Role: Project manager, Field Operator, Data Analysis, Author.
- **Macquarie Perch population monitoring in the Yarra River (1994 - ongoing),** Victoria.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Oxleyan Pygmy Perch management plan, Woolgoolga to Ballina (2015-2016),** south-east Queensland. AMEC Foster Wheeler / NSW Roads and Maritime Services.
  Role: Author of the final version of the Management Plan.
- **Cotter Dam upgrade - Potential impacts of a dam enlargement on a nationally threatened fish species (2010),** Australian Capital Territory. Hydronumerics / ACTEW.
  Role: Project manager, Expert review.
- **Potential impacts of dredge spoil on barramundi spawning grounds (2010)**, Darwin, Northern Territory. INPEX.
  Role: Desktop review, Gap analysis, Author.
- **Effects of suspended sediment exposure on early life stages of barramundi (2010)**, Darwin, Northern Territory. INPEX.
  Role: Expert advice.
- **Macquarie Perch coastal population assessment (2006),** central coast NSW. Sydney Catchment Management Authority, central NSW.
  Role: Field operator.
- **Age and growth of Estuary Perch in the Hopkins River (1998),** south-west Victoria. Deakin University.
  Role: Project manager, Field operator, Data analysis, Author.

Expert advice / witness

- **Nucrush Quarry (2022-ongoing),** south-east Queensland. Connor O'Meara Solicitors.
  Role: Expert witness.
- **Moorabool Quarry aquatic ecology assessment (2020)**, south-east Queensland. Edith Pastoral Company.
  Role: Project manager, Field operator, Data analysis, Author.
- **Eastern Golf Course Relocation Project – Hazard identification and gap analysis (2010-2011),** Victoria. Robert Luxmore Project Management.
  Role: Gap analysis, expert witness advice.

Risk Assessment

- **Insurance Risk Assessment – Significant sewage facility failure (2022),** south-east Queensland. Queensland Urban Utilities.
  Role: Development and costing of a hypothetical monitoring program.
- **Beaconsfield Mine Tailings Recovery Project – Hazard identification and gap analysis (2012),** Tasmania. Beaconsfield Mining.
  Role: Gap analysis, expert review.

Fishway Assessment

- **Willawong Fish Passage Assessment (2021)**, south-east Queensland. Queensland Urban Utilities / Brisbane City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Scrubby Creek Queens Road culvert fish passage assessment (2021)**, south-east Queensland. Redfin AquaSciences / Logan City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Slacks Creek assessment of fish barriers (2021)**, south-east Queensland. Redfin AquaSciences / Logan City Council.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Gregory River Wide Bay Pipeline upgrade (2021)**, south-east Queensland. Blue Earth Environmental.
  Role: Field Operator.
- **Aurizon Network culvert upgrades (2020)**, central Queensland. AECOM / Aurizon.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Waterway assessment and expert advice on waterway barrier and fish passage for a new dam development (2018 - 2020)**, north Queensland. Mulgowie Farming Company.
  Role: Project Manager, Field Operator, Data Analysis, Author.
- **Sideling Creek Dam Spillway Fishway Monitoring Plan (2019)**, south-east Queensland, Australia. SEQ Water.
  Role: Project manager, Author.
- **Cedar Grove fish passage assessment (2014, 2019)**, south-east Queensland, Australia. SEQ Water.
  Role: Field operator.
- **Wiggins Island Rail Loop - fish passage and geomorphological condition monitoring (2013)**, central Queensland. Aurizon.
  Role: Project manager, Field operator, Technical reviewer.
- **Fish passage assessments of various fishways including Warren, Gunningbah, Duck Creek, Crooked Creek, Manilla (2005)**, NSW. NSW Fisheries.
  Role: Field operator.

- **Fish passage assessments of a rock ramp fishway on the Merri River (1998)**, south-west Victoria. Deakin University.
  Role: Field operator.

Catchment / Waterway Health Monitoring

- **Moggill Creek Health Monitoring Program (2011-2016),** south-east Queensland, Moggill Creek Catchment Group.
  Role: Project manager, Experimental design, Design of sampling protocol, Community training, Field operator, Data analysis, Author.
- **Hydro-Ecological Relationships and Thresholds to Inform Environmental Flow Management and River Restoration (2008-2009)**, south-east Queensland, Griffith University.
  Role: Scientific advisor, Field operator, Backpack Electrofishing trainer.
- **Sustainable Rivers Audit – Fish theme (2004),** central NSW, Murray-Darling Basin Commission.
  Role: Field operator.

Training Courses

- **Fishing with Electricity: Theory, Principles and Application (Short Course) (2010)**, Brisbane.
  Role: Project manager (organisation of national/ international experts and course content), Field trainer.

Training / Certification

- Senior Backpack Electrofisher Operator
- Senior Boat Electrofisher Operator
- Commercial Boat License (enclosed waters)
- AUSRIVAS accredited in NSW and QLD
- QLD Generic Coal Induction (Standard 11)
- Defensive Driver Training and Education
- 4WD Training (nationally accredited)
- Senior First Aid (incl. CPR)

Memberships

- Australian Freshwater Sciences Society
- Australian Society for Fish Biology
- Australia New Guinea Fish Association (Qld, National)

Publications

During his professional working career Tim has authored and co-authored a range of books and papers in international scientific journals. Further details can be provided on request.

DR MICHAEL CUNNINGHAM

Senior Ecologist

With over 20 years' experience in ecological research, Michael's expertise includes:

- ***Bioregional scale surveys of aquatic and terrestrial vertebrates using quantitative and qualitative approaches (trapping, transects, audio, spotlighting, electrofishing)***
- ***Desktop analysis and prioritization of survey effort to address bioregional gaps in inventory knowledge***
- ***Identification and safe handling of vertebrate species***
- ***Technical analysis of ecological data including distributional modeling, population viability and habitat suitability***
- ***Science writing and communication including research grants, papers, technical reports and public presentations***

CAREER SUMMARY

2019 – Present: Senior Ecologist, Boobook Ecological Consulting, Roma, Qld

2012 – 2019 Senior Lecturer, Population Genetics, University of Pretoria, South Africa

2004 – 2010 Senior Lecturer, Zoology, University of the Free State, South Africa

2002 – 2004 Post-Doctoral Fellowship, Molecular Ecological Research, University of Pretoria, South Africa

1997 – 2000 Senior Research Assistant, Systematics & Ecology, University of Stellenbosch, South Africa

1991 – 1996 Tutor in Ecology and Population Genetics, University of Queensland

QUALIFICATIONS

PhD (2002, UQld) – Ecology & Systematics

BSc Hons I (1993, UQld) – Population & Ecological Genetics

BSc (1991, UNE) – Zoology, Botany, Ecology

OTHER TRAINING

Snake Handling (ASI, South Africa)

Aquatic Vertebrate Survey techniques (SAIAB, South Africa)

Occupational health and safety - Construction Induction – Queensland

4WD Driver Training

HLTAID0013 – Provide First Aid & CPR

AFFILIATIONS

Melbourne Museum (Research Associate)

South African Institute for Aquatic Biodiversity (SAIAB) (Research Associate)

Molecular Ecology and Evolution Programme, University of Pretoria (Research Associate)

Birdlife Southern Queensland

Weed Society of Queensland

Queensland Naturalists Society

SELECTED PROFESSIONAL EXPERIENCE

Coal Seam Gas Industry

- Delivery and reporting of ecological assessments within the Surat and lower Bowen Basins
- Targeted surveys for threatened flora/fauna species, weed surveys, pre-clearance surveys and regional ecosystem/TEC mapping
- Property level surveys of MNES/MSES features including mapping of remnant and regrowth vegetation communities (GTRE)
- Vegetation and habitat quality analysis using Queensland government BioCondition and Offsets assessment methodology

Ecological Research

- Author of over 50 scientific research papers, book chapters technical reports and natural history notes
- Research and reports on threatened rainforest reptile and amphibian fauna from North-East, Central and South-East Queensland

Faunal surveys, threatened and invasive species assessments and management reports

- IUCN conservation status assessments of various Australian frogs, and frog and reptile species of Southern Africa
- Surveys and recovery plan for the Critically Endangered Kroombit Tinker Frog, Qld
- Vertebrate surveys of Mt Binnie and Crater Mt Reserve, PNG
- Sanctuary sites and transplantation of the Critically Endangered Maloti Minnow, Lesotho
- Conservation status of reptiles and amphibians of the Cape Fold Mountains and Maloti-Drakensberg Bioregion, South Africa
- Herpetofaunal surveys of threatened species in montane areas of southern Africa including Mulanje Mountain, Malawi and Chimanimani Mountains, Zimbabwe
- Biotic assessment and recovery of frogs in the Rondegat River, South Africa, through piscicide based removal of alien fishes

Teaching and Supervision

- 20 years tertiary teaching experience (AQF levels 6-8)
- Designed, coordinated and delivered courses in General Biology, Vertebrate Ecology, Field Techniques, Conservation, Evolution and Population Genetics, Ornithology, Herpetology, Biostatistics
- Contributions to professional workshops in distributional modelling, phylogeography and conservation of herpetofauna in regional biodiversity hotspots
- Supervisor of 2 PhD, 8 MSc and 12 BSc Hons research students

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