Vintage Energy

Vali Gas Field Project

Supporting Documentation for Site-Specific Application

01342F, December 2025

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Appendix 1_v5	27/03/2025	A. Todd-Weckmann	D. Browne	D. Browne
Appendix 1_v6	4/04/2025	A. Todd-Weckmann	D. Browne	D. Browne
Appendix 1_v7	26/11/2025	A. Todd-Weckmann, D. Browne	D. Browne	D. Browne
Appendix 1_v8	4/12/2025	A. Todd-Weckmann	D. Browne	D. Browne

Information Request Response

The following table outlines the location of the information requested by Department of the Environment, Tourism, Science and Innovation (DETSI).

Item Number	Information Required	Location of Information	ERIAS Comment
1	Clarity around total disturbance of the project	Section 1, pg. 1-4	Table provided demonstrating current and proposed disturbance.
2	Spatial data	–	Not required, DETSI used the incorrect spatial file for PL1125
3	Prescribed environmental matters - connectivity	Section 3.1.1.2, pg. 3-5	Connectivity analyses completed and included.
4	Category C environmentally sensitive area – essential habitat	Appendix A, pg. 81 to 122	Mapping, impact assessment and table provided in Appendix A.
5	Cumulative impact assessment	–	Ecology assessment was inclusive of existing and proposed disturbance.
6	Significant residual impact assessment - endangered wildlife	Section 3.1.1.1, pg. 3-2 to 3-3 and Appendix A, Section 5.5.2, pg. 88 to 102	Further detailed justification provided in the SRI assessment for the Curlew Sandpiper, Common Greenshank and Australian Painted Snipe.
7	Significant residual impact assessment - vulnerable wildlife	Section 3.1.1.1, pg. 3-2 to 3-3 and Appendix A, Section 5.5.2, pg. 102-113	Further detailed justification provided in the SRI assessment for the Sharp-tailed Sandpiper and Blue-winged Parrot.
8	Significant residual impact assessment - Southern Whiteface *Aphelocephala leucopsis* vulnerable wildlife	Section 3.1.1.1, pg. 3-2 to 3-3 and Appendix A, Section 5.5.2, pg. 113-117	Further detailed justification provided in the SRI assessment for the Southern Whiteface.
9	Rehabilitation in arid environment	Section 3.5, pg. 3-24 to 3-26	Additional description on rehabilitative methods included. Information on analogue sites provided.
10	Mix, bury cover	Section 3.5, pg. 3-23 to 3-24.	Volume and chemical content of drill fluids clarified. Additional information on backfilling and sampling of the sump provided.
11	Vali 4 and Vali 5 underground water impacts	Section 5, pg. 5-1 to 5-12.	Requested to edits to UWIR completed, Vali-4 and Vali-5 included.
12	Erosion and sediment control	Section 2.1, pg. 2-1 and Section 3.6, pg. 3-26.	Information on soil type found in Section 2.1. Erosion and sediment control measures included in Section 3.6.

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Attachments

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Attachment B: Risk Assessment Approach

Attachment C: ERCE Emissions Forecast Report

Attachment D: Contaminated Land Register Search Results

Attachment E: Vali Gas Field Underground Water Impact Report

1. Project Description

The Vali Gas Field Project is located in ATP 2021 within the Cooper Basin, in the Shire of Bulloo in Queensland (Figure 1.1). Currently Environmental Authority BRPG005 authorises Non-Scheduled Petroleum Activity on Authority to Prospect ATP2021 (located on Lot plan 450 SP274333). Vintage Energy and their joint venture (JV) partners are seeking to partially convert the existing Authority to Prospect (ATP) 2021 into a Petroleum Lease (PL) 1125 (Vali Gas Field) in the Cooper Basin for conventional gas production.

PL1125 (Figure 1.2) currently includes the Vali-1, Vali-2 and Vali-3 wells and associated flowlines (authorised under ATP 2021 (environmental authority BRPG005)) and the Vali pipeline and Vali processing facility, permitted under Pipeline Licence (PPL) 2070 (environmental authority P-EA-100271494). The Vali pipeline exports gas from PL1125 to the Santos-operated Moomba gas plant in South Australia, however, this will not be part of this application. Vali-1, Vali-2 and Vali-3 and their associated flowlines have all been constructed.

There is the potential for two future exploration/production wells within the PL1125, Vali-4 and Vali-5 (Figure 1.1). However, the locations of these two wells and expected drilling timeline is not set. The locations included in this application are nominal locations at time of submission. If these additional wells are drilled, Vintage Energy will need to construct and operate associated infrastructure, potentially including laydowns, temporary accommodation camps and borrow pits. This infrastructure would be housed within the projected 200 x 200 m pads for Vali-4 and Vali-5. The proposed Vali-4 well lease will require a new access track to be created to connect it to the Vali-1 facility. The proposed Vali-5 well lease is within close proximity of the Kudnari bore operated by Vintage, it may require a short access track for connection to the existing road. Well stimulation at Vali-4 and Vali-5 is not included in this application.

In addition to Vali-4 and Vali-5, there may be future wells drilled in PL1125, although their locations and time of drilling is yet to be determined. These potential future wells are included in the greenhouse emissions forecast, but not mentioned elsewhere in this document or included in this application.

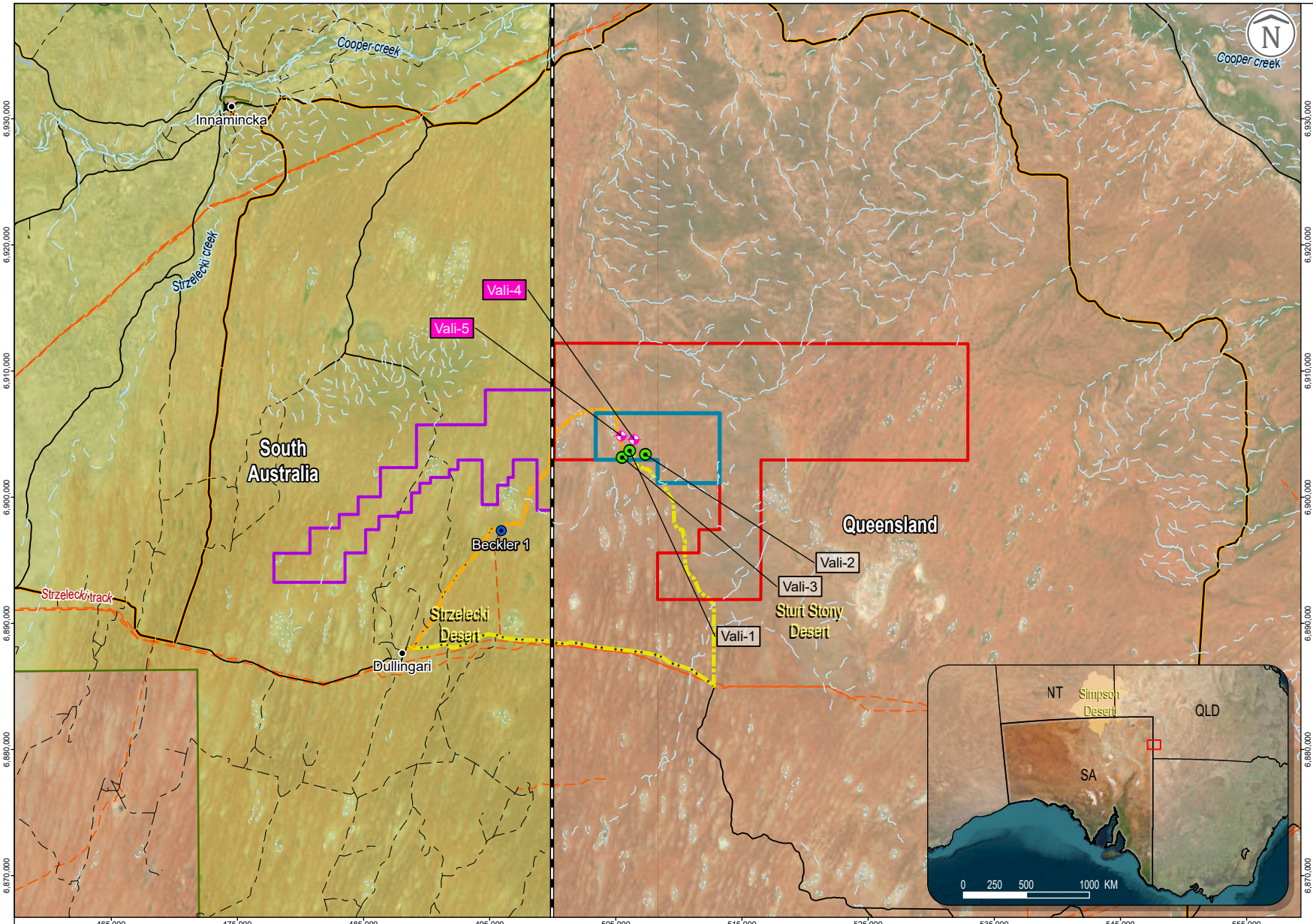
Currently there are two operational lined water storage ponds at the Vali-1 facility with capacities of 600 m^3 and 1320 m^3. These are not considered to be regulated structures as they have less than 2.5 ML of capacity. An additional holding pond may be required on the existing and cleared Vali-1 lease to increase water holding capacity during production. This additional pond will be less than 2.5 ML capacity.

PL1125 is unmanned with operators attending the site from Moomba as required. Consequently, there is no permanent accommodation on site. Vintage Energy plans to produce commercially viable quantities of gas from the existing and operating Vali wells with gas to be exported to Moomba.

PROJECT LAYOUT

Site-specific Application | Environmental Assessment

FIGURE 1.1



- Populated place
- Well locations
- Proposed well locations
- Other wells
- Main road
- Minor road
- Track
- Dullingari-Kappa-Vali-1
- Dullingari-Vali-1
- Pipelines
- Watercourse - Stream order
- PL 1125
- ATP 2021
- PRL 211
- State border
- Innamincka Regional Reserve

Watercourse

- Perennial area
- Non Perennial area

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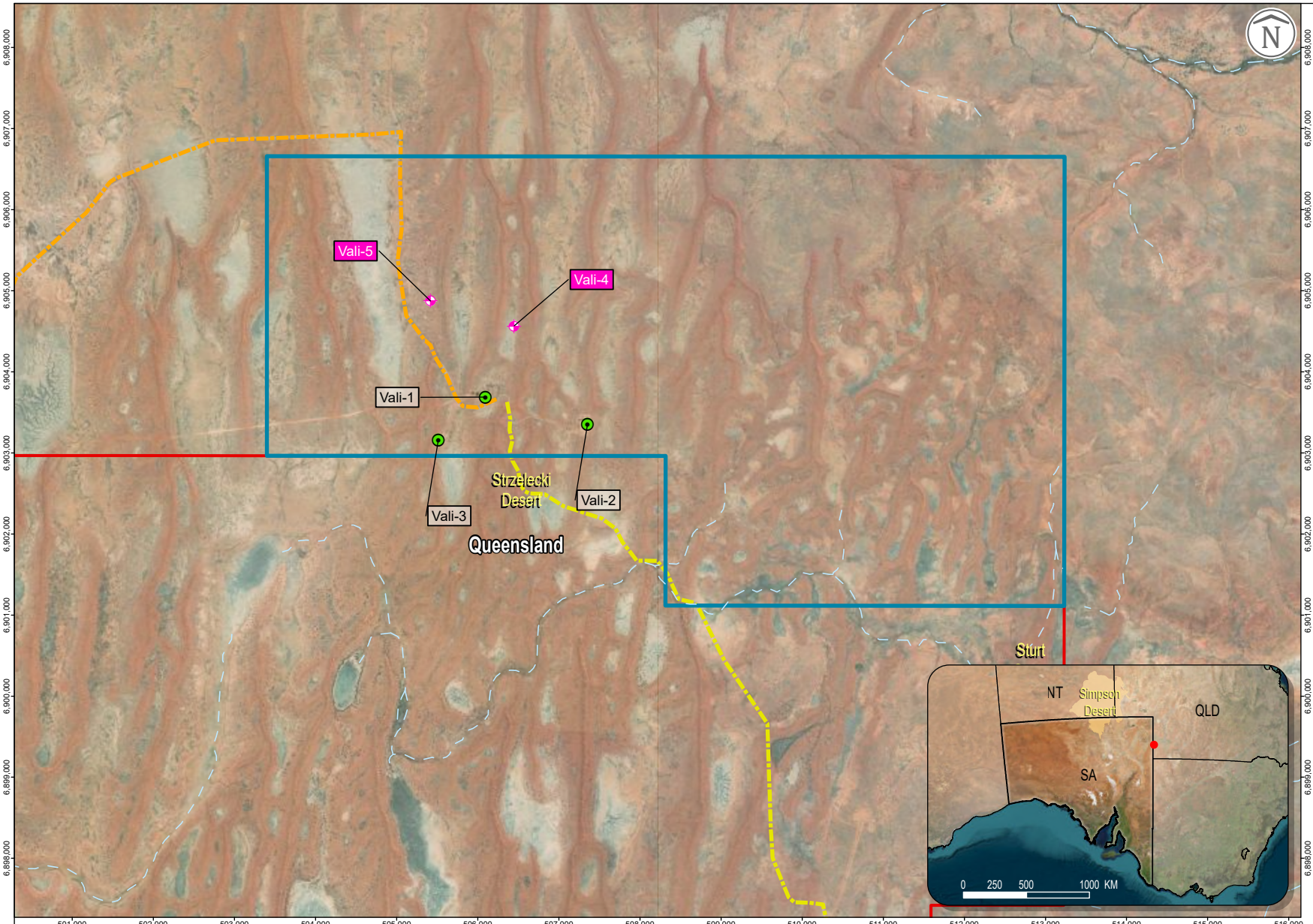
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VALI GAS FIELD AND PL 1125

Site-specific Application | Environmental Assessment

FIGURE 1.2



- Well locations
- Proposed well locations
- Dullingari-Vali-1
- Dullingari-Kappa-Vali-1
- Watercourse - Stream order
- ATP 2021
- PL 1125
- State border

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The total current and proposed disturbance is provided in Table 1.1.

Table 1.1 – Project Disturbance

Project Component	Area (Ha)
Existing Disturbance	
Vali-3 pad	5.65
Vali-1 pad	7.16
Vali-2 pad	2.68
Flowline (Vali-1 pad to Odin border)	10.04
Access track (at Vali-2)	0.29
Pipeline corridor from Vali-2 to Vali-1	2.58
Pipