Desktop Ecological Assessment

Santos

Petroleum Lease 302

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Document management

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Contents

List of tables

List of figures

Appendices

Definitions

Term	Definition
Disturbance footprint	The area that is proposed to be impacted by the project.
The project	Petroleum Lease 302 petroleum activities.
Regional Ecosystem	A vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil. Regional Ecosystems are described in the Regional Ecosystem Description Database, produced by the Queensland Herbarium.
Regulated vegetation	Vegetation that is mapped within the Regulated Vegetation Management Map produced by DOR.
The PL	Petroleum Lease (PL) 302.
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat may include breeding, foraging and shelter resources for fauna or preferred environmental conditions of flora.
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered (E), vulnerable (V) or conservation dependent (CD) under the *Environment Protection and Biodiversity Conservation Act 1999* or extinct in the wild (PE), Endangered, Vulnerable or Near Threatened (EVNT) under the *Nature Conservation Act 1992*.

Abbreviations

Abbreviation	Description
DAWE	Commonwealth Government Department of Agriculture, Water and Environment, formerly the Department of Environment and Energy (DEE)
DES	Department of Environment and Science
DOR	Department of Resources, formerly the Department of Natural Resources Mines and Energy (DNRME)
E2M	E2M Pty Ltd
EO Act	*Environmental Offsets Act 2014*
EO Regulation	*Environmental Offsets Regulation 2014*
EP Act	*Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
PL	Petroleum Lease

Abbreviation	Description
RE	Regional Ecosystem
SRI	Significant Residual Impact

1 Introduction

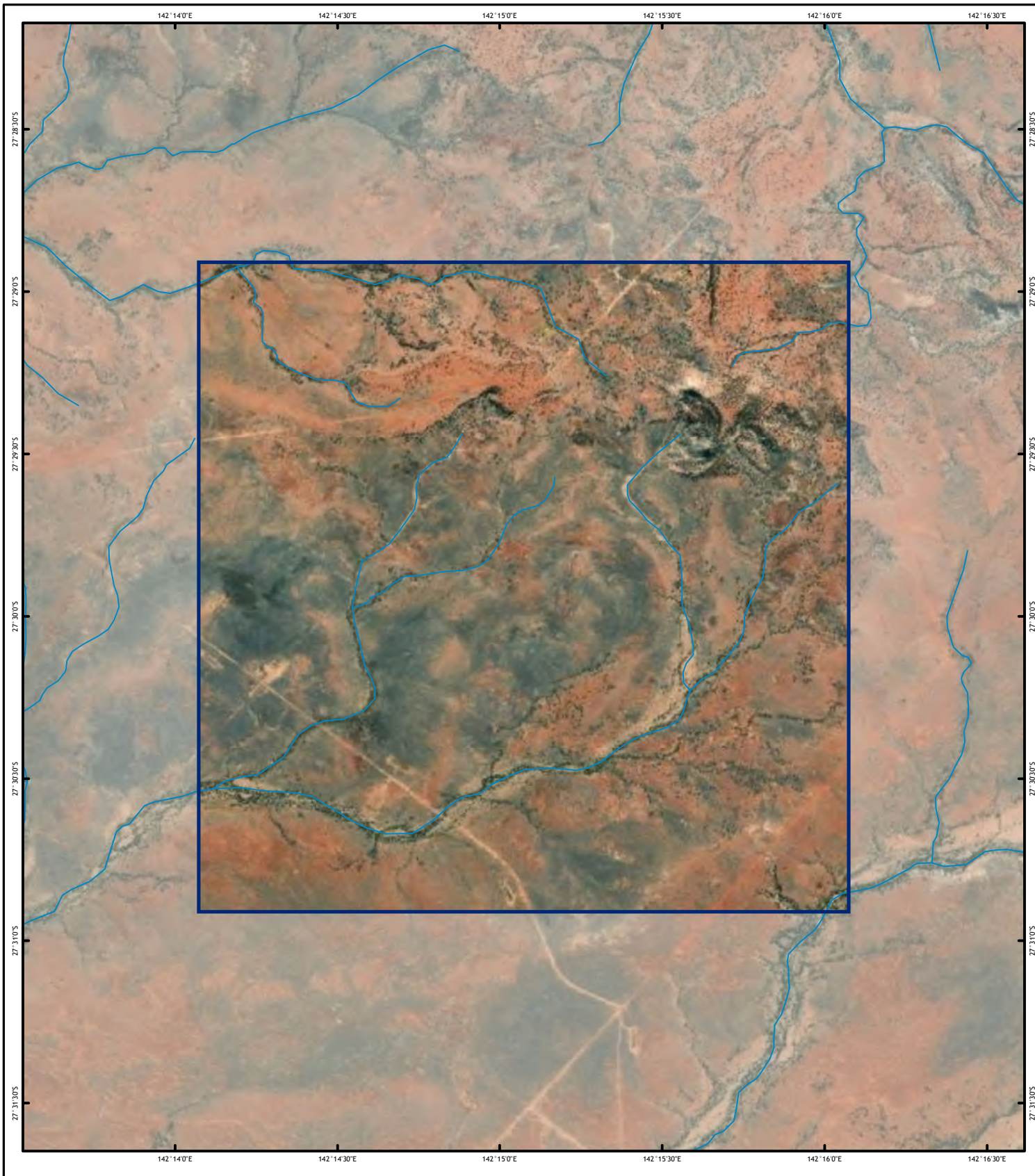
1.1 Project background and scope

Santos is proposing new petroleum activities within Petroleum Lease (PL) 302, herein referred to as 'the PL', and has engaged E2M to undertake a desktop ecological assessment for the PL. The scope of this assessment is to:

- Conduct a review of Commonwealth and State Government environmental mapping, databases and legislative considerations
- Provide a preliminary assessment of potential impacts of the proposed development on identified Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES)
- Detail management strategies to avoid, minimise or mitigate potential impacts to MNES and MSES within the PL; and
- Undertake preliminary significant residual impact (SRI) assessments to determine potential offset requirements for identified MNES and MSES.

1.2 Site description

The PL is located approximately 18 km north-west of the Jackson gas plant and 43 km south-east of the Ballera gas plant. The PL is located within the Sturt Stony Desert subregion of the Channel Country bioregion. The PL is approximately 1,216 ha and is contained within Lot 1 on SP133822 and Lot 2 on SP184928. Land within the PL is predominately used for cattle grazing. The PL and surrounding environs are depicted in Figure 1.



Legend

- Watercourse
- Petroleum Lease - PL302

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

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FIGURE 1: SITE OVERVIEW

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1 of 1	QEJ19118	2

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2 Methods

2.1 Desktop assessment

A desktop assessment was undertaken to review Commonwealth and State Government environmental mapping and databases to identify potential MNES and MSES within the PL. The following legislation, associated triggers and databases were reviewed:

- Department of Agriculture, Water and the Environment (DAWE) Protected Matters Report, for a search radius of 100 km from the approximate centre of the PL (-27.4985, 142.2514)
- Department of Environment and Science (DES) MSES mapping for the PL
- Department of Resources (DOR) Vegetation Management Regulated Vegetation Management – version 4.10, Vegetation Management Regional Ecosystem Map – version 11.0 and Vegetation Management Essential Habitat Map – version 9.10 for the PL
- DES Protected Plants Flora Survey Trigger mapping for the PL
- DES WildNet Database, for a 100 km buffer around the boundaries of the PL
- DES Map of Environmentally Sensitive Areas for the PL
- Queensland Globe environmental mapping layers for the PL
- Atlas of Living Australia species records
- The latest available aerial photography; and
- Environmental Authority for the PL (EPPG00641613; herein referred to as 'the EA').

2.2 Likelihood of occurrence assessment

Threatened flora and fauna species identified in the desktop review were assessed for their likelihood of occurrence within the PL. This assessment considered the species distribution, habitat requirements and historical records in proximity to the PL.

The likelihood of occurrence of threatened, migratory and marine species were based on the following criteria:

- **Likely to occur**: suitable habitat to support the species is present and the species has previously been recorded within 100 km of the PL (the desktop search extent)
- **Possible occurrence**: The PL is within the species known distribution and suitable habitat to support the species is present; however
  - the species has not previously been recorded within the desktop search extent; and/or
  - suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence.
- **Unlikely to occur**: the PL does not comprise suitable habitat for the species, or is outside of the species known distribution.

2.3 Assumptions and limitations

This assessment has been based on a desktop review only, using information sources identified in Section 2.1. Assessments of the distribution and impact to MNES/MSES species habitat within the PL are reliant on DOR supplied RE mapping.

Preliminary impact assessments were based on design information that includes the preliminary assumptions identified within Section 4.1. The actual impact arising from the proposed works may differ to the preliminary assessment. The self-assessment has only considered impacts resulting from the proposed works and has not considered cumulative impacts.

3 Results

3.1 Desktop assessment

3.1.1 Commonwealth matters

A Protected Matters Report, generated by the DAWE, was generated to identify MNES that are predicted to occur within the PL (the search results have been included in Appendix A). Matters identified as potentially occurring within 100 km of the PL include:

- One wetland of International Importance (Coongie lakes)
- 10 threatened fauna species
- Four threatened flora species
- 10 migratory (marine, terrestrial, wetland); and
- 15 marine species.

A likelihood of occurrence assessment has been conducted for MNES flora and fauna species (Appendix B).

3.1.2 State matters

3.1.2.1 Vegetation Management Act 1999

The PL was mapped as entirely containing Category B (remnant) regulated vegetation (Figure 2). All Regional Ecosystems (REs) mapped within the PL by DOR have a 'least concern' vegetation management class and 'no concern at present' biodiversity status (Queensland Herbarium 2019b).

3.1.2.2 Nature Conservation Act 1992

The Queensland Government WildNet database was searched within a 100 km buffer of the PL boundaries to identify the confirmed recorded presence of threatened flora and fauna species. The extract listed four bird, three mammal and four plant species (Appendix A). To determine potential presence within the PL, a likelihood of occurrence assessment has been conducted for these species (Appendix B).

3.1.2.2.1 NC Act Protected Plants

The *Nature Conservation Wildlife Regulation 2006* (NC Regulation) lists flora and fauna species considered to be extinct in the wild, critically endangered, endangered, vulnerable, near threatened or least concern in Queensland. Clearing of protected plants is regulated by the NC Regulation. Furthermore, the State Government has produced a mapping layer which triggers a flora survey requirement if disturbance is proposed within a mapped high risk area. The PL does not contain mapped high risk areas.

3.1.3 Environmental Offsets Act 2014

The EO Act outlines the framework for environmental offsets within Queensland and how they should be provided. As defined within Section 7 of the EO Act, an environmental offset is an *activity undertaken to counterbalance a significant residual impact of a prescribed activity on a prescribed environmental matter*, such as matters of Commonwealth, State or local significance.

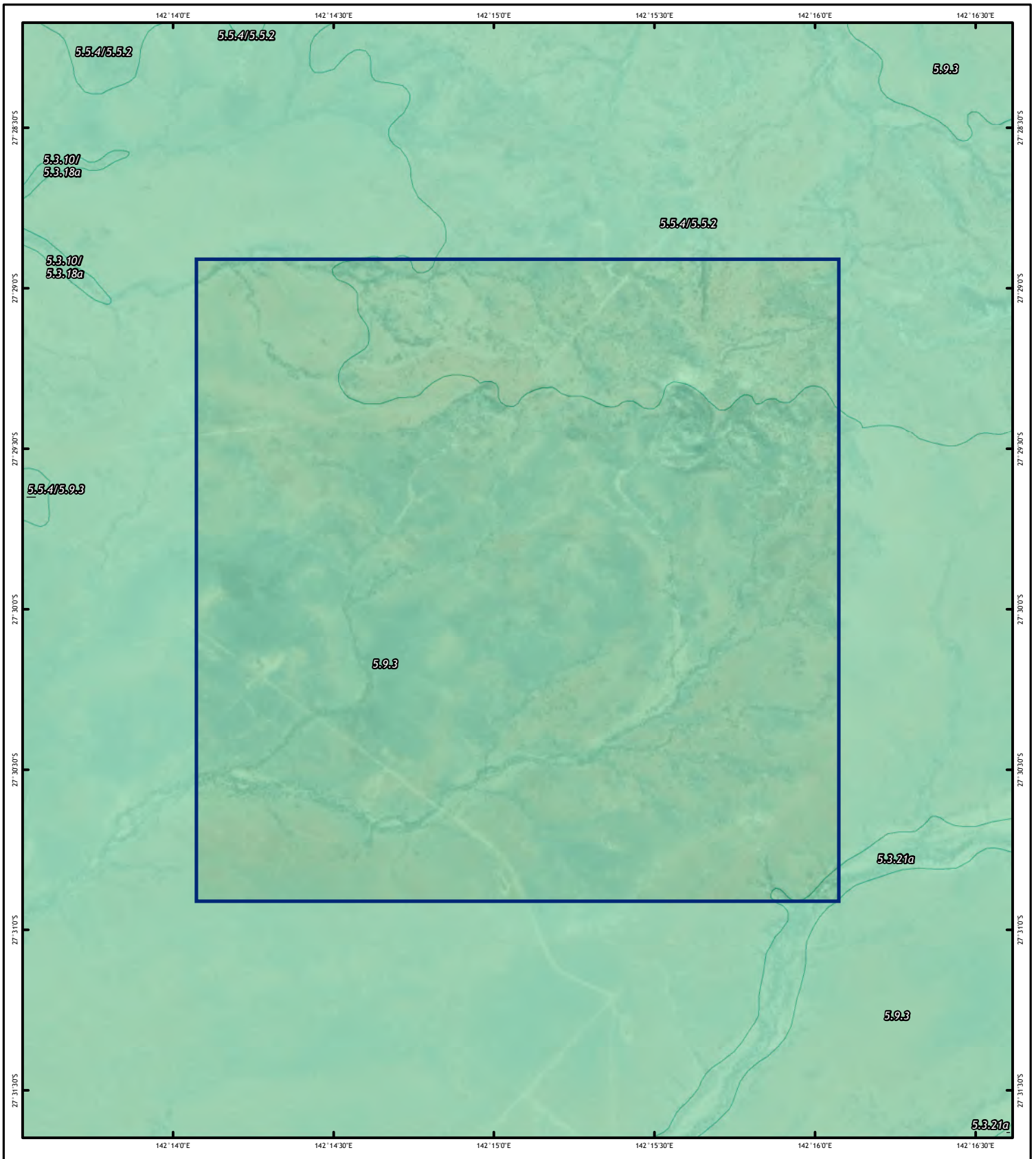
Environmental offsets are not an assessment trigger, but are imposed as a condition for a proposed activity. If a SRI on the prescribed environmental matter remains after the application of impact

avoidance, minimisation and mitigation measures, an environmental offset may be required. MSES identified within the PL in the desktop assessment include:

- Threatened species listed under the NC Act
- Special least concern species listed under the NC Act
- Regulated vegetation – intersecting a watercourse; and
- Connectivity areas.

3.1.4 Environmental Protection Act 1994

No Category A, B or C ESAs are mapped to occur within the PL on the Map of Environmentally Sensitive Areas produced by the DES.



Legend

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RE Biodiversity Status

No concern at present

N

Scale 1:30,000 (A4)

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Metres

Coordinate System: GCS GDA 1994

Noccundra

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FIGURE 2: DOR MAPPED REGIONAL ECOSYSTEMS

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1 of 1	QEJ19118	2

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3.2 Matters of National Environmental Significance

Four MNES have been identified as likely to occur within the PL, these comprise three species listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, *Xerothamnella parvifolia*, grey falcon (*Falco hypoleucos*) and white-throated needletail (*Hirundapus caudacutus*). Two species listed as migratory under the EPBC Act, fork-tailed swift (*Apus pacificus*) and white-throated needletail, (Table 1) were identified as likely to occur. Marine species, while not a MNES are protected under the EPBC Act through their relationship with the Commonwealth marine environment. Habitat associations for MNES species likely to occur within the PL are summarised in Table 1.

Table 1 Summary of MNES species likely to occur within the PL

Species	EPBC Act status	Regional Ecosystem (RE) associations	Area within the PL (ha)
Flora			
Xerothamnella parvifolia	Vulnerable	REs comprising Acacia dominated woodlands, particularly *A. cambagei* (gidgee) and *Acacia aneura* (mulga) on skeletal clay soils, which may include the REs 5.5.2 and 5.5.4 that are mapped within the PL	194
Fauna			
Fork-tailed swift (*Apus pacificus*)	Marine and migratory	All REs provide foraging habitat for the species. This species does not breed within Australia	1,216
Grey falcon (*Falco hypoleucos*)	Vulnerable	Timbered woodlands (REs 5.5.2 and 5.5.2) provide breeding habitat for the species and adjacent treeless areas (REs 5.9.3 and 5.3.21) which provide foraging habitat.	1,216
White-throated needletail (*Hirundapus caudacutus*)	Vulnerable; Marine and migratory	All REs provide foraging habitat for the species. The species does not breed within Australia	1,216

3.2.1 Threatened species

The likelihood of occurrence assessment (Appendix B) identified that the PL is likely to provide habitat for three threatened species listed under the EPBC Act, namely *Xerothamnella parvifolia*, grey falcon and white-throated needletail. Habitat for MNES threatened species within the PL is mapped within Figure 3 (Section 3.3.2).

A further four threatened species listed under the EPBC Act are considered to have the possibility of occurrence within the PL; however, these species are not considered likely, primarily due to the absence of previous records within 100 km of the PL or the marginal quality of potential habitat for each species within the PL (Appendix B).

3.2.2 Migratory species

The likelihood of occurrence assessment identified that the PL is likely to provide habitat for two migratory species, fork-tailed swift and white-throated needletail, which are listed as marine and migratory under the EPBC Act. Whilst all REs provide foraging habitat for the species covering a total area of 1,216 ha within the PL, the species do not breed within Australia.

A project is required to seek approval under the EPBC Act for actions that are likely to have 'significant impact' on listed migratory species. 'Important habitat' for migratory species is a key factor for determining whether an action will result in a significant impact. Important habitat is defined in the significance criteria (DotE 2013) 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.

The PL is unlikely to comprise important habitat for any migratory species listed under the EPBC Act and is therefore unlikely to have a significant impact on listed migratory species.

3.2.3 Marine species

The likelihood of occurrence assessment identified that the PL is likely to provide habitat for four marine species listed under the EPBC Act, black-eared cuckoo (*Chrysococcyx osculans*), rainbow bee-eater (*Merops ornatus*), white-throated needletail and fork-tailed swift.

A project is required to seek approval under the EPBC Act for actions that are likely to have 'significant impact' on the Commonwealth marine environment, which includes resulting in a '*substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution*'.

Impact to listed marine species resulting from the proposed disturbance is likely to be minimal. As such, the project is unlikely to have a significant impact on listed marine species.

3.3 State matters

3.3.1 Regional Ecosystems

The PL is mapped as entirely containing Category B (remnant) regulated vegetation. All Regional Ecosystems (REs) mapped within the PL by DOR have a 'least concern' vegetation management class and 'no concern at present' biodiversity status (Queensland Herbarium 2019b). DOR mapped REs within the PL are listed within Table 2 and locations depicted within Figure 2 (refer to Section 3.1.2.1).

Table 2 DOR mapped Regional Ecosystems (REs)

RE Code	Short Description	VM Class/BD Status	MSES Wetland	Structural category	Area within the PL (ha)
5.3.21a	Variable sparse to open herbland, *Senna* spp. open shrubland and bare scalded areas on infrequently flooded alluvia of major rivers their distributaries, drainage channels and creeks	Least concern / No concern at present	No – floodplain (other than floodplain wetlands); however, not included in MSES wetland mapping	Sparse	2.4
5.5.4/ 5.5.2	5.5.4: *Acacia sibirica* +/- *Acacia aneura* +/- *Corymbia* spp. open shrubland on Quaternary sediments 5.5.2: *Acacia aneura* low open woodland +/- *Acacia sibirica* +/- *Eremophila latrobei* on Quaternary deposits	Least concern / No concern at present	No	Very sparse	194
5.9.3	*Astrebla* spp. +/- short grasses +/- forbs open herbland on Cretaceous sediments	Least concern / No concern at present	No	Sparse	1020

3.3.2 Threatened and special least concern species

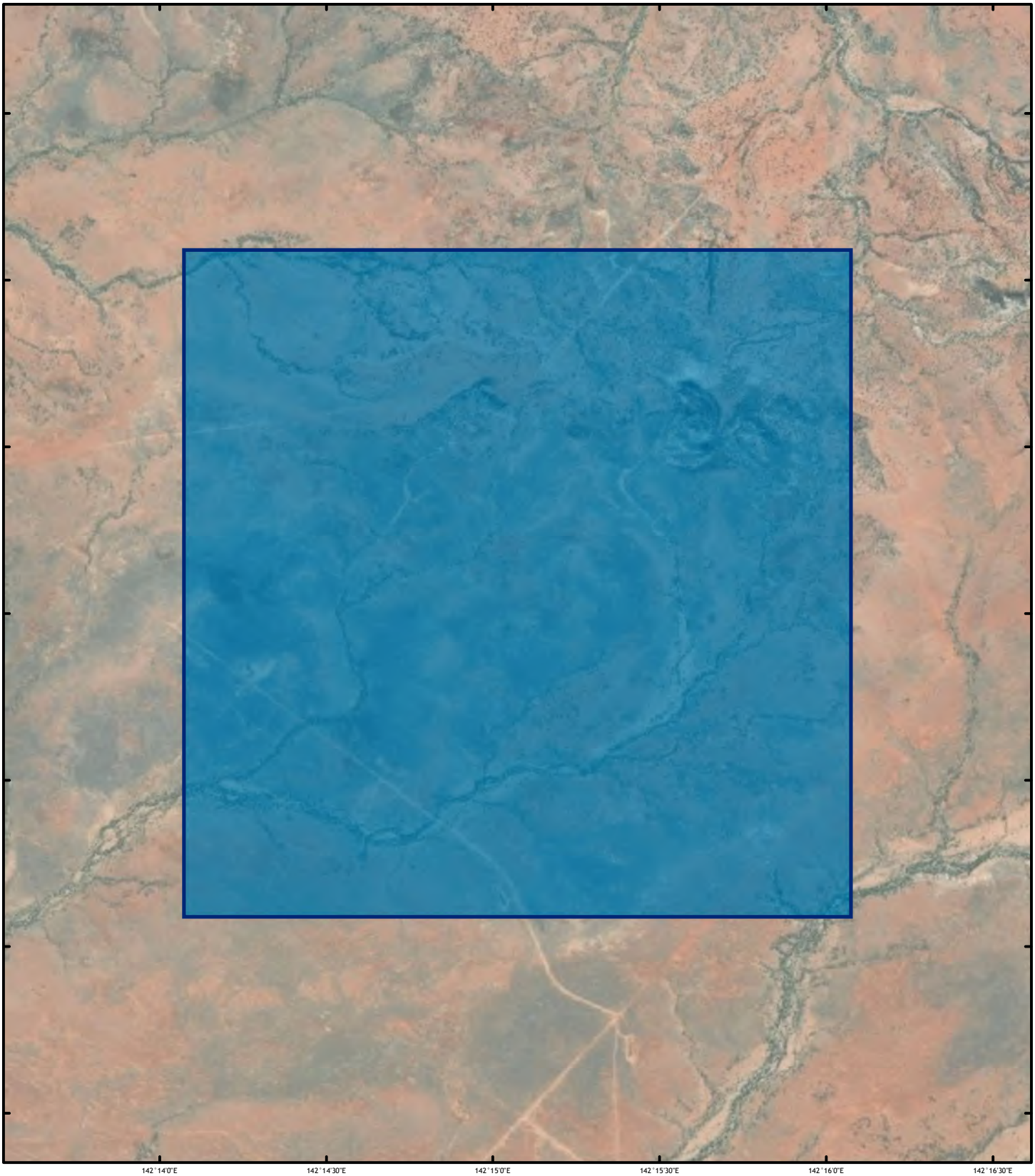
The likelihood of occurrence assessment identified that the PL is likely to provide habitat for three species listed as vulnerable, two species listed as near threatened and two species listed as special least concern under the *Nature Conservation Act 1992* (NC Act). NC Act listed species considered likely to occur within the PL and their habitat associations are summarised in Table 3 and their habitat within the PL is mapped within Figure 3.

A further six threatened species listed under the NC Act are considered to have the possibility of occurrence within the PL; however, these species are not considered likely, primarily due to the absence of previous records within 100 km of the PL or the marginal quality of potential habitat for each species within the PL (Appendix B).

The PL does not contain mapped high-risk areas as identified within the DES Protected Plants Flora Survey Trigger mapping.

Table 3 NC Act listed species likely to occur within the PL

Species	NC Act status	RE associations	Area within the PL (ha)
Flora			
Indigofera oxyrachis	Vulnerable	REs comprising Acacia dominated woodlands, which include the REs 5.5.2 and 5.5.4 that are mapped within the PL	194
Rhodanthe rufescens	Near threatened	REs comprising Acacia dominated woodlands, particularly *A. cambagei* (gidgee) and *Acacia aneura* (mulga), which include the REs 5.5.2 and 5.5.4 that are mapped within the PL	194
Fauna			
Woma python (*Aspidites ramsayi*)	Near threatened	All REs within the PL provide habitat for the species	1,216
Fork-tailed swift (*Apus pacificus*)	Special least concern	All REs provide foraging habitat for the species. This species does not breed within Australia	1,216
Grey falcon (*Falco hypoleucos*)	Vulnerable	The PL is mapped to contain REs that provide both breeding and foraging habitat for the species. Timbered woodlands (REs 5.5.2 and 5.5.4) provide breeding habitat, and adjacent treeless areas (REs 5.9.3 and 5.3.21) provide foraging habitat	1,216
Short-beaked echidna (*Tachyglossus aculeatus*)	Special least concern	All REs	1,216
White-throated needletail *(Hirundapus caudacutus)*	Vulnerable	All REs provide foraging habitat for the species. This species does not breed within Australia	1,216



Legend

- Petroleum Lease - PL302
- Fork-tailed swift habitat

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

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FIGURE 3A: THREATENED SPECIES HABITAT - FORK-TAILED SWIFT

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Map Number	Job Number	Rev
1 of 8	QEJ19118	2

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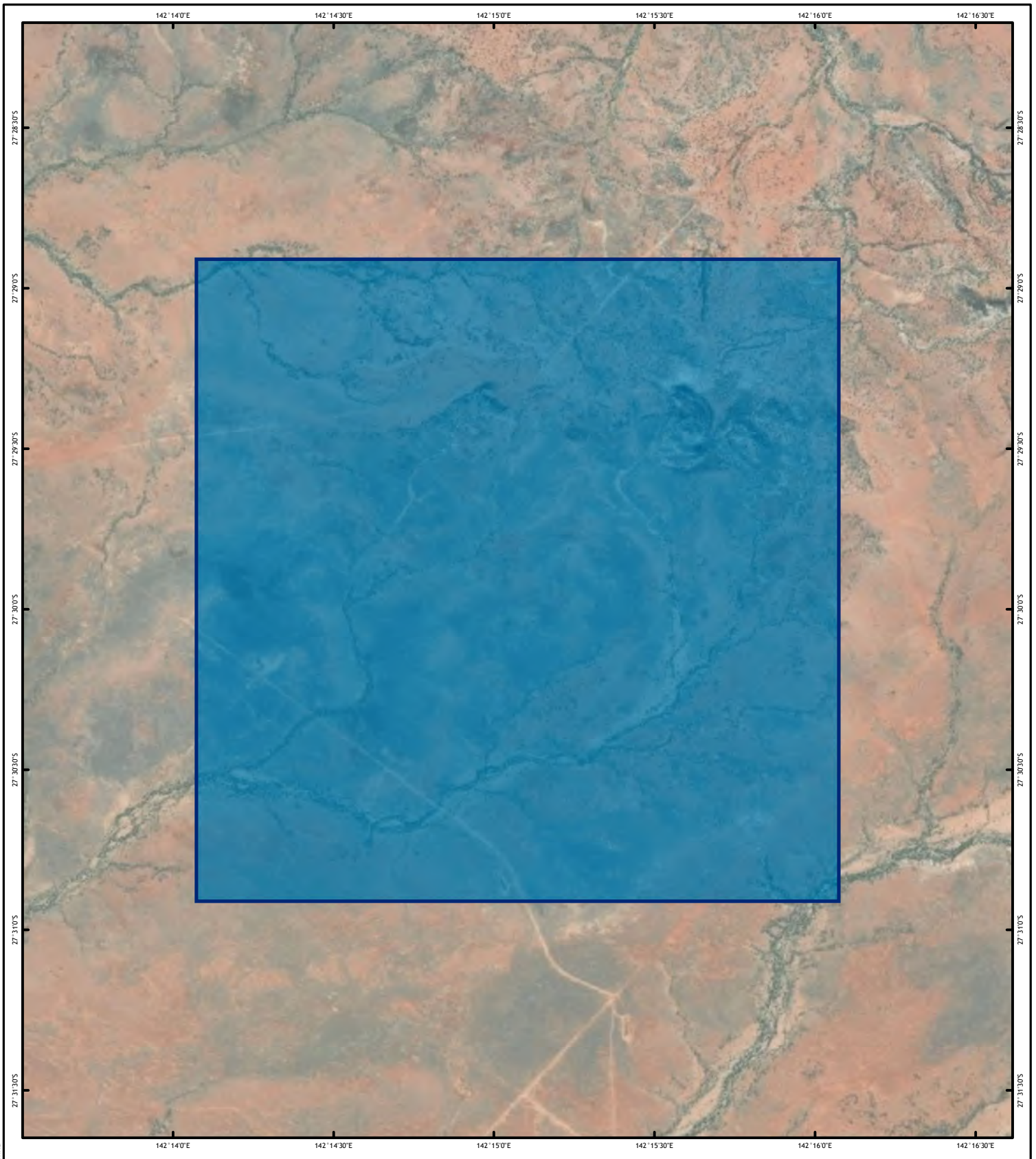

Legend

- Petroleum Lease - PL302
- Grey falcon habitat

N

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FIGURE 3B: THREATENED SPECIES HABITAT - GREY FALCON

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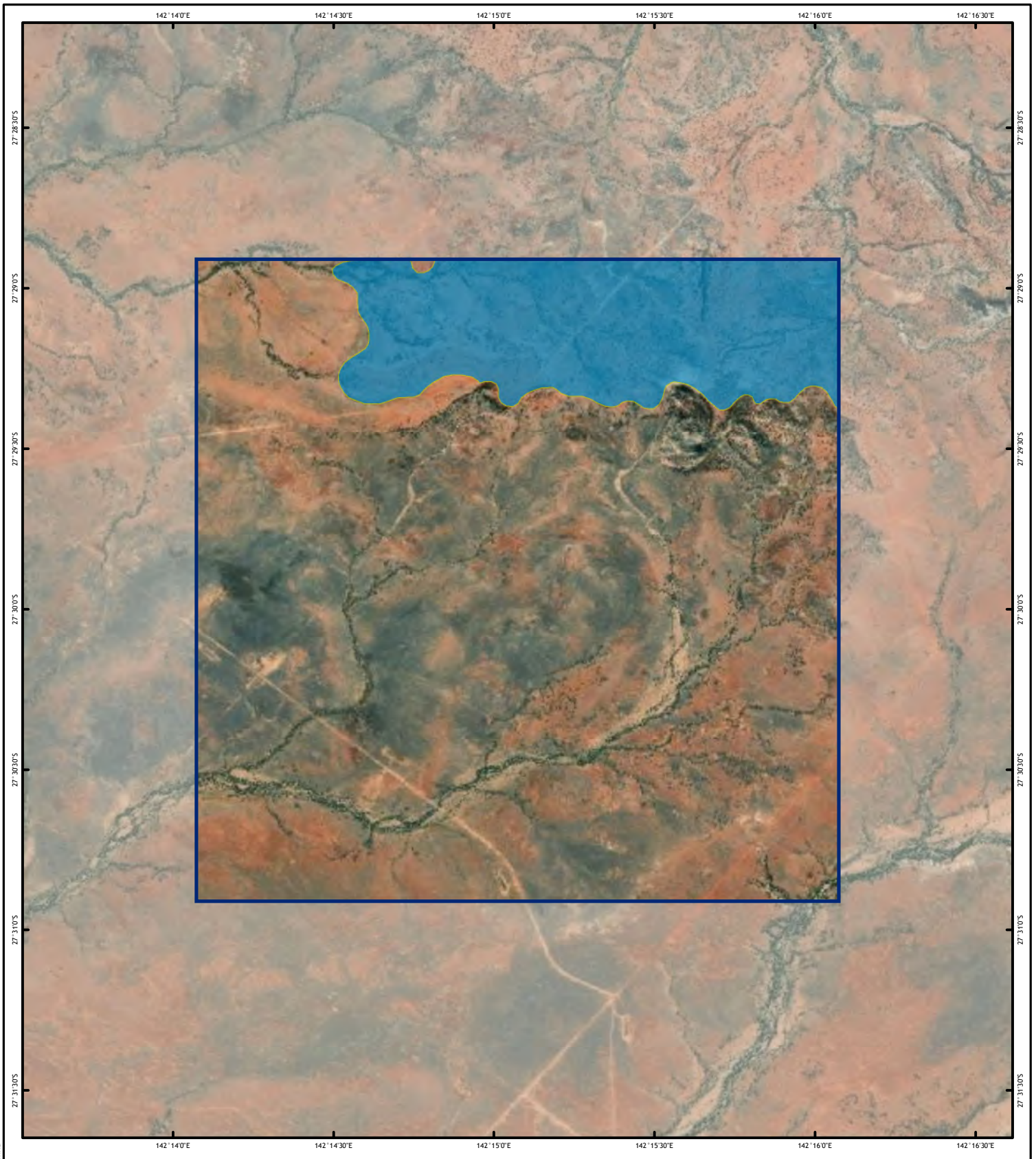

Legend

- Petroleum Lease - PL302
- Indigofera oxyrachis habitat

N

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0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

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FIGURE 3C: THREATENED SPECIES HABITAT - INDIGOFERA OXYRACHIS

Desktop Ecological Assessment - PL 302
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3 of 8	QEJ19118	2

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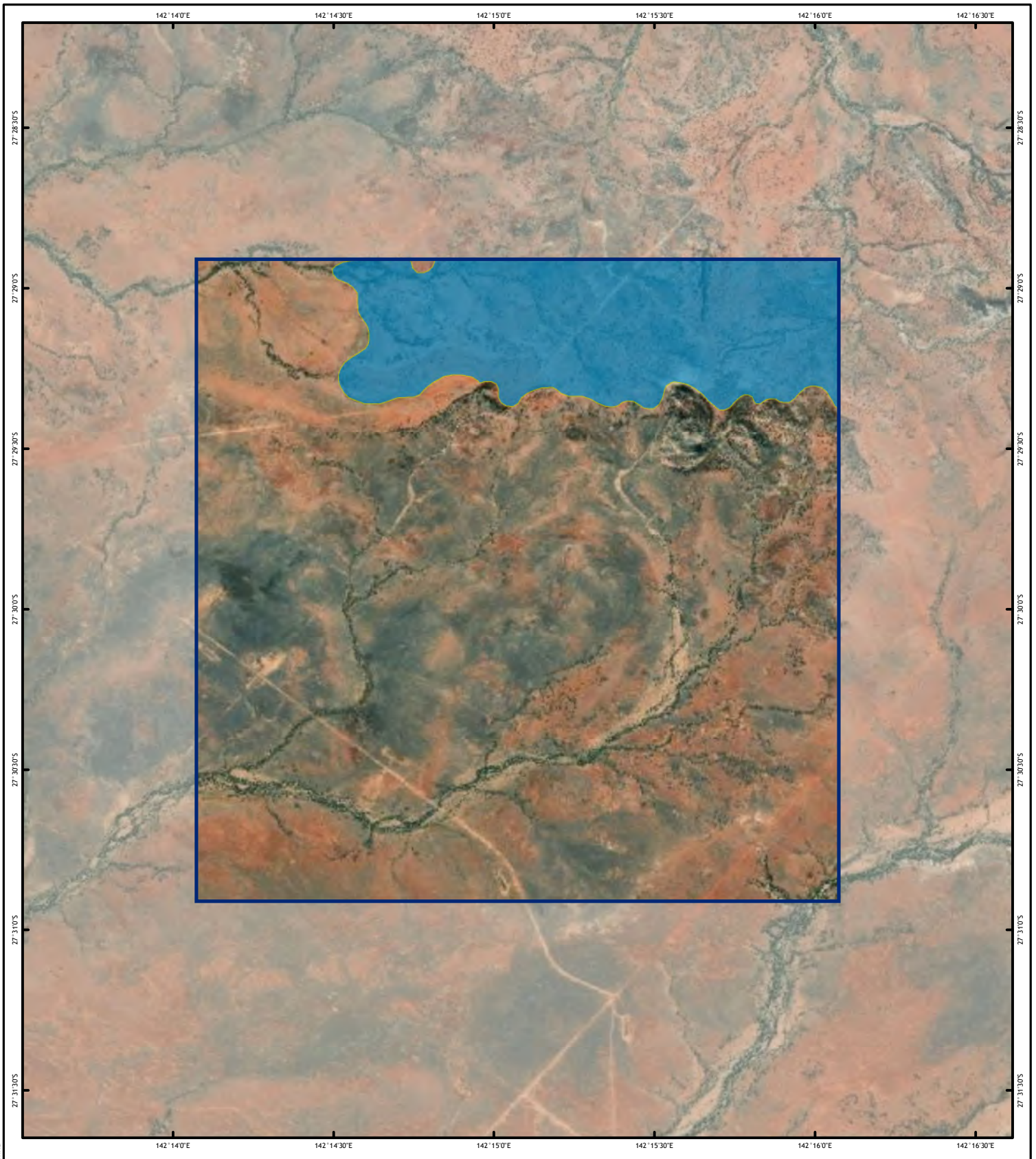

Legend

- Petroleum Lease - PL302
- Rhodanthe rufescens habitat

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

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FIGURE 3D: THREATENED SPECIES HABITAT - RHODANTHE RUFESCENS

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Map Number	Job Number	Rev
4 of 8	QEJ19118	2

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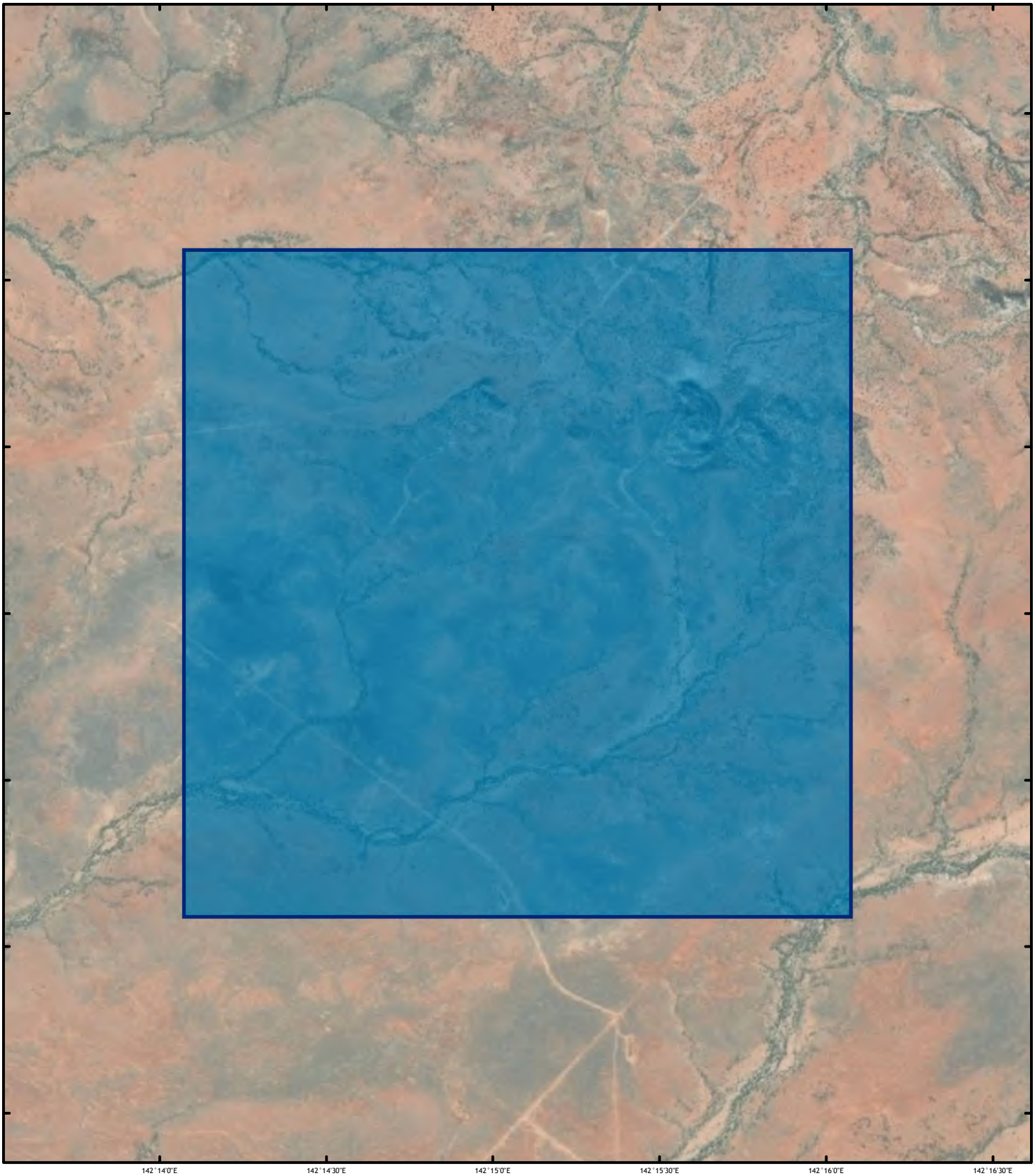

Legend

- Petroleum Lease - PL302
- Short-beaked echidna habitat

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

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FIGURE 3E: THREATENED SPECIES HABITAT - SHORT-BEAKED ECHIDNA

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Map Number	Job Number	Rev
5 of 8	QEJ19118	2

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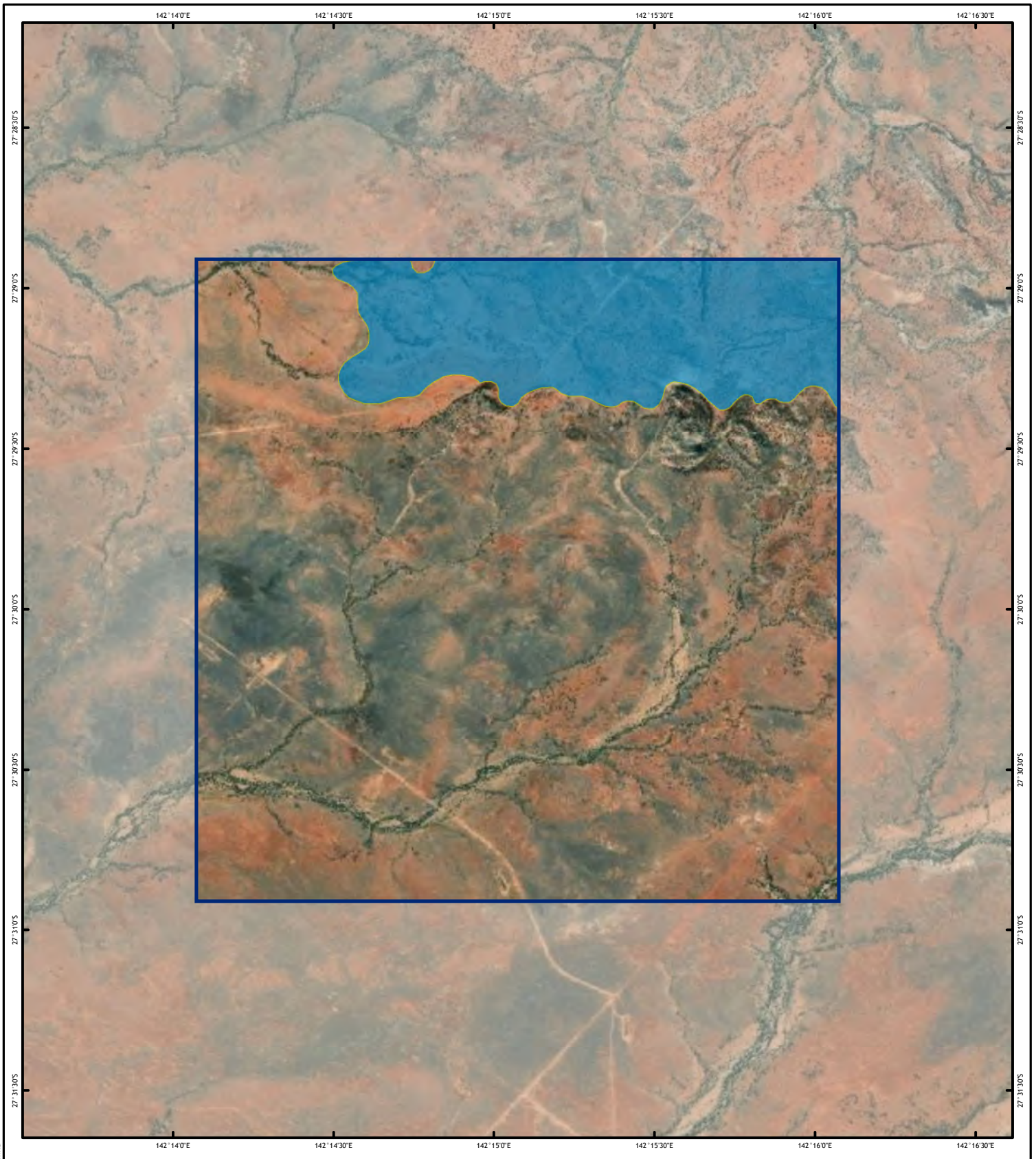

Legend

- Petroleum Lease - PL302
- Xerothamnella parvifolia habitat

N

Scale 1:30,000 (A4)

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Metres

Coordinate System: GCS GDA 1994

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Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014

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2	Issued for Use	CD	BD	16/03/2021
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FIGURE 3F: THREATENED SPECIES HABITAT - XEROTHAMNELLA PARVIFOLIA

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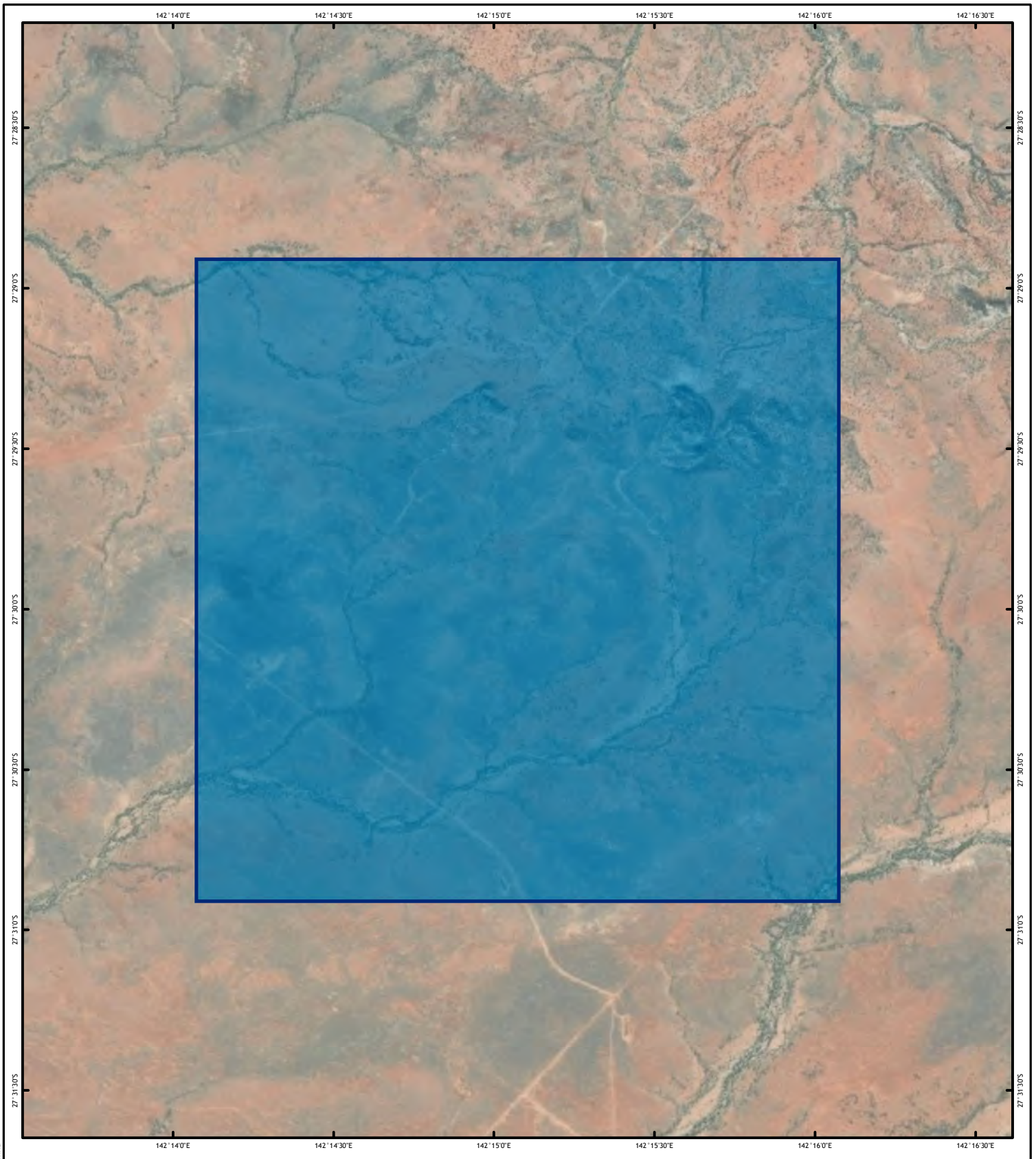
Santos

Map Number	Job Number	Rev
6 of 8	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_ThreatenedSpecies.mxd



Legend

- Petroleum Lease - PL302
- Woma python habitat

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: ©
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014

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2	Issued for Use	CD	BD	16/03/2021
1	Issued for Use	CD	BD	11/12/2019

FIGURE 3G: THREATENED SPECIES HABITAT - WOMA PYTHON

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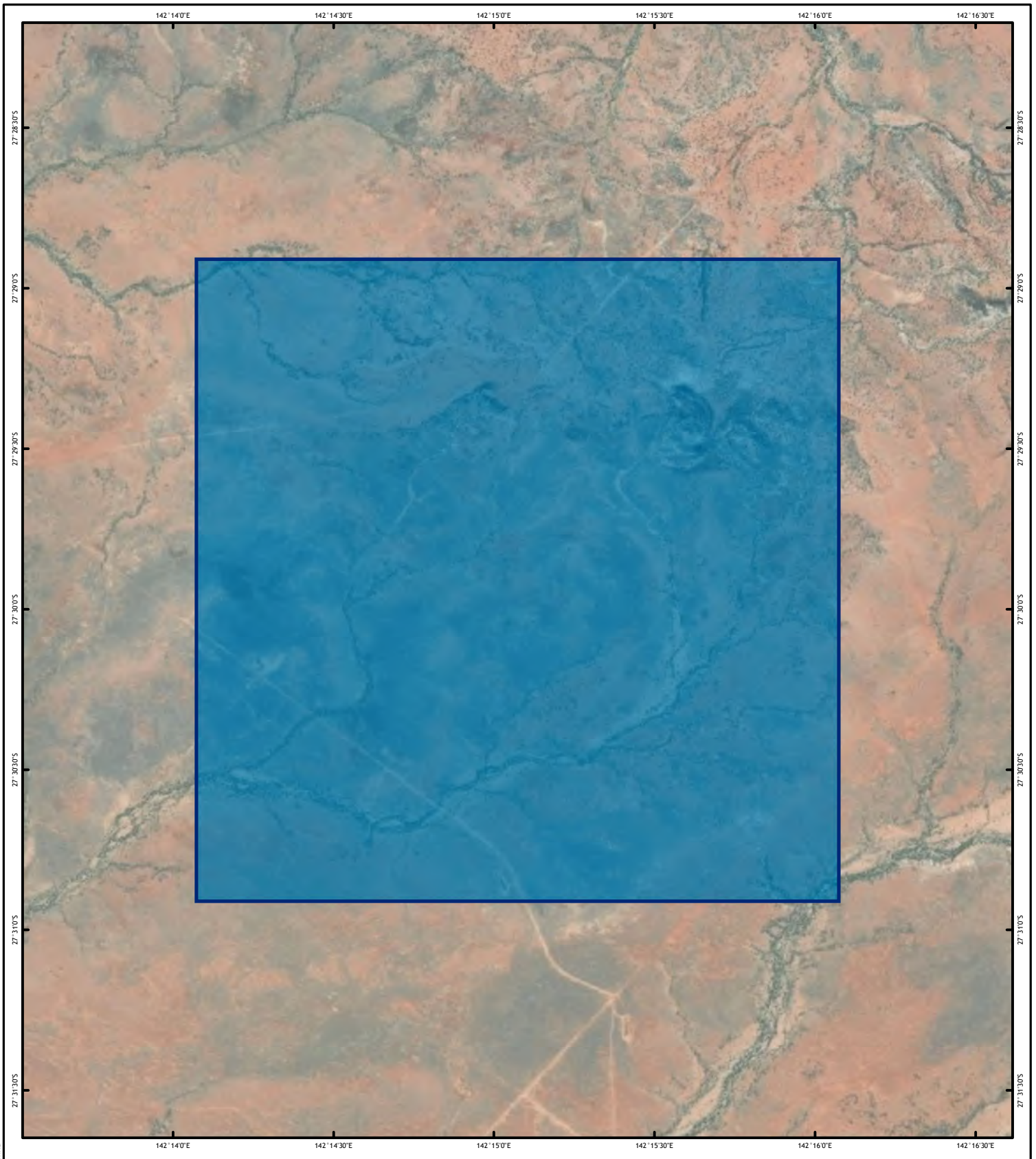
Santos

Map Number	Job Number	Rev
7 of 8	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_ThreatenedSpecies.mxd



Legend

- Petroleum Lease - PL302
- White-throated Needletail

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: ©
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014

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2	Issued for Use	CD	BD	16/03/2021
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FIGURE 3H: THREATENED SPECIES HABITAT - WHITE-THROATED NEEDLETAIL

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Santos

Map Number	Job Number	Rev
8 of 8	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_ThreatenedSpecies.mxd

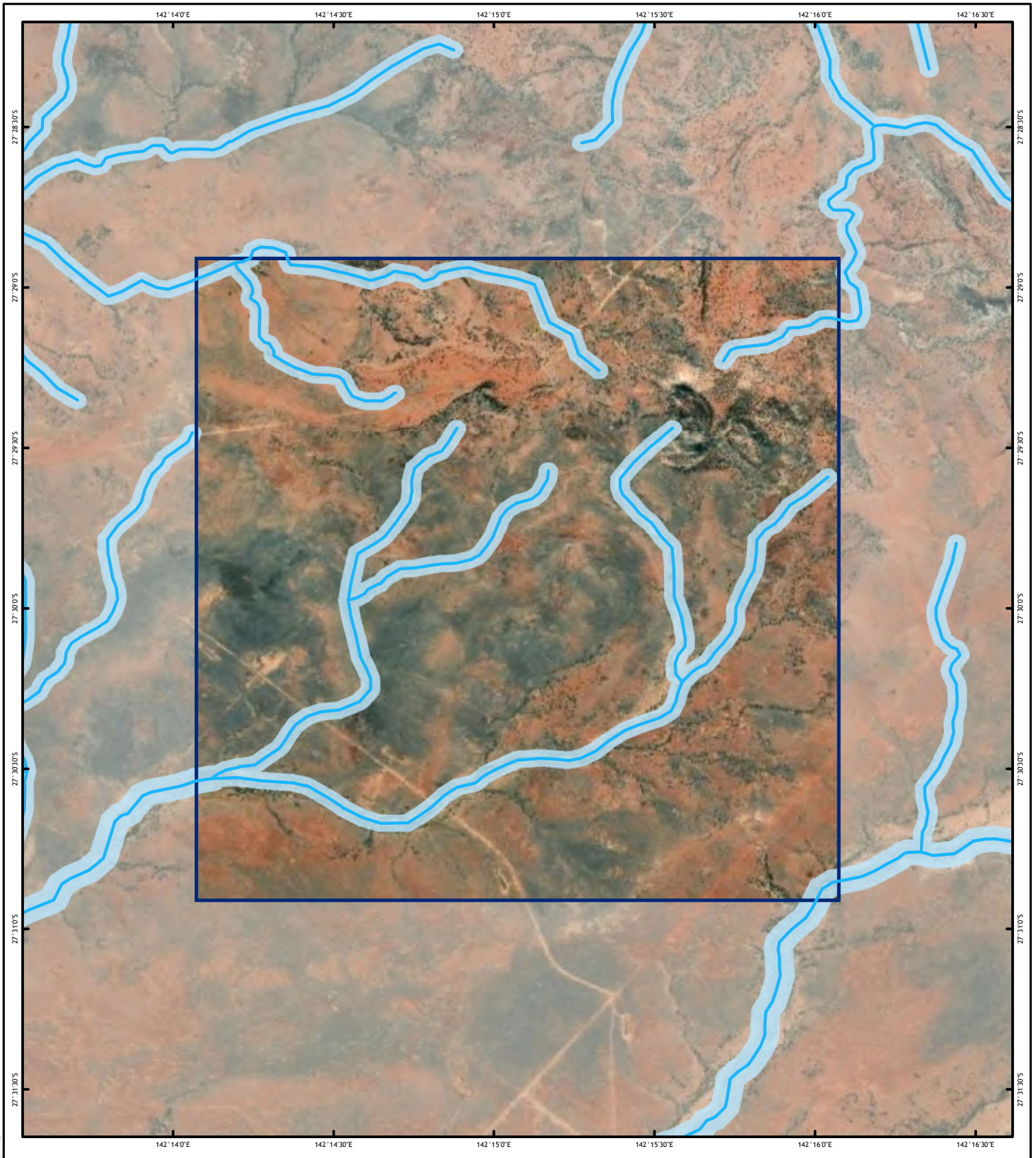
3.3.3 Wetlands

One DOR mapped RE, 5.3.21a, within the PL is listed to contain 'floodplain (other than floodplain wetlands)', within the Regional Ecosystem Description Database (Queensland Herbarium 2019b). The PL does not contain any wetland values identified within the map of Queensland wetland environmental values under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* or the vegetation management wetlands map under the *Vegetation Management Act 1999*.

3.3.4 Waterways

The *vegetation management watercourse and drainage feature map* identifies 14.7 km of stream order 1, 2 and 3 watercourse and drainage features within the PL (Figure 4). All watercourses and drainage features are tributaries of the Cooper Creek. The location of defining banks for Vegetation Management Watercourses was estimated by buffering the centreline of Vegetation Management Watercourses by 25 m on each side, i.e. this assumes a typical watercourse channel width of 50 m. Assessment of the MSES regulated vegetation – intersecting a watercourse is discussed in Section 4.3.2.

No watercourse is likely to comprise the MSES 'waterway providing for fish passage'. The EO Regulation states that '*waterway providing for passage of fish is a matter of State environmental significance only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway*'. As the proposed development is unlikely to limit fish passage, this MSES does not apply.



Legend

- MSES Regulated Vegetation Intersecting a Watercourse
- MSES Regulated Vegetation Intersecting a Watercourse (Buffer)
- Petroleum Lease - PL302

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

Noccundra

Notes:
Aerial Imagery: © ESRI 2019
Cadastre: © DNRME 2018
Watercourse: © Geoscience Australia 2018
Road: © PSMA 2014
Wetland: © DES 2015
Petroleum Lease: © DNRME 2019

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2	Issued for Use	CD	BD	16/03/2021
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FIGURE 4: WETLANDS AND WATERWAYS

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Santos

Map Number	Job Number	Rev
1 of 1	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_WetlandWatercourse.mxd

3.3.5 Corridors and connectivity

The PL entirely contains remnant RE, with unimpeded habitat connectivity to adjacent contiguous habitats. The PL is entirely located within a state-wide terrestrial biodiversity corridor. Watercourse and drainage features located within the PL are connected to the Cooper Creek floodplain, located approximately 17 km downstream of the PL.

The MSES 'connectivity areas' includes all remnant vegetation that is required for ecosystem functioning. As the entire PL contains remnant RE and is connected to extensive areas of adjacent remnant vegetation, the entire PL is considered to comprise the MSES connectivity areas.

3.3.6 Introduced/non-native flora

Four introduced/non-native flora species were identified in the Protected Matters Report (Appendix A). Of these, three species, *Acacia nilotica* (prickly acacia), *Parkinsonia aculeata* (parkinsonia) and *Prosopis spp.* (mesquite), are listed as Weeds of National Environmental Significance (WONS) and as Category 3 restricted matter under the Queensland Biosecurity Act 2014. One species, *Cenchrus ciliaris* (buffel grass) is not listed as either a WONS or under the Queensland Biosecurity Act 2014. The Protected Matters Report is based off modelled habitat for the species. A search of the Queensland weed distribution dataset (Department of Agriculture and Fisheries, 2018), identified that the PL is outside of the current recorded distribution of these species.

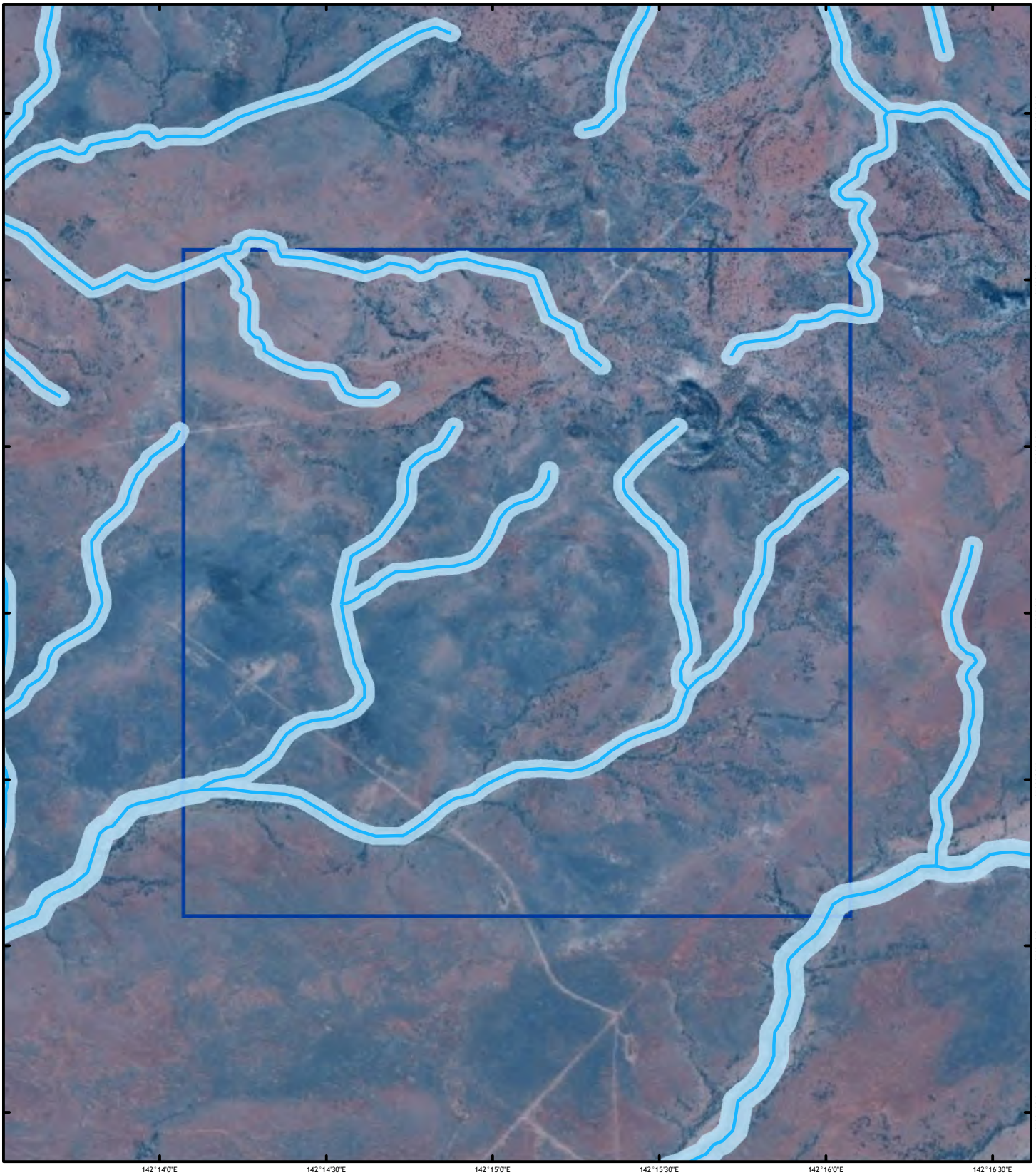
3.3.7 Matters of State Environmental Significance

Six MSES have been identified as likely to occur within the PL (Table 4). These MSES are associated with habitat for threatened and special least concern species, regulated vegetation and connectivity areas. Protected wildlife habitat for species listed as near threatened under the NC Act and migratory special least concern animals are not listed as MSES under the *Environmental Offsets Regulation 2014*. The location of MSES within the PL are depicted within Figure 5.

Table 4 MSES summary

MSES	Area within the PL (ha)	Report section
Regulated vegetation - intersecting a watercourse	75	Section 3.3.4
Connectivity areas	1,216	Section 3.3.5
Wetlands and watercourses	0	Section 3.3.3
Designated precinct in a strategic environmental area	0	N/A
Protected wildlife habitat for:		Section 3.3.2
• Grey falcon, listed as vulnerable	1,216	
• *Indigofera oxyrachis*, listed as vulnerable	194	
• White-throated needletail, listed as vulnerable	1,216	
• Short-beaked echidna, listed as special least concern. An additional one special least concern bird species is considered likely to occur within the PL; however, only short-beaked echidna is listed as a MSES under the EO Regulation.	1,216	

MSES	Area within the PL (ha)	Report section
Protected areas	0	N/A
Highly protected zones of State marine parks	0	N/A
Fish habitat areas	0	N/A
Waterway providing for fish passage	0	Section 3.3.4
Marine plants	0	N/A
Legally secured offset areas	0	N/A



Legend

- MSES Regulated Vegetation Intersecting a Watercourse
- MSES Regulated Vegetation Intersecting a Watercourse (Buffer)
- Petroleum Lease - PL302
- Statewide Terrestrial Biodiversity Corridor

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

Noccundra

Notes:
Aerial Imagery: © ESRI 2019
Cadastre: © DNRME 2018
Road: © PSMA 2014
MSES: © DNRME 2020
Petroleum Lease: © DNRME 2019

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2	Issued for Use	CD	BD	16/03/2021
1	Issued for Use	CD	BD	11/12/2019

FIGURE 5: MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE

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Santos

Map Number	Job Number	Rev
1 of 1	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_MSES.mxd

4 Impacts and mitigation

4.1 Potential impacts

The proposed works are for the construction of two petroleum well leases and associated infrastructure including borrow pits, pipeline right of ways and access tracks. The location and extent of disturbance footprints are under investigation and are preliminary in nature. The preliminary disturbance footprints for each of the two wells and associated infrastructure are identified within Table 5.

The preliminary disturbance footprint comprises a total area of 23.2 ha, which includes 7.8 ha to be rehabilitated post-construction and 15.4 ha to be rehabilitated at the end of the asset's life. Preliminary disturbance footprints are conservative. For the purposes of impact assessment, a large proportion of the proposed disturbance footprint has been located within 'high constraint' areas, where appropriate (refer to Section 4.2 and 4.3). As such, the assessment of impacts within this report takes a precautionary approach and simulates a conservative disturbance scenario.

Potential impacts arising from the proposed works include:

- removal of native vegetation
- removal of fauna habitat for native species, including potentially suitable habitat for threatened species
- potential injury and death of native fauna associated with vegetation removal and operational activities
- modification of overland flow/hydrology
- sedimentation and erosion particularly during flood events; and
- introduction and spread of pest species.

Table 5 Preliminary disturbance footprint assumptions per well

Infrastructure type	Surface disturbance (ha)	Area rehabilitated post-construction (ha)	Area for final rehabilitation at end of life (ha)
Well pad	1.65	0	1.65
Flowline	4.8 (16 m flowline disturbance width)	3.9	0.9
Access track	3.9 (13 m unsealed access track width)	0	3.9
Borrow pits	1.25	0	1.25
Total per well	**11.6**	**3.9**	**7.7**

4.2 Significant residual impact assessment

4.2.1 Matters of National Environmental Significance

The Australian Government has produced the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (2013) (MNES Referral Guidelines) to assist in determining if residual impacts associated with a proposed development requires referral. An assessment against the MNES Referral Guidelines is provided in Appendix C. In summary it was determined that the proposed works will require the clearing of approximately:

- 23.2 ha of suitable habitat for grey falcon, which represents 1.9% of the species habitat identified within the PL. A SRI to the species is unlikely as:
  - The preliminary disturbance footprint is likely to avoid DOR mapped timbered woodlands (REs 5.5.2 and 5.5.4), which comprise breeding habitat for the species.
  - The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which provides foraging habitat only for the species. The proposed clearing comprises a negligible proportion of the species foraging habitat, which is widely available within and surrounding the PL.
  - Approximately 7.8 ha of disturbed area will be immediately rehabilitated post-disturbance. Rehabilitation is expected to rapidly reinstate a vegetation community consistent with the pre-disturbance vegetation community.
  - The preliminary disturbance footprint represents a negligible proportion of the home range for grey falcon individuals/pairs, which are a highly mobile nomadic species (Schoenjahn 2018).
- 23.2 ha of suitable habitat for white-throated needletail, which represents 1.9% of the species habitat identified within the PL. A SRI to the species is unlikely as:
  - In Australia, the species is primarily aerial, from heights of 1 m up to 1000 m above the ground (TSSC 2019). The species does not breed in Australia (TSSC 2019). The proposed disturbance is unlikely to interfere with the species foraging activities within the PL.
  - The preliminary disturbance footprint represents a negligible proportion of the habitat available to this wide-ranging nomadic species (TSSC 2019).

In addition, the PL is likely to provide habitat for *Xerothamnella parvifolia*. The proposed works are considered unlikely to result in a significant impact to the species as:

- The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which does not comprise habitat for *Xerothamnella parvifolia*.
- Management measures have been identified to identify and mitigate impacts on the species should disturbance be required in suitable habitat for the species (refer to Section 4.3).

Habitat for two migratory bird species, fork-tailed swift and white-throated needletail were identified within the PL. Significant impact to migratory species is unlikely as the PL is unlikely to meet the definition of 'important habitat' for migratory species (Section 3.2.2).

4.2.2 Matters of State Environmental Significance

Assessments against the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (SRI Guideline) (DES 2014) were conducted to determine if offsets are likely to be required for impacts to MSES (Appendix D). SRI assessments determined that SRI to any MSES likely to occur within with PL is unlikely. In summary it was determined that the proposed works will require the clearing of up to approximately:

- 23.2 ha of suitable habitat for grey falcon, which represents 1.9% of the species habitat identified within the PL. A SRI to the species is unlikely for the reasons identified within Section 4.2.1.
- 23.2 ha of suitable habitat for white-throated needletail, which represents 1.9% of the species habitat identified within the PL. A SRI to the species is unlikely for the reasons identified within Section 4.2.1.
- 23.2 ha of short-beaked echidna habitat, which represents 1.9% of the species habitat identified within the PL. A SRI to the species is unlikely as:
  - The proposed clearing comprises a negligible proportion of the species habitat, which is widely available within and surrounding the PL.
  - Management measures have been identified to mitigate impacts on the species habitat (Section 4.3.3).
  - The proposed clearing will not increase fragmentation of the species habitat.
- 23.2 ha of connectivity area, which represents 1.9% of this MSES identified within the PL. While the Landscape Fragmentation and Connectivity Tool (DES 2018) could not be used as the location of disturbance has not been confirmed, the scale of the disturbance in relation to the extensive areas of remnant regional ecosystem in the surrounding region result in an unlikely SRI on connectivity.

The PL is likely to provide habitat for *Indigofera oxyrachis*. The proposed works are considered unlikely to result in a significant impact to the species as:

- The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which does not comprise habitat for *Indigofera oxyrachis*.
- Management measures have been identified to identify and mitigate impacts on the species should disturbance be required in suitable habitat for the species (refer to Section 4.3).

In addition, areas of regulated vegetation - intersecting a watercourse may require clearing. The project will avoid the placement of non-linear infrastructure within the defined distance of the defining bank of regulated vegetation intersecting a watercourse (refer to Section to 4.3.2), where practicable. Where disturbance occurs within the defined distance of a Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. As such, a SRI to this MSES is unlikely.

4.3 Mitigation measures

The EPBC Act Environmental Offsets Policy (DSEWPC 2012) and Queensland Environmental Offsets Policy (DES 2020) require proponents to take all reasonable avoidance and mitigation measures to remove or reduce potential impact to MNES and MSES. The following section identifies measures to avoid, minimise and mitigate potential ecological impacts associated with the proposed petroleum infrastructure. Application of these measures is likely to avoid significant residual impact to MNES and MSES.

4.3.1 Impact avoidance

A risk-based approach has been used to identify environmentally constrained areas within the PL (Figure 6). Where possible, avoidance of disturbance to environmentally constrained areas is preferred. The level of environmental constraint has been determined using the following framework.

High constraint

The proposed petroleum activities within high constraint areas have substantial potential to result in a SRI. High constraint areas require targeted impact avoidance, minimisation and mitigation measures to be implemented to avoid a SRI, which are in addition to the typical ecological management measures employed. High constraint areas within the PL have been identified as areas that:

- Are located within Queensland Government mapped MSES regulated vegetation - within 100 m of a Vegetation Management Wetland; and
- Provide habitat for threatened species listed under the EPBC Act and/or NC Act.

No areas of high constraint have been identified within the PL.

Moderate constraint

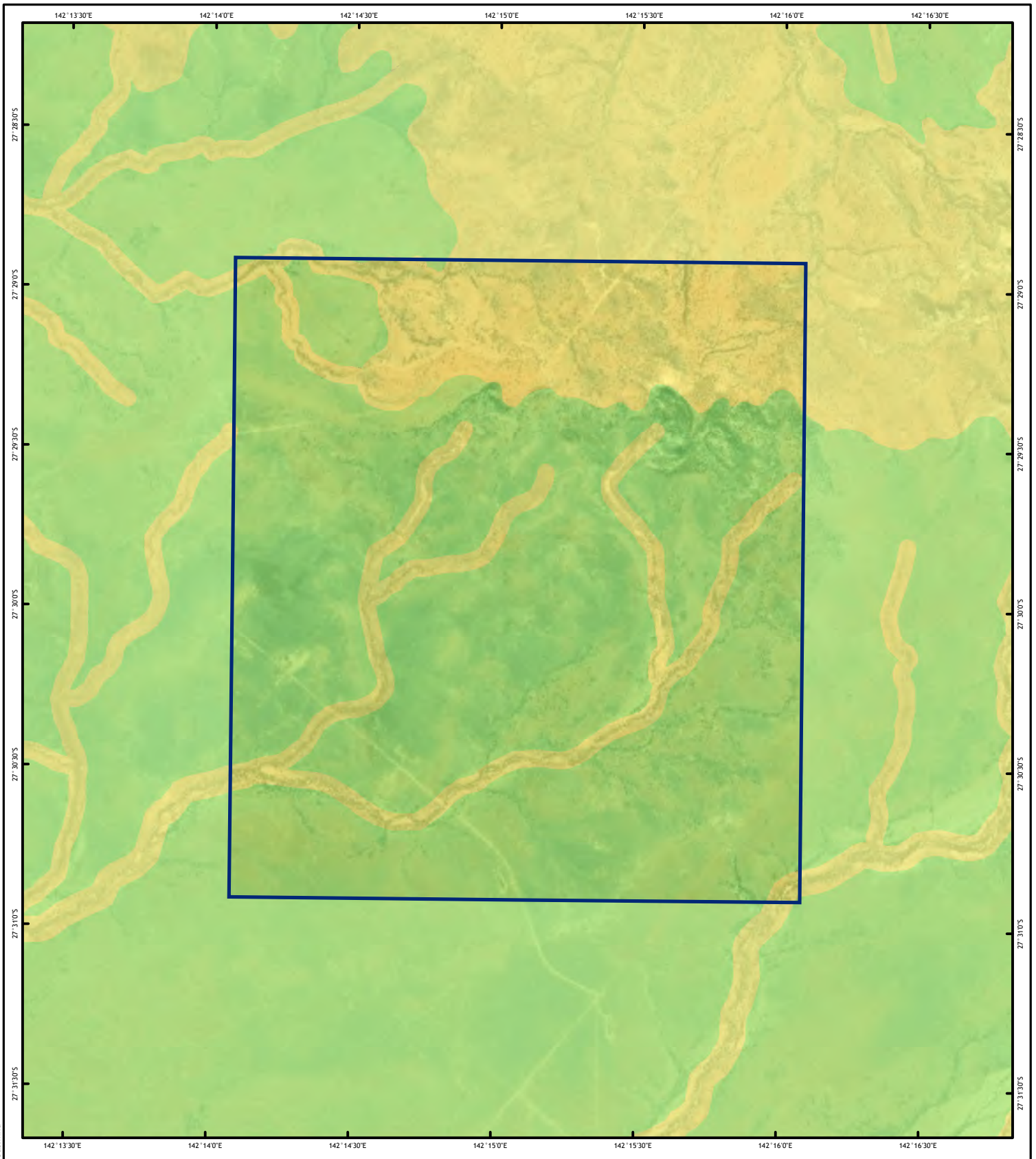
The proposed petroleum activities within moderate constraint areas may result in a SRI; however, general ecological management measures that are typically employed for the petroleum activities and the proposed area of disturbance make a SRI unlikely. Of relevance to the PL, these areas include:

- Threatened species habitat that has been broadly mapped as likely to occur; however, the exact areas of threatened species habitat is yet to be ground truthed. These species include *Xerothamnella parvifolia* and *Indigofera oxyrachis*, which are likely to occur within RE 5.5.2 and RE 5.5.4.
- MSES regulated vegetation - intersecting a watercourse (refer to Section 3.3.4).

Low constraint

The proposed petroleum activities within low constraint areas have limited potential to result in a SRI. Of relevance to the PL, these areas include:

- Suitable habitat for wide ranging MNES and/or MSES threatened species, including grey falcon and white-throated needletail.
- Habitat for migratory MNES species, including fork-tailed swift.
- Habitat for near threatened and special least concern species listed under the NC Act, including *Rhodanthe rufescens*, short-beaked echidna and woma python.



Legend

- Petroleum Lease - PL302

Environmental Constraints

- Moderate
- Low

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GDA 1994 MGA Zone 54
Projection: Transverse Mercator

Noccundra

Notes:
Aerial Imagery: © ESRI 2019
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014
Regional Ecosystem: © DES 2019
Petroleum Lease: © DNRME 2019

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FIGURE 6: ENVIRONMENTALLY CONSTRAINED AREAS

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Map Number	Job Number	Rev
1 of 1	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_EnviroConstrainedAreas.mxd

4.3.2 Impact minimisation

Significant Residual Impact Guideline clearing limits- Regulated Vegetation

The SRI Guideline (DEHP 2014) provides criteria for identifying when an impact on MSES may be deemed to be significant. The SRI Guideline contains tests and criteria that provide a trigger for when Environmental Offsets may be required. The SRI Guideline provides test criteria for one MSES occurring within the PL, namely regulated vegetation – RE intersecting a watercourse.

Section 2.1 of the SRI Guideline states that for a SRI to occur for these MSES, proposed disturbance must exceed clearing area and width limits (refer to Table 6), and clearing must occur within a specific distance of the 'defining bank' of the wetland or watercourse.

For the purposes of this SRI assessment, the following rules and assumptions have been applied:

For clearing in a regional ecosystem that is within the defined distance of a watercourse:

1. Vegetation Management Watercourses are as per the Vegetation Management Watercourse and Drainage Feature Map (as per Section 20AA of the VMA) to the extent the RE contains remnant vegetation.
2. Defined distance from the defining banks of Vegetation Management Watercourses is as per the Queensland Environmental Offsets Policy V1.9 (DES 2020) using stream order as per the Vegetation Management Watercourse and Drainage Feature Map.
3. The location of defining banks for Vegetation Management Watercourses was estimated by buffering the centreline of Vegetation Management Watercourses by 25 m on each side (i.e. this assumes a typical watercourse channel width of 50 m).

The maximum area of regulated vegetation - intersecting a watercourse was estimated by buffering the Vegetation Management Watercourse and Drainage Feature Map by the defined distance as per the Queensland Environmental Offsets Policy V1.9 (DES 2020), using stream order as per the Vegetation Management Watercourse and Drainage Feature Map.

Table 6 Significant residual impact test criteria and impact minimisation measures

MSES	Infrastructure type	SRI test criteria (DEHP 2014)	Impact minimisation for the project
Regulated vegetation - intersecting a watercourse	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger a SRI (as described in Section 4.3.2).	Linear infrastructure will be located outside the defined distance from the defining banks of Vegetation Management Watercourses and Drainage Features, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits.

MSES	Infrastructure type	SRI test criteria (DEHP 2014)	Impact minimisation for the project
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger a SRI (as described in Section 4.3.2).	Non-linear infrastructure will be located outside the defined distance from the defining banks of Vegetation Management Watercourses and Drainage Features, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits.

Siting and co-location of linear infrastructure

Co-location of linear infrastructure including access tracks and flowlines, potentially reduces the total disturbance footprint and reduces habitat fragmentation. When assessing route optimisation Santos may consider combining access track and flowlines into a single disturbance footprint and/or co-locating linear infrastructure within existing disturbed areas, where possible. The sparse nature of vegetation may also enable areas of woody vegetation to be avoided by linear infrastructure.

4.3.3 Impact mitigation

Management measures to further mitigate ecological impacts and avoid SRI resulting from the proposed development are identified within Table 7.

Table 7 Impact mitigation measures

Impact mitigation measures
During construction
Vegetation to be retained adjacent to proposed disturbance areas will be suitably demarcated where required (e.g. using marker pegs, flagging tape).
Clearing of vegetation is to be undertaken by a suitably qualified contractor.
Disturbance activities will be excluded from areas of retained vegetation.
Erosion and sediment control measures implemented where appropriate.
Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens.

Impact mitigation measures

Measures implemented to reduce risks to fauna from entrapment and injury in pipes and excavations, including:

- Use of a qualified fauna spotter/catcher where required.
- Pipes capped to prevent fauna entrapment during construction or after abandonment.
- Facilities (e.g. borrow pits, well cellars) are designed and constructed as far as practicable to minimise impacts to fauna.
- Borrow pits are not established in locations that pose an unacceptable hazard to livestock.
- Sumps, mud pits and other pits holding fluid are fenced as appropriate to minimise fauna (medium to large) and livestock access.
- Minimising the period trenches remain open to as short as reasonably practicable.
- Regular inspections of open excavations / trenches and prior to backfilling.
- Provision of escape ramps and refuge material for fauna that do enter trenches.
- Hollow logs (located on ground) within disturbance areas retained and shifted to adjacent undisturbed areas.

Post construction

Flowline Right of Ways will be reinstated as soon as practicable following gathering line / pipeline installation. The rehabilitation works are expected to mitigate the majority of impacts resulting from disturbance for flowline construction. Rehabilitation aims to reshape and stabilise disturbed areas to provide appropriate site conditions to facilitate natural revegetation processes, and will include the following activities (where appropriate):

- ripping of areas of compacted soil (except on sensitive soils / environments).
- respreading of stockpiled topsoil, vegetation and seed stock (where available) to facilitate natural revegetation.
- restoration of natural landform contours.

Final rehabilitation of disturbed areas would be undertaken to achieve the final rehabilitation criteria conditions specified in the relevant Environmental Authority.

Threatened fauna specific mitigation measures

Where threatened species nests are identified to be present, disturbance should be avoided. If disturbance cannot be avoided, clearing of the nest and a surrounding area should be postponed until after the relevant breeding season and/or incubation period. Clearing must not occur while the nest is active, with adults, eggs or nestlings.

Typical characteristics of grey falcon nests are stick nests, typically of other bird of prey or *Corvus* species (Beruldsen 2003). Sometimes a nest is merely a rough platform built into an upright fork near the top of a tall tree (Beruldsen 2003). Preferred trees usually occur in a patch of timber or belt of timber along a watercourse (Beruldsen 2003).

Threatened flora specific mitigation measures

Disturbance of areas that are likely to represent habitat for threatened flora species (REs 5.5.2 and 5.5.4) will be avoided wherever practicable. Should clearing of threatened flora be required, approval under the EPBC Act and/or NC Act may be required.

Waterway specific mitigation measures

Time construction and rehabilitation works to occur outside of flood periods.

Impact mitigation measures
Where possible, areas to be rehabilitated should be rehabilitated as soon as practicable post-disturbance. Rehabilitation areas may include pipeline Right of Ways and a portion of disturbance for well leases and sump pits.
Rehabilitation activities will reinstate natural landform contours to ensure natural surface water flows are not impacted.
Topsoil stockpiles separated from subsoil and maintained to preserve the seedbank (where practicable). Compaction of topsoil stockpiles avoided. The topsoil contains an existing seed bank, which will accelerate rehabilitation following a flood event after landform reinstatement. A topsoil stripping depth of up to 200 mm is generally appropriate to retain the seed bank.
Soils should be replaced in order of excavation wherever practicable to restore subsurface soil horizons.
No drilling is proposed in waterway channels. Activities to be located away from watercourses wherever practicable.
Access tracks, infrastructure and seismic lines located, prepared and constructed to maintain pre-existing surface water flows. Culverts and floodways installed where required.
Fuel, oil and chemical storage and handling undertaken in accordance with Australian standards and guidelines (i.e. in bunded areas) and in small volumes wherever practicable. Spill response equipment and materials kept on site and in operational vehicles (where appropriate). In the event of expected flooding, non-essential items/facilities such as chemicals, fuel and oil storages and waste receptacles removed from areas at risk of inundation (where appropriate / safe to do so).
Where possible, restrict the width of linear infrastructure corridors (access tracks and pipeline Right of Ways) to the minimum width practicable at waterway channel crossings. Preferentially select dry crossing sites for linear infrastructure with minimal earthworks requirements. Pre-existing areas of disturbance used to place infrastructure or seismic lines wherever practicable.

4.4 Cumulative impacts

For the purposes of undertaking a cumulative impact assessment, disturbances within the PL have been defined according to:

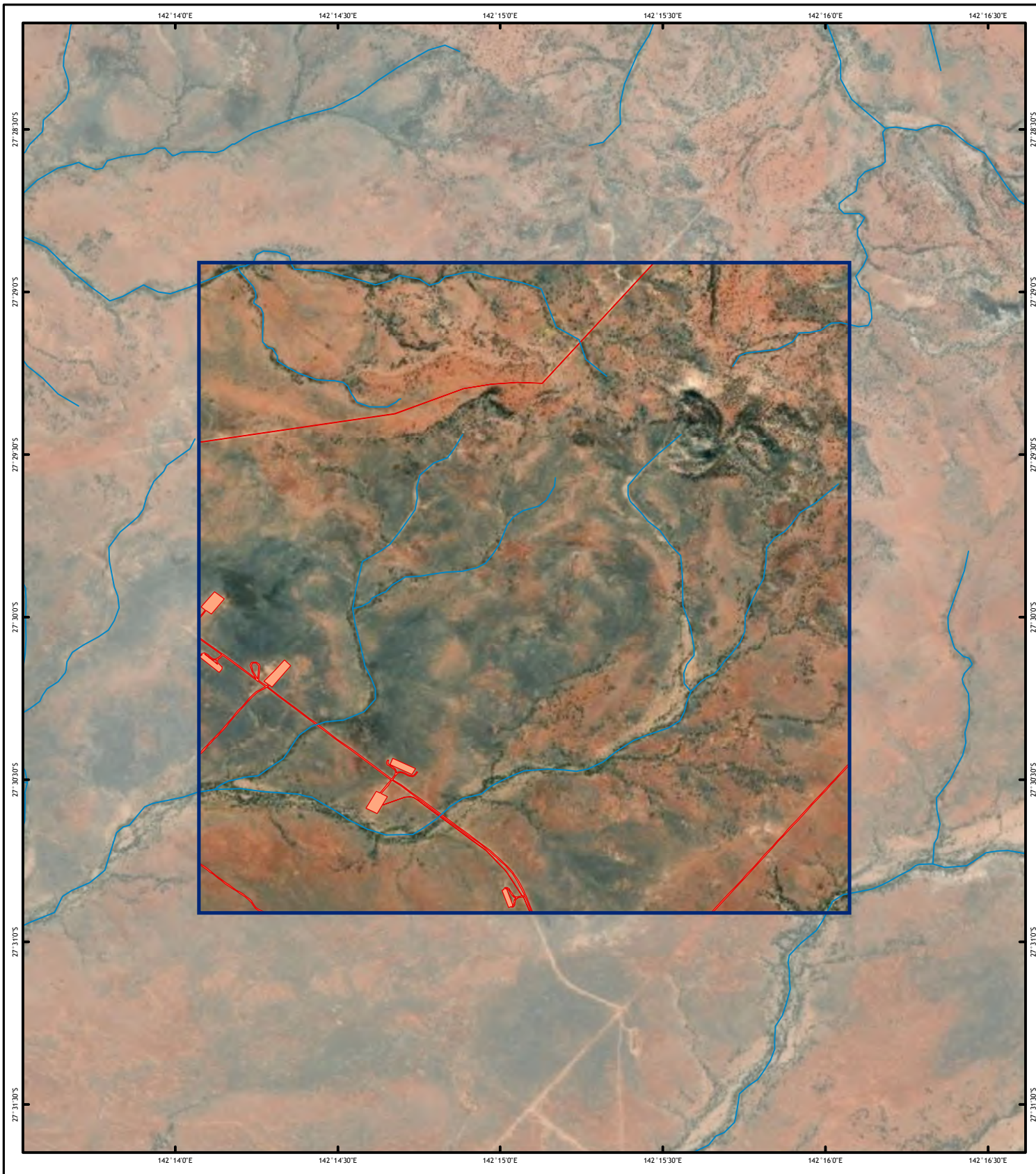
1. **Existing disturbance**: comprises a total area of 6.9 ha, which includes existing well leases, access tracks, flowlines, borrow pits and other disturbance footprints for supporting infrastructure[1].
2. **Proposed disturbance**: comprises a total area of 23.2 ha, which represents an additional 236% of the existing disturbance area. 7.8 ha of this area is proposed to be rehabilitated as soon as practicable post-construction and 15.3 ha to be rehabilitated at the end of the asset's life.

The existing disturbance and proposed disturbance areas for each MNES and MSES identified within the PL are summarised within Table 8 and depicted within Figure 7.

[1] Existing disturbance footprints are based on data supplied by Santos on 28 November 2019. Where supplied disturbance feature data comprised point, or line information, a disturbance polygon was created by assuming a 16 m wide corridor for pipelines, 6 m wide corridor for access tracks and 1.65 ha disturbance area for well leases.

Table 8 MNES and MSES cumulative impact disturbance area

MNES/MSES	Existing disturbance (ha)	Proposed disturbance (ha)
MNES		
Protected wildlife habitat for:		
• *Xerothamnella parvifolia*, listed as vulnerable	0.1	0
• Grey falcon, listed as vulnerable	6.9	23.2
• White-throated needletail, listed as vulnerable	6.9	23.2
• Fork-tailed swift (foraging habitat), listed as migratory and marine	6.9	23.2
MSES		
Regulated vegetation - intersecting a watercourse	0.4	N/A
Connectivity areas	6.9	23.2
Wetlands and watercourses (e.g. high ecological significance wetland)	0	0
Designated precinct in the Channel Country SEA	0	0
Protected wildlife habitat for		
• *Indigofera oxyrachis*, listed as vulnerable	0.1	0
• Grey falcon, listed as vulnerable	6.9	23.2
• White-throated needletail, listed as vulnerable	6.9	23.2
• Short-beaked echidna, listed as special least concern	6.9	23.2
Protected areas	0	0
Highly protected zones of State marine parks	0	0
Fish habitat areas	0	0
Waterway providing for fish passage	0	0
Marine plants	0	0
Legally secured offset areas	0	0



Legend

- Watercourse
- Petroleum Lease - PL302
- Existing Disturbance

N

Scale 1:30,000 (A4)

0 300 600 900 1,200

Metres

Coordinate System: GCS GDA 1994

Noccundra

Notes:
Aerial Imagery: ©
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014

Rev	Description	Drawn	Approved	Date
2	Issued for Use	CD	BD	16/03/2021
1	Issued for Use	CD	BD	11/12/2019

FIGURE 7: CUMULATIVE IMPACT

Desktop Ecological Assessment - PL 302
Santos

Map Number	Job Number	Rev
1 of 1	QEJ19118	2

Document Path: X:\JOBS\-2019\QEJ19118\GIS\QEJ19118_Disturbance.mxd

5 Legislative compliance

5.1 Commonwealth legislation

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

Preliminary assessments against the Australian Government MNES Referral Guidelines (DotE 2013) were conducted to assist in determining if residual impacts associated with a proposed development require referral to the DAWE. In summary, it was determined that the proposed works are unlikely to result in a significant impact to MNES. Based on the findings of the preliminary assessment against the MNES Referral Guidelines, the proposed development is unlikely to require a referral to the DAWE. Significant Impact assessments are summarised within Section 4.2.1 and provided in detail in Appendix C.

5.2 State legislation

5.2.1 Environmental Offsets Act 2014

Assessments against the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (DEHP 2014) were conducted to determine if offsets are likely to be required for impact to MSES. In summary, SRI assessments determined that SRI to all MSES known or likely to occur within with the PL is unlikely. As such, environmental offsets under the EO Act are unlikely to be required for the project. SRI assessments are summarised within Section 4.2 and provided in detail in Appendix D.

5.2.2 Environmental Protection Act 1994

No Category A, B or C ESAs were identified within the PL during the desktop assessments. Ground-truthing of watercourses as defined under the EP Act was not conducted (Section 3.3.4).

5.2.3 NC Act Protected Plants

The PL does not contain mapped 'high risk' areas, and as such the provisions of the *Flora Survey Guidelines - Protected Plants* do not apply. However, any threatened plant occurring 'in the wild' cannot be knowingly cleared or impacted without a clearing permit. If a protected plant is identified within the disturbance footprint and requires removal, a clearing permit will be needed.

6 Conclusion

Santos is proposing new petroleum activities within PL 302. A desktop assessment was conducted to identify environmental values that are known, or are likely, to occur within the PL.

MNES identified as likely to occur within the PL include:

- Three species listed as vulnerable under the EPBC Act:
  - *Xerothamnella parvifolia*
  - Grey falcon; and
  - White-throated needletail.
- One species, fork-tailed swift, listed as migratory under the EPBC Act.

MSES identified as likely to occur within the PL include:

- Three species listed as vulnerable under the NC Act
  - *Indigofera oxyrachis*
  - Grey falcon; and
  - White-throated needletail.
- One species, short-beaked echidna, listed as special least concern under the NC Act
- Regulated vegetation – intersecting a watercourse; and
- Connectivity areas.

No Category A, B or C ESAs under the EP Act occur within the PL.

Commonwealth and Queensland Government legislative frameworks require proponents to take all reasonable avoidance and mitigation measures to remove or reduce potential impact to MNES and MSES (DES 2020; DSEWPC 2012). The mitigation hierarchy of avoid, minimise, mitigate and offset is to be applied in the design process for the proposed petroleum infrastructure. After the application of avoidance, minimisation and mitigation measures it was determined that the proposed development is unlikely to have a significant residual impact on MNES and MSES occurring within the PL.

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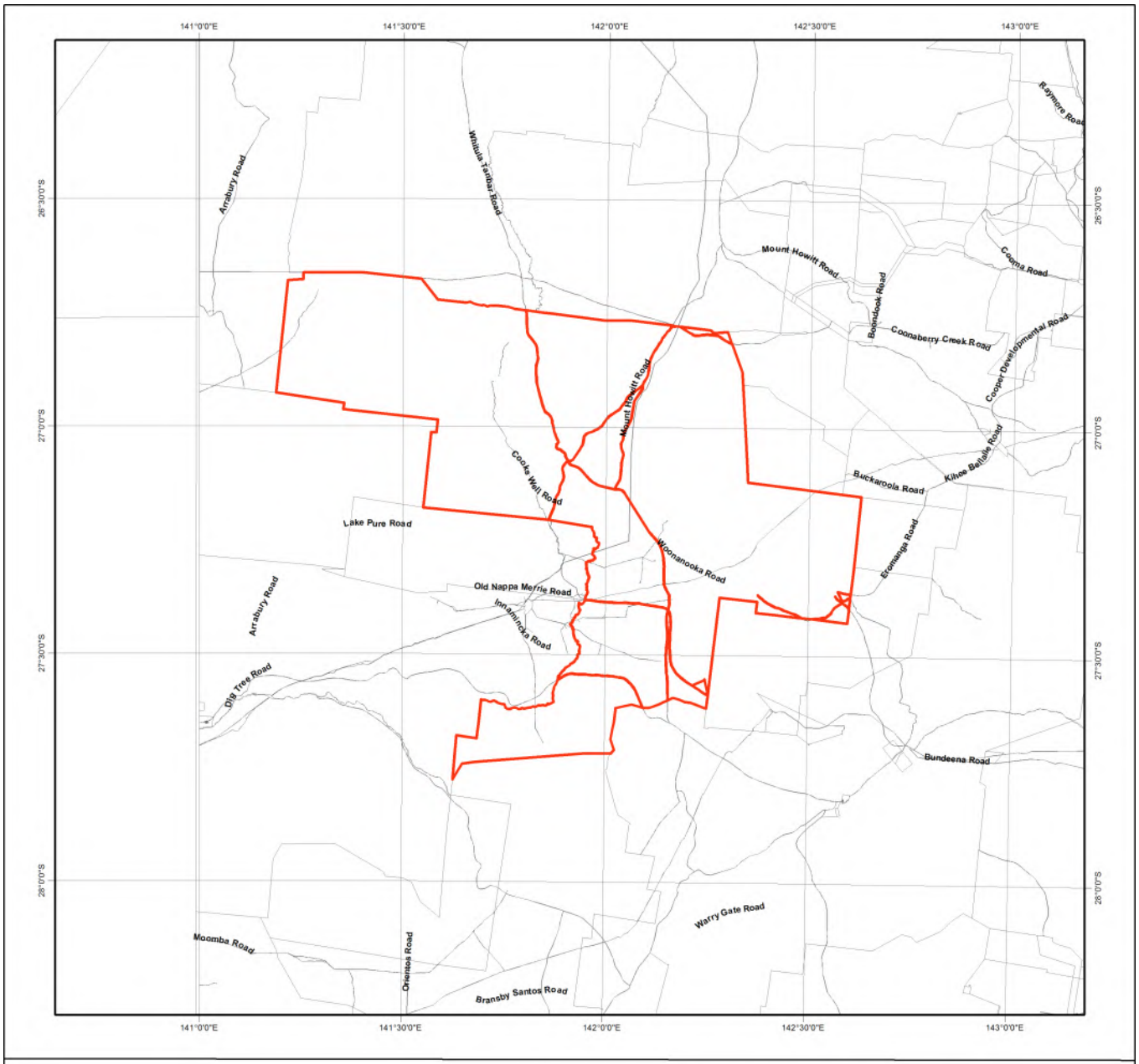
Appendix A Database search results

WildNet Records supplied by the Department of Environment and Science (2021)

Kingdom	Family	Scientific name	Common name	NC Act	EPBC Act	Record Date	Locality	Latitude	Longitude
Rosopsidea	Acanthaceae	*Xerothamnella parvifolia*		C	V	20/07/1977	Grey ra c. 82km from Thargomindah on rd to Noccundra	-27.74014	143.07621
Rosopsidea	Acanthaceae	*Xerothamnella parvifolia*		C	V	21/12/2008	C. 80km w of Thargomindah, at base of grey range.	-27.71764	143.0051
Rosopsidea	Chenopodiaceae	*Maireana cheelii*		C	V	28/06/1936	Nockatunga	-27.5068	143.00955
Rosopsidea	Asteraceae	*Rhodanthe rufescens*		NT		11/08/1987	Noccundra 130km wnw of thargomindah	-27.80681	142.59289
Rosopsidea	Asteraceae	*Rhodanthe rufescens*		NT		29/08/2010	1km N of 'Plevna Downs' homestead, W of Eromanga.	-26.67472	142.58694
Rosopsidea	Fabaceae	*Indigofera oxyrachis*		V		30/08/2010	Repeater Tower hill, 1km N of Cooneberry Creek road, W of Eromanga.	-26.76778	142.67056
Mammalia	Macropodidae	*Petrogale xanthopus celeris*	yellow-footed rock-wallaby	V	V	1/10/1960	Orient	Unavailable	Unavailable
Mammalia	Macropodidae	*Petrogale xanthopus celeris*	yellow-footed rock-wallaby	V	V	7/08/1974	Orient	Unavailable	Unavailable
Mammalia	Macropodidae	*Petrogale xanthopus celeris*	yellow-footed rock-wallaby	V	V	7/09/1974	Orient	Unavailable	Unavailable
Mammalia	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna	SL		31/10/2012	Cooper Developmental Road, west of Eromanga, SWQ.	-27.13012	142.78636

Kingdom	Family	Scientific name	Common name	NC Act	EPBC Act	Record Date	Locality	Latitude	Longitude
Aves	Threskiornithidae	*Plegadis falcinellus*	glossy ibis	SL		28/10/2012	Wilson River Campground, Noccundra Waterhole, Noccundra, SWQ.	-27.8214	142.58994
Aves	Cacatuidae	*Lophochroa leadbeateri*	Major Mitchell's cockatoo	V		1/05/1994	McGregor Range, 60km W Eromanga	-26.77764	142.66788
Mammalia	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna	SL		3/09/2011	QSN3 Wallumbilla - Ballera	-26.77764	142.66788
Aves	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper	SL		25/08/1994	Coothero Waterhole-Nockatunga Station	-27.72628	142.71652
Mammalia	Megadermatidae	*Macroderma gigas*	ghost bat	E	V	31/12/1988	Mt Margaret, Wilson river	-26.89833	142.33444
Aves	Laridae	*Gelochelidon nilotica*	gull-billed tern	SL		1/06/1976	Lake pure-cooper creek-karmona middle	-27.20682	141.66789
Aves	Threskiornithidae	*Plegadis falcinellus*	glossy ibis	SL		1/06/1976	Cooper creek - Nappa merrie - middle	Unavailable	Unavailable
Mammalia	Macropodidae	*Petrogale xanthopus celeris*	yellow-footed rock-wallaby	V	V	1/01/1970	Orient Stn	Unavailable	Unavailable



Map of Great Barrier Reef Wetland Protection Areas

- Selected Lot and Plan
- Cadastral Boundary
- Wetland in a wetland protection area
- Great Barrier Reef wetland protection area

N

Note:
This map shows the location of wetland protection areas which are defined under the Environmental Protection Regulation 2008. Within wetland protection areas, certain types of development involving high impact earthworks are made assessable under Schedule 3 of the Sustainable Planning Regulation 2009.

The Department of State Development, Manufacturing, Infrastructure and Planning is the State Assessment Referral Agency (SARA) under Schedule 7 of the Sustainable Planning Regulation 2009 for assessable development involving high impact earthworks within wetland protection areas. The Department of Environment and Science is a technical agency.

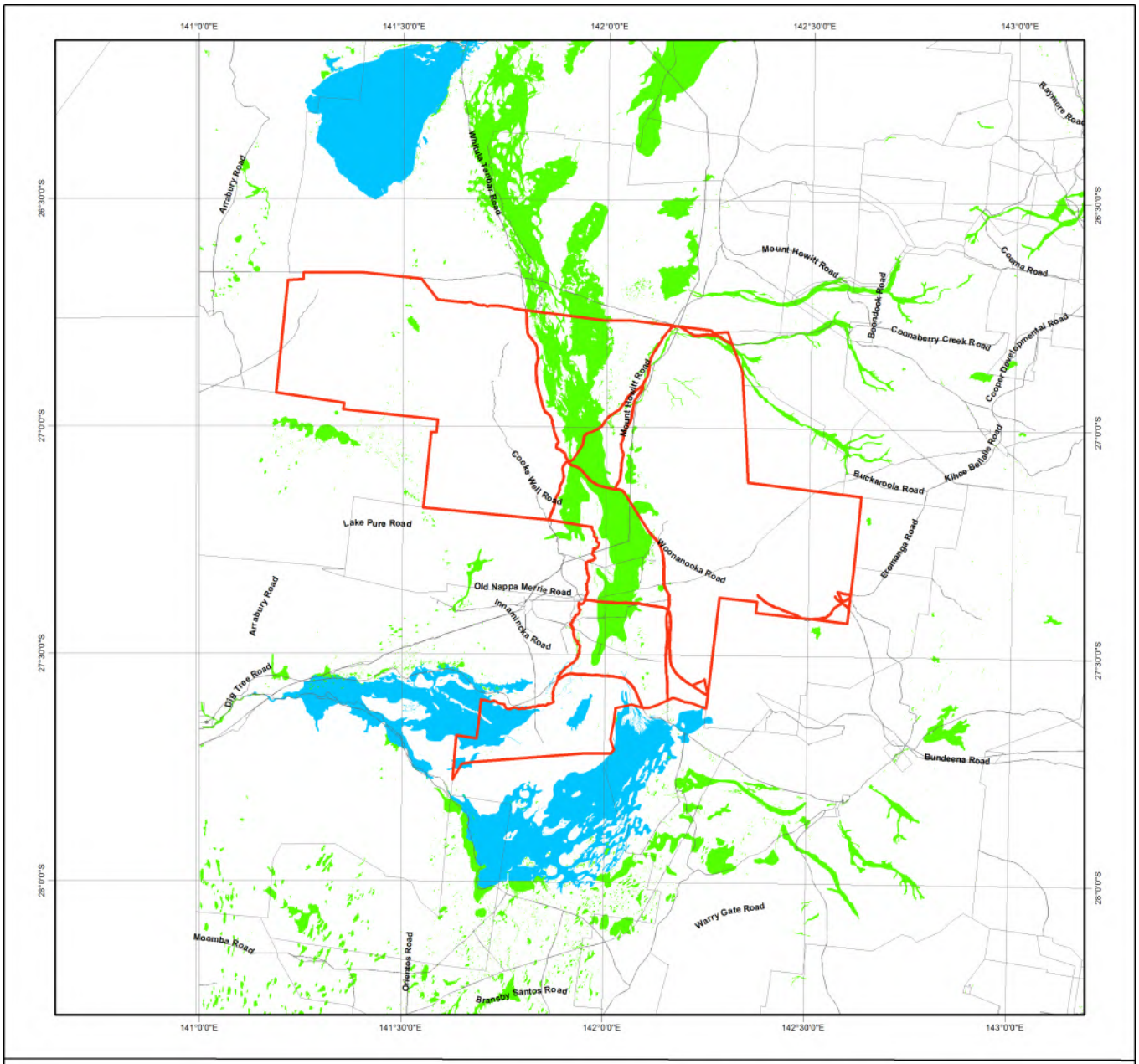
The policy outcome and assessment criteria for assessing these applications are described in the State Development Assessment Provisions (SDAP) *State Code 9 : Great Barrier Reef Wetland Protection Areas.*

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science, email planning.support@des.qld.gov.au.

0 13000 26000 39000 52000 65000 m

This product is projected into GDA 1994 MGA Zone 54



Map of Queensland Wetland Environmental Values

Selected Lot and Plan

Cadastral Boundary

High ecological values waters management intent

Wetlands assessed under section 7

GBR wetland of high ecological significance

Wetland of high ecological significance

Wetland of general ecological significance

N

Note:
This map shows the location of wetlands on the Map of Queensland Wetland Environmental Values under the Environmental Protection (Wetland and Water Biodiversity) Policy 2019. The map also shows high ecological value waters management intent under Schedule 2 of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.

Wetlands are assessed for ecological significance using the environmental values for wetlands in section 7 of the Environmental Protection (Wetland and Water Biodiversity) Policy 2019. Wetlands are considered either High Ecological Significance (HES) or of General Ecological Significance (GES) for the purposes of the environmental values.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science, email planning.support@des.qld.gov.au.

0 13000 26000 39000 52000 65000 m

This product is projected into GDA 1994 MGA Zone 54

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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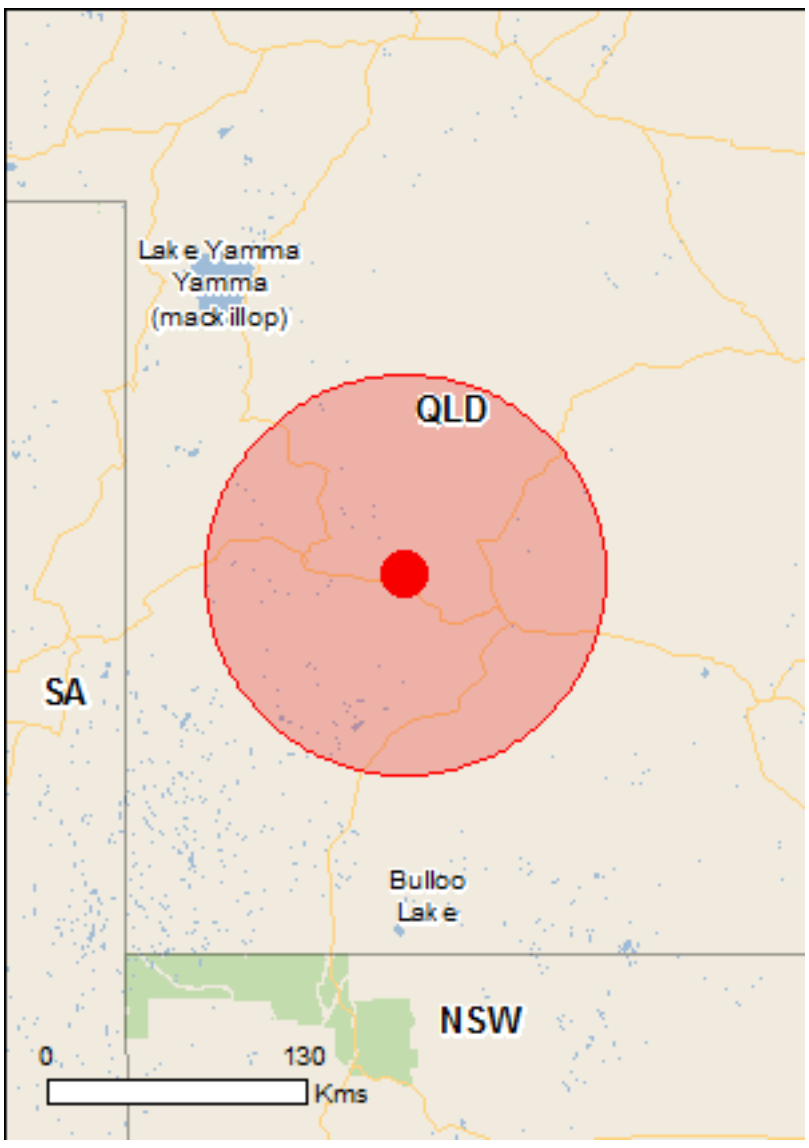
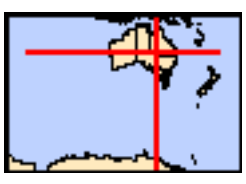


Coordinates

Buffer: 100.0Km



Summary

Matters of National Environmental 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:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	14
Listed Migratory Species:	10

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 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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	19
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Coongie lakes	30 - 40km upstream

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Amytornis barbatus barbatus		
Bulloo Grey Grasswren, Grey Grasswren (Bulloo) [67065]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Notomys fuscus		
Dusky Hopping-mouse, Wilkiniti [125]	Vulnerable	Species or species habitat likely to occur within area
Petrogale xanthopus celeris		
Yellow-footed Rock-wallaby (central-western Queensland) [87608]	Vulnerable	Species or species habitat may occur within area
Plants		
Frankenia plicata		
[4225]	Endangered	Species or species habitat likely to occur within area
Grevillea kennedyana		
Flame Spider-flower [6974]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Sclerolaena walkeri [16152]	Vulnerable	Species or species habitat likely to occur within area
Xerothamnella parvifolia [3141]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		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 known to 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
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to 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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Cooper Creek - Wilson River Junction	QLD
Cooper Creek Swamps - Nappa Merrie	QLD

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-27.49842 142.25146

Acknowledgements

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
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-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 B Likelihood of occurrence assessments

Likelihood of occurrence for threatened species

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Flora				
Frankenia plicata	E	LC	The species grows in a range of habitats, including on small hillside channels, which take the first run-off after rain (DEWHA 2008a). In the Simpson Desert, the species has been recorded predominantly from swales of loamy sands to clay (DEWHA 2008a). This species is found in a wide range of vegetation communities that have good drainage (DEWHA 2008a).	**Unlikely to occur** The PL is outside of the current known distribution of the species. The species has not been recorded within Queensland (Queensland Herbarium 2019a).
Indigofera oxyrachis	-	V	The species has been recorded from stony ground and along creek lines with *Acacia* species (P. G. Wilson, 1994). This species is typically found in the sandy beds of creeks (Wilson 1994).	**Likely to occur** The species has been recorded approximately 90 km north-east of the PL. The PL is mapped to contain suitable habitat for the species, namely RE 5.5.2 and RE 5.5.4, which are mapped to occur within the northern portion of the PL.
Maireana cheelii Chariot wheels	V	LC	The species is usually found in chenopod shrubland and grassland communities on heavy clay soils, dominated by various native shrubs, grasses and herbs (Mavromihalis 2010). The species was recorded in south-western Queensland in 1936, at two locations close to Eulo on the Paroo River plain and on a private pastoral property (Nockatunga) about 125 km west of Thargomindah, in the Mulga Lands IBRA bioregion (Mavromihalis 2010). No record of the species has been made at either location since 1936 (Mavromihalis 2010). The species has since been recorded in Queensland in Currawinya National Park (ALA 2021).	**Unlikely to occur** Previous records of this species within 100 km of the PL were recorded in 1936, with no further record of the species being made at these locations (Mavromihalis 2010). In addition, the PL does not contain floodplains of major river systems, which has been identified as suitable habitat for the species (Mavromihalis 2010).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Grevillea kennedyana	V	V	This species occurs on scree slopes of mesas, steep jump-ups and rocky drainage lines. The species grows in loamy soils on weathered silcrete in areas which receive low annual rainfall. On lower slopes, it is usually the only species of low shrub present with other low shrub and tree species occurring on higher slopes. The species normally occurs in sparse shrubland or low woodland of mulga (*Acacia aneura*), gidgee (*A. cambagei*), curara (*A. tetragonophylla*), whitewood (*Atalaya hemiglauca*) and occasionally black oak (*Casuarina pauper*) with a chenopodiaceous ground cover (TSSC 2016a).	**Possible occurrence** The PL is mapped to contain possible habitat for this species in the northern portion of the PL which comprises RE 5.5.4/5.5.2. The species however has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Sclerolaena walkeri	V	LC	The species is known to occur on saline river channels, flats and floodplains (DEWHA 2008c).	**Unlikely to occur** The species has not been recorded within 100 km of the PL within the Queensland Government WildNet database. In addition, DOR supplied RE mapping identifies the area of floodplain vegetation community to be restricted to a small area (approximately 2.5 ha) within the south-east of the PL. The nearest record of the species within the Cooper Creek floodplain is from approximately 280 km to the north-east.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Rhodanthe rufescens	-	NT	Occurrence records for the species have identified habitat to include *Acacia aneura* and *A. cambagei* woodland, with soil types including pale brown clay, red loamy soil and on a low ridgetop (ALA 2021).	**Likely to occur** The species has been recorded within 100 km of the PL and the PL is mapped to contain suitable habitat for the species, namely RE 5.5.2 and RE 5.5.4, which are mapped to occur within the northern portion of the PL. Both REs occur on the crests of dissected tablelands with very shallow to shallow soils, frequently with silcrete stones present (Queensland Herbarium 2019b).
Xerothamnella parvifolia	V	LC	The species has typically been recorded in association with skeletal clay soils in minimally vegetated areas associated with mesas (DEWHA 2008b). It has been recorded within *Acacia aneura* (mulga) woodland as well as *A. cambagei* (gidgee) woodland with a *Senna* understory in Queensland and NSW (DEWHA 2008b).	**Likely to occur** The species has been recorded approximately 75 km south-east of the PL within *Acacia* dominated vegetation communities, particularly *A. cambagei* (gidgee) (ALA 2021). The PL is mapped to contain suitable habitat for the species, namely RE 5.5.2 and RE 5.5.4, which are mapped to occur within the northern portion of the PL. Both REs occur on the crests of dissected tablelands with very shallow to shallow soils, frequently with silcrete stones present (Queensland Herbarium 2019b).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Birds				
Common sandpiper *Actitis hypoleucos*	Marine, Migratory	SLC	The species has been recorded from a wide range of wetland habitats, of varying levels of salinity (DAWE 2021). The species typically forages in shallow water and on bare soft mud at the edges of wetlands (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Grey grasswren *Amytornis barbatus*	E	E	The species occurs on periodically-inundated swampy floodplains (DAWE 2021). It inhabits patches of dense vegetation that are comprised of lignum thickets, 1.0 to 2.5 m tall, with clumps of *Eragrostis australasica*, about 1 to 2 m tall, and/or clumps of *Atriplex nummularia* (DAWE 2021). It also sometimes occurs in areas of *Halosarcia pergranulata* that lie adjacent to more typical habitat (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Fork-tailed swift *Apus pacificus*	Marine, Migratory	SLC	The species is predominantly aerial and occurs over inland areas and occasionally above the foothills in coastal areas with dry and open habitat (DAWE 2021). The species can also occur over low scrub, heathland, saltmarsh and riparian woodlands and are associated with low pressure systems that favour the occurrence of insect prey (DAWE 2021).	**Likely to occur** The species is a wide-ranging and nomadic aerial feeder. The species is likely to occur within the airspace above the PL while foraging. The species does not breed in Australia (DAWE 2021).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Eastern great egret *Ardea alba modesta*	Marine	LC	The species occurs in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial) (DAWE 2021). These include swamps, marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural lands; reservoirs, sewage treatment ponds, drainage channels, salt pans, salt lakes, salt marshes, estuarine mudflats, tidal streams, mangrove swamps, coastal lagoons and offshore reefs (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Cattle egret *Ardea ibis*	Marine	LC	Typical habitat for the species comprises tropical and temperate grasslands, wooded lands and terrestrial wetlands (DAWE 2021). High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures (DAWE 2021). It has been recorded on earthen dam walls and ploughed fields (DAWE 2021). It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer (DAWE 2021). It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora (DAWE 2021). They have sometimes been observed in swamps with tall emergent vegetation (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Sharp-tailed sandpiper *Calidris acuminata*	Marine, Migratory	SLC	The species typically inhabits muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation (DAWE 2021). This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland (DAWE 2021). The species may use flooded paddocks, sedgelands and other ephemeral wetlands, but vacate these habitats during dry conditions (DAWE 2021). Marine habitats for the species include intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves (DAWE 2021). Sometimes occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).	**Unlikely to occur** While the species has been recorded within 100 km of the PL (WildNet), the PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species.
Curlew sandpiper *Calidris ferruginea*	CE, Marine, Migratory	E	In Australia, this species usually forages and roosts in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Pectoral sandpiper *Calidris melanotos*	Marine, Migratory	SLC	Typical habitat for the species comprises shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DAWE 2021). The species is usually found in coastal or near coastal habitat but occasionally further inland (DAWE 2021). Also recorded in swamp overgrown with lignum (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Black-eared cuckoo *Chrysococcyx osculans*	Marine	LC	The species inhabits drier woodlands and scrublands, including mallee, mulga, lignum, saltmarsh and riverside thickets (Pizzey & Knight 2007).	**Likely to occur** The PL is likely to contain suitable habitat for the species, including *Acacia* dominated vegetation communities. While the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database, the PL is within the species distribution and public records of the species occur within 100 km of the PL (ALA 2021). Impact to listed marine species resulting from the proposed disturbance is likely to be minimal.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Latham's snipe, japanese snipe *Gallinago hardwickii*	Marine, Migratory	SLC	In Australia the species typically occurs in permanent and ephemeral wetlands up to 2000 m above sea-level (DAWE 2021). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (DAWE 2021). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (DAWE 2021). Various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Painted honeyeater *Grantiella picta*	V	V	The species forages on mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, Acacia dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes (DAWE 2021).	**Possible occurrence** While the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database, the PL is mapped to contain suitable habitat for the species, namely Acacia dominated woodlands (REs 5.5.2 and 5.5.4).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Grey falcon *Falco hypoleucos*	-	V	Habitat for the species is generally timbered lowland plains that are crossed by tree-lined watercourses, and adjacent to treeless areas, grasslands and open woodlands that are used for foraging (Garnett et al. 2011). Key habitat is identified as Acacia shrublands that are crossed by tree-lined watercourses (Garnett et al. 2011).	**Likely to occur** While the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database, multiple public records for the species occur within 100 km of the PL (ALA 2021). The PL is mapped to contain vegetation that provides suitable habitat for the species; namely timbered woodlands (REs 5.5.2 and 5.5.2), which provide breeding habitat, and adjacent treeless areas (REs 5.9.3 and 5.3.21), which provide foraging habitat.
Major Mitchell's cockatoo *Lophochroa leadbeateri*	-	V	The species prefers semi-arid and arid regions, typically occurring in dry woodlands dominated by Eucalyptus, Callitris and Casuarina spp. (Curtis & Dennis 2012).	**Possible occurrence** While the species has been recorded within 100 km of the PL within the Queensland Government WildNet database and public records (ALA 2021), DOR mapped vegetation communities within the PL are treeless or are dominated by Acacia species, which are unlikely to form suitable nesting hollows for the species.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Rainbow bee-eater *Merops ornatus*	Marine	LC	Occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins, 1999). It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water (DAWE 2021). The species is known to occur in a wide variety of other habitats, including mangroves, grasslands, wetlands, vine thickets and heathlands (DAWE 2021).	**Likely to occur** The PL contains suitable habitat for the species and the species has been previously recorded within 100 km of the PL (ALA 2021).
Grey wagtail *Motacilla cinerea*	Marine, Migratory	SLC	Near running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields, airfields (Pizzey & Knight 2007).	**Unlikely to occur** The species is an uncommon vagrant to Australia. In addition, the PL is unlikely to contain suitable habitat for the species.
Yellow wagtail *Motacilla flava*	Marine, Migratory	SLC	The species typically inhabits short grass and bare ground; swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and town lawns (Pizzey & Knight 2007). The species is regularly recorded as a summer migrant to coastal northern Australia (Pizzey & Knight 2007).	**Unlikely to occur** The species is an uncommon vagrant to Australia. In addition, the PL is unlikely to contain suitable habitat for the species.
Eastern osprey *Pandion cristatus*	Marine, Migratory	SLC	The species occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands (DAWE 2021). They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia (DAWE 2021). They require extensive areas of open fresh, brackish or saline water for foraging (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Plains-wanderer *Pedionomus torquatus*	CE	V	The species typically occurs within sparse, treeless, lowland native grasslands which usually occur on hard red-brown clay soils (Department of the Environment (DotE) and the Department of Environment, Water and Natural Resources (DEWNR) 2016). Grassland structure is much more important than floristic composition with the species showing a strong preference for sites with approximately 50% bare ground and most vegetation less than 5 cm in height and some widely-spaced plants up to 30 cm (DotE & DEWNR 2016). The species occasionally occurs in other types of habitat such as in stubble; amongst low cereal crops; and in low, sparse chenopod shrubland (DotE & DEWNR 2016).	**Possible occurrence** The nearest record of the species occurs approximately 140 km south of the PL, associated with the Bulloo River floodplain (ALA 2021). Habitat mapping within the National Recovery Plan for the species, identifies the PL to occur within a 'species may occur' area (DotE & DEWNR 2016). The PL is mapped to contain sparsely treed native grasslands, which comprise suitable habitat for the species.
Night parrot *Pezoporus occidentalis*	E	E	Queensland records for the species are typically associated with spinifex *Triodia* hummock grasslands, *Astrebla* spp. grasslands, shrubby samphire and chenopod associations and occasional areas with *Acacia cambagei* or *A. aneura* (TSSC 2016). Roosting and nesting sites are consistently reported as within clumps of dense vegetation, primarily old and large Spinifex clumps, but sometimes other vegetation types (TSSC 2016).	**Possible occurrence** The PL is likely to contain suitable foraging habitat for the species, particularly *Astrebla* spp. grasslands. While the species has not been recorded within 100 km of the PL, the species is highly cryptic with an uncertain present day distribution.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Glossy ibis *Plegadis falcinellus*	Marine, Migratory	SLC	The species typically inhabits freshwater marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation (DAWE 2021). The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons (DAWE 2021). Sometimes recorded in wooded swamps, artificial wetlands (such as irrigated fields), and in mangroves for breeding (DAWE 2021). Feeds in very shallow water (DAWE 2021).	**Unlikely to occur** While the species has been recorded within 100 km of the PL within the Queensland Government WildNet database, the PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species.
Australian painted snipe *Rostratula australis*	E, Marine	V	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DAWE 2021). They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DAWE 2021). The species has been recorded to sometimes utilise areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins 1993). Breeding occurs in shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby, typically from or near small islands in fresh water wetlands (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Gull-billed tern *Gelochelidon nilotica*	Marine, Migratory	SLC	The species inhabits beaches, mudflats, brackish wetlands, including inland wetlands, grasslands, crops, ploughed fields and airfields (Pizzey and Knight 2007). The species usually breeds in small colonies on islands in inland lakes (Pizzey and Knight 2007).	**Unlikely to occur** While the species has been recorded within 100 km of the PL (WildNet 2021), the PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species.
Common greenshank *Tringa nebularia*	Marine, Migratory	SLC	The species occurs in all types of wetlands (Higgins & Davies 1996). Typical habitat for this species a wide variety of inland wetlands and sheltered coastal habitats of varying salinity (DAWE 2021), including sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass, both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats (DAWE 2021).	**Unlikely to occur** The PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Marsh sandpiper *Tringa stagnatilis*	Marine, Migratory	SLC	Lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. In north Australia they prefer intertidal mudflats. In the south-east Gulf of Carpentaria they have been recorded round both saline and fresh waters. Elsewhere they said to avoid, or rarely occur in, tidal habitats, and rarely occur on beaches (DotE 2015).	**Unlikely to occur** While the species has been recorded within 100 km of the PL (ALA 2021), the PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species.
White-throated needletail *Hirundapus caudacutus*	V; Marine, Migratory	SLC	Conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species (TSSC 2019). Although they occur over most types of habitat, they are probably 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 (TSSC 2019). They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps (TSSC 2019). When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (TSSC 2019). In coastal areas, they are sometimes seen flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes (TSSC 2019).	**Likely to occur** The species is likely to intermittently forage within the airspace above the PL. As such, the PL contains general foraging habitat for the species. The species has also been recorded within 100 km of the PL.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Caspian Tern *Hydroprogne caspia*	Marine, Migratory	SLC	Mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred (DotE 2015). They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks (DotE 2015). They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs (DotE 2015). Breeding sites include low islands, cays, spits, banks, ridges, beaches of sand or shell, terrestrial wetlands and stony or rocky islets or banks (DotE 2015).	**Unlikely to occur** While the species has been recorded within 100 km of the PL (ALA 2021), the PL is not mapped to contain suitable habitat for the species. A small area (approximately 2.5 ha) of floodplain vegetation community is mapped in the south-eastern portion of the PL; however, the vegetation occurs in infrequently flooded areas and as such, is not considered to comprise habitat for the species.
Mammals				
Ghost bat *Macroderma gigas*	V	E	The species occurs across a range of habitats, from arid Pilbara to tropical savanna woodlands and rainforests (DAWE 2021). During the daytime they roost in caves, rock crevices and old mines (DAWE 2021). Roost sites used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23°–28°C and a moderate to high relative humidity of 50–100 percent (DAWE 2021). The average foraging distance is approximately 2 km from the daytime roost (DAWE 2021).	**Unlikely to occur** The PL is outside of the current known distribution for the species (DAWE 2021). The Queensland Government WildNet database lists a record of the species within 100 km of the PL; however, this record is from 1770, indicating that it is likely a historical record.
Greater bilby *Macrotis lagotis*	V	E	The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (TSSC 2016b).	**Unlikely to occur** The PL is outside of the current known distribution of the species (TSSC 2016b).

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Dusky hopping-mouse, wilkiniti *Notomys fuscus*	V	E	This species inhabits a variety of soft sandy habitats, preferring sand dunes, hills and ridges with cane grass (*Ophiuros exaltatus*), sandhill wattle (*Acacia ligulata*), nitrebush (*Nitraria billardiera*), sticky hopbush (*Dodonea viscose*) and other annual and perennial shrubs (DEWHA 2008b).	**Unlikely to occur** The PL is outside of the current known distribution of the species (ALA 2021; DEWHA 2008b) and the PL is not mapped to contain suitable habitat for the species.
Yellow-footed rock-wallaby *Petrogale xanthopus celeris*	V	V	The yellow-footed rock-wallaby (central-western Queensland) is mostly nocturnal, and shelters during the day in caves and rock crevices (TSSC 2016c). It is closely associated with rugged rocky areas, along the edges of low sandstone tablelands and hills, typically with low Acacia woodlands or shrublands (TSSC 2016c).	**Unlikely to occur** Examination of aerial imagery for the PL identified limited potential for suitable rocky habitat within the PL. In addition, the species has not been recorded within 100 km of the PL within the Queensland Government WildNet database.
Short-beaked echidna *Tachyglossus aculeatus*	-	SLC	The species occurs throughout Australia in a wide variety of habitats; wherever there is a supply of ants and termites, upon which it feeds (Van Dyck & Strahan 2008). The species usually seeks shelter under thick bushes, in hollow logs, under piles debris, or occasionally in a rabbit burrow (Van Dyck & Strahan 2008).	**Likely to occur** The PL contains suitable habitat for the species and the species has been previously recorded within 100 km of the PL.

Species	EPBC Act Status[1]	NC Act Status[1]	Habitat	Likelihood of occurence[2]
Reptiles				
Common death adder *Acanthophis antarcticus*	-	V	The species is strongly associated with deep leaf litter and therefore, wooded ecosystems. The species is found in a wide variety of habitats including rainforests, wet sclerophyll forests, woodland, grasslands, chenopod dominated shrublands, and coastal heathlands (DES 2018).	**Possible occurrence** While the PL contains suitable habitat for the species, there were no Wildnet records. One ALA record exists within 100km of the PL; however, this record has uncertain coordinate precision, and the PL is either outside or at the very extremes of the distribution as published within Wilson & Swan (2011) and Wilson (2015).
Woma python *Aspidites ramsayi*	-	NT	Wide variety of dry habitats from spinifex desert to brigalow (Wilson, 2015). Known from *Eucalyptus* and *Acacia* woodlands, heaths, and shrublands (Bruton et al., 2014; Wilson & Swan, 2011). Can inhabit cleared and regrowth areas where underground shelters persist (Bruton et al. 2014).	**Likely to occur** The PL contains suitable habitat for the species and the species has been previously recorded within 100 km of the PL (ALA 2021).

[1] EPBC Act = Environment Protection and Biodiversity Conservation Act 1999; NC Act = Nature Conservation Act 1992. E-Endangered, V-Vulnerable, NT-Near Threatened, SLC-Special Least Concern

[2] **Known** to occur: species were recorded during field surveys. **Likely** to occur: suitable habitat to support the species is present and the species has previously been recorded within the desktop search extent. **Possible** occurrence: The PL is within the species known distribution and suitable habitat to support the species is present; however, the species has not previously been recorded within the desktop search extent; and/or, suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence. **Unlikely** to occur: the PL does not comprise suitable habitat for the species, or is outside of the species known distribution.

Appendix C MNES significant impact assessment

C.2 MNES significant impact assessment

Definitions and terminology

Term	Definition under the EPBC Act
Important population	A population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that 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.
Habitat critical to the survival of the species	Areas that are necessary: • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long term evolutionary development, or • for the reintroduction of populations or recovery of the species or ecological community. Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.
Invasive species	An introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.

MNES significant impact assessment for *Xerothamnella parvifolia*

MNES Significant Impact Guideline criteria for endangered species	Response
Lead to a long-term decrease in the size of an important population of a species	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *X. parvifolia*. As such, the proposed disturbance is unlikely to lead to a long-term decrease in the size of an important population of the species.
Reduce the area of occupancy of an important population	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *X. parvifolia*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Fragment an existing important population into two or more populations	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *X. parvifolia*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Adversely affect habitat critical to the survival of a species	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *X. parvifolia*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Disrupt the breeding cycle of an important population	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *X. parvifolia*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *X. parvifolia*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**No significant impact** Overgrazing by goats and macropods is listed as threatening processes to the species (DAWE 2021). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the species to decline	**No significant impact** Disease is not listed as a potential threat to the species (DAWE 2021). The project is unlikely to introduce a disease that may cause the species to decline.

MNES Significant Impact Guideline criteria for endangered species	Response
Interfere substantially with the recovery of the species	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species as the project is likely to avoid clearing of the species or altering the species habitat.

MNES significant impact assessment for grey falcon

MNES Significant Impact Guideline criteria for endangered species	Response
Lead to a long-term decrease in the size of an important population of a species	**No significant impact** The proposed disturbance will require the clearing of approximately 23.2 ha of grey falcon habitat, which represents 1.9% of the grey falcon habitat identified within the PL. The proposed disturbance is unlikely to lead to a long-term decrease in the size of a population as: • The preliminary disturbance footprint is likely to avoid DOR mapped timbered woodlands (REs 5.5.2 and 5.5.4), which comprise breeding habitat for the species. • The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which provides foraging habitat only for the species. The proposed clearing comprises a negligible proportion of the species foraging habitat, which is widely available within and surrounding the PL. • Approximately 7.8 ha of disturbed area will be immediately rehabilitated post-disturbance. Rehabilitation is expected to rapidly reinstate a vegetation community consistent with the pre-disturbance vegetation community. • The preliminary disturbance footprint represents a negligible proportion of the home range for grey falcon individuals/pairs, which are a highly mobile nomadic species (Schoenjahn 2018). • Management measures have been identified to mitigate impacts on the species habitat (Section 4.3.3).
Reduce the area of occupancy of an important population	**No significant impact** The proposed clearing comprises a minimal proportion of the overall area of occupancy of the species and will not impact connectivity of suitable habitat.
Fragment an existing important population into two or more populations	**No significant impact** The project is unlikely to impact the movement of grey falcon individuals among habitat areas within and surrounding the PL.

MNES Significant Impact Guideline criteria for endangered species	Response
Adversely affect habitat critical to the survival of a species	**No significant impact** The proposed disturbance is unlikely to adversely affect habitat critical to the survival of a species as: • The preliminary disturbance footprint is likely to avoid DOR mapped timbered woodlands (REs 5.5.2 and 5.5.4), which comprise breeding habitat for the species. • The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which provides foraging habitat only for the species. The proposed clearing comprises a negligible proportion of the species foraging habitat, which is widely available within and surrounding the PL. • Approximately 7.8 ha of disturbed area will be immediately rehabilitated post-disturbance. Rehabilitation is expected to rapidly reinstate a vegetation community consistent with the pre-disturbance vegetation community. • The preliminary disturbance footprint represents a negligible proportion of the home range for grey falcon individuals/pairs, which are a highly mobile nomadic species (Schoenjahn 2018). • Management measures have been identified to mitigate impacts on the species habitat (Section 4.3.3).
Disrupt the breeding cycle of an important population	**No significant impact** Given the small area of suitable habitat to be impacted by the proposed works in comparison to the large extent of suitable habitat within and surrounding the PL, the proposed works will not disrupt the breeding cycle of a population of the species. In addition, management measures have been identified to mitigate impacts on the species habitat (Section 4.3.3).
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**No significant impact** Given suitable habitat for the species is widely available within the PL and the surrounding region the proposed vegetation clearing is unlikely to lead to a long-term decrease in the size of the local grey falcon population.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**No significant impact** Feral cats and grazing by exotic herbivores are listed as threatening processes to the species (TSSC 2020). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the species to decline	**No significant impact** Disease is not listed as a potential threat to the species (TSSC 2020). The project is unlikely to introduce a disease that may cause the species to decline.

MNES Significant Impact Guideline criteria for endangered species	Response
Interfere substantially with the recovery of the species	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the grey falcon population. No actions proposed are in contrast to the specific recovery actions for the species (TSSC 2020).

MNES significant impact assessment for white-throated needletail

MNES Significant Impact Guideline criteria for endangered species	Response
Lead to a long-term decrease in the size of an important population of a species	**No significant impact** The proposed disturbance will require the clearing of approximately 23.2 ha of white-throated needletail habitat, which represents 1.9% of species habitat identified within the PL. The proposed disturbance is unlikely to lead to a long-term decrease in the size of a population as: • In Australia, the species is primarily aerial, from heights of 1 m up to 1000 m above the ground (TSSC 2019). The species does not breed in Australia (TSSC 2019). The proposed disturbance is unlikely to interfere with the species foraging activities within the PL. • The preliminary disturbance footprint represents a negligible proportion of the habitat available to this wide-ranging nomadic species (TSSC 2019). • Approximately 7.8 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to pre-disturbance vegetation communities.
Reduce the area of occupancy of an important population	**No significant impact** The proposed clearing comprises a minimal proportion of the overall area of occupancy of the species and will not impact connectivity of suitable habitat.
Fragment an existing important population into two or more populations	**No significant impact** The project is unlikely to impact the movement of white-throated needletail individuals among habitat areas within and surrounding the PL.
Adversely affect habitat critical to the survival of a species	**No significant impact** The proposed disturbance is unlikely to adversely affect habitat critical to the survival of the species as: • In Australia, the species is primarily aerial, from heights of 1 m up to 1000 m above the ground (TSSC 2019). The species does not breed in Australia (TSSC 2019). The proposed disturbance is unlikely to interfere with the species foraging activities within the PL. • The preliminary disturbance footprint represents a negligible proportion of the habitat available to this wide-ranging nomadic species (TSSC 2019). • Approximately 7.8 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to pre-disturbance vegetation communities.

MNES Significant Impact Guideline criteria for endangered species	Response
Disrupt the breeding cycle of an important population	**No significant impact** This species does not breed in Australia (TSSC 2019) and as such, the proposed disturbance is unlikely to disrupt the breeding cycle of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**No significant impact** The preliminary disturbance footprint represents a negligible proportion of the habitat available to this wide-ranging nomadic species (TSSC 2019). Clearing is unlikely to lead to a long-term decrease in the size of the local species population.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**No significant impact** No invasive species are listed as a threatening process to the species (TSSC 2019). The project is unlikely to result in an invasive species that is harmful to the species becoming established.
Introduce disease that may cause the species to decline	**No significant impact** Disease is not listed as a potential threat to the species (TSSC 2019). The project is unlikely to introduce a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the species population. No actions proposed are in contrast to the specific recovery actions for the species (TSSC 2019).

Appendix D MSES significant residual impact assessment

D.2 MSES significant residual impact assessment

Definitions and terminology

Term	Definition under the EO Act
Habitat	An area occupied, or periodically or occasionally occupied, by any species, population or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycles.
Long-term decrease	Any decline in a local population that is greater than which would be apparent without the action being present.
Population	An occurrence of the species in a particular area. In relation to *Critically Endangered, Endangered*, *Vulnerable* and *Special Least Concern* species, occurrences include but are not limited to: • a geographically distinct regional population, or collection of local populations; or • a population, or collection of local populations, that occurs within a particular bioregion.

Significant residual impact assessment for grey falcon

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Lead to a long-term decrease in the size of a local population	**No significant impact** The proposed disturbance will require the clearing of approximately 23.2 ha of grey falcon foraging habitat, which represents 1.9% of grey falcon habitat identified within the PL. A SRI to the species is unlikely as: • The preliminary disturbance footprint is likely to avoid DOR mapped timbered woodlands (REs 5.5.2 and 5.5.4), which comprise breeding habitat for the species. • The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which provides foraging habitat only for the species. The proposed clearing comprises a negligible proportion of the species foraging habitat, which is widely available within and surrounding the PL. • Approximately 7.8 ha of disturbed area will be immediately rehabilitated post-disturbance. Rehabilitation is expected to rapidly reinstate a vegetation community consistent with the pre-disturbance vegetation community. • The preliminary disturbance footprint represents a negligible proportion of the home range for grey falcon individuals/pairs, which are a highly mobile nomadic species (Schoenjahn 2018). • Management measures have been identified to mitigate impacts on the species habitat (Section 4.3.3).
Reduce the extent of occurrence of the species	**No significant impact** The proposed clearing comprises a minimal proportion of the overall extent of occurrence of the species and will not impact connectivity of suitable habitat.
Fragment an existing population	**No significant impact** The project is unlikely to impact the movement of grey falcon individuals between habitat areas within and surrounding the PL and is unlikely to fragment the local grey falcon population.
Result in genetically distinct populations forming as a result of habitat isolation	**No significant impact** The project is unlikely to impact the movement of grey falcon individuals between habitat areas within and surrounding the PL.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No significant impact** Feral cats and grazing by exotic herbivores are listed as threatening processes to the species (TSSC 2020). The project is unlikely to increase the abundance of these invasive species above their current levels or result in the introduction of new invasive species.

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Introduce disease that may cause the population to decline	**No significant impact** Disease is not listed as a potential threat to the species (TSSC 2020). The project is unlikely to introduce a disease that may cause the species to decline.
Interfere with the recovery of the species.	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the grey falcon population. No actions proposed are in contrast to the specific recovery actions for the species (TSSC 2020).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	**No significant impact** The precautionary principal was applied to consider all grey falcon habitat mapped within the PL to represent ecologically significant locations for the species. The project is unlikely to cause disruption to ecologically significant locations as: • The preliminary disturbance footprint is likely to avoid DOR mapped timbered woodlands (REs 5.5.2 and 5.5.4), which comprise breeding habitat for the species. • The preliminary disturbance footprint is likely to occur entirely within RE 5.9.3, which provides foraging habitat only for the species. The proposed clearing comprises a negligible proportion of the species foraging habitat, which is widely available within and surrounding the PL. • Approximately 7.8 ha of disturbed area will be immediately rehabilitated post-disturbance. Rehabilitation is expected to rapidly reinstate a vegetation community consistent with the pre-disturbance vegetation community. • The preliminary disturbance footprint represents a negligible proportion of the home range for grey falcon individuals/pairs, which are a highly mobile nomadic species (Schoenjahn 2018). • Management measures have been identified to mitigate impacts on the species habitat (Section 4.3.3).

Significant residual impact assessment for *Indigofera oxyrachis*

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Lead to a long-term decrease in the size of a local population	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *I. oxyrachis*. As such, the proposed disturbance is unlikely to lead to a long-term decrease in the size of an important population of the species.
Reduce the extent of occurrence of the species	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *I. oxyrachis*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Fragment an existing population	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *I. oxyrachis*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Result in genetically distinct populations forming as a result of habitat isolation	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *I. oxyrachis*. As such, the project is likely to avoid clearing of the species or altering the species habitat.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No significant impact** The project is unlikely to increase the abundance of invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the population to decline	**No significant impact** The project is unlikely to introduce a disease that may cause the species to decline.
Interfere with the recovery of the species.	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species as the project is likely to avoid clearing of the species or altering the species habitat.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	**No significant impact** The preliminary disturbance footprint avoids clearing within DOR mapped REs that provide suitable habitat for *I. oxyrachis*. As such, the project is likely to avoid clearing of the species or altering the species habitat.

Significant residual impact assessment for short-beaked echidna

MSES Significant Residual Impact Guideline criteria. The action will result in:	Response
A long-term decrease in the size of a local population	**No significant impact** The proposed disturbance will require the clearing of approximately 23.2 ha of echidna habitat. As the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (Van Dyck & Strahan 2008), the project is unlikely to lead to a long-term decrease in the local population of the species.
A reduced extent of occurrence of the species	**No significant impact** As the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (Van Dyck & Strahan 2008), the project is unlikely to reduce the extent of occurrence of the species.
Fragmentation of an existing population	**No significant impact** The project will have negligible impact on the species local and regional movement.
Reduced gene flow among populations	**No significant impact** The project will have negligible impact on the species local and regional movement.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**No significant impact** The proposed disturbance will require the clearing of approximately 23.2 ha of echidna habitat, which is likely to include breeding, feeding and nesting habitat. However, as the species is widely distributed and has no particular habitat preferences, except for the supply of ants and termites (Van Dyck & Strahan 2008), the project is unlikely to lead to a long-term decrease in the local population of the species.

Significant residual impact assessment for white-throated needletail

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Lead to a long-term decrease in the size of a local population	**No significant impact** The proposed disturbance will require the clearing of approximately 23.2 ha of white-throated needletail habitat, which represents 1.9% of species habitat identified within the PL. The proposed disturbance is unlikely to lead to a long-term decrease in the size of a population as: • In Australia, the species is primarily aerial, from heights of 1 m up to 1000 m above the ground (TSSC 2019). The species does not breed in Australia (TSSC 2019). The proposed disturbance is unlikely to interfere with the species foraging activities within the PL. • The preliminary disturbance footprint represents a negligible proportion of the habitat available to this wide-ranging nomadic species (TSSC 2019). • Approximately 7.8 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to pre-disturbance vegetation communities.
Reduce the extent of occurrence of the species	**No significant impact** The proposed clearing comprises a minimal proportion of the overall extent of occurrence of the species and will not impact connectivity of suitable habitat.
Fragment an existing population	**No significant impact** The project is unlikely to impact the movement of white-throated needletail individuals between habitat areas within and surrounding the PL and is unlikely to fragment the local species population.
Result in genetically distinct populations forming as a result of habitat isolation	**No significant impact** The project is unlikely to impact the movement of white-throated needletail individuals between habitat areas within and surrounding the PL.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	**No significant impact** No invasive species are listed as a threatening process to the species (TSSC 2019). The project is unlikely to result in an invasive species that is harmful to the species becoming established.
Introduce disease that may cause the population to decline	**No significant impact** Disease is not listed as a potential threat to the species (TSSC 2019). The project is unlikely to introduce a disease that may cause the species to decline.

MSES Significant Residual Impact Guideline criteria. The action is likely to:	Response
Interfere with the recovery of the species.	**No significant impact** The proposed works are unlikely to interfere with the recovery of the species due to the minimal impact on the white-throated needletail population. No actions proposed are in contrast to the specific recovery actions for the species (TSSC 2019).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration, or resting sites) of a species.	**No significant impact** The project is unlikely to cause disruption to ecologically significant locations as: • In Australia, the species is primarily aerial, from heights of 1 m up to 1000 m above the ground (TSSC 2019). The species does not breed in Australia (TSSC 2019). The proposed disturbance is unlikely to interfere with the species foraging activities within the PL. • The preliminary disturbance footprint represents a negligible proportion of the habitat available to this wide-ranging nomadic species (TSSC 2019). • Approximately 7.8 ha of the disturbance footprint is proposed for rehabilitation, which includes pipeline right of ways, sump pits and a proportion of the lease areas. These areas are expected to re-establish to pre-disturbance vegetation communities.

Significant residual impact assessment for regulated vegetation within the PL

MSES	Disturbance type	Residual impact criteria	Significant residual impact assessment
Regulated vegetation - intersecting a watercourse	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger an SRI (as described in Section 4.3.2).	**No significant impact** As discussed in Section 4.3.2 (Table 6), where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. Flowline Right of Ways (RoW) will cause temporary disturbance of up to 16 m in width. Approximately 13 m of the flowline RoW width will be reinstated as soon as practicable following installation (inclusive of reinstatement of trenches where flowlines are buried). Access tracks will be up to 13 m wide. Flowlines and access tracks will be restricted as much as practicable at watercourse crossings.
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger an SRI (as described in Section 4.3.2).	**No significant impact** As discussed in Section 4.3.2 (Table 6), where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits. Well pads will be up to 1.65 ha.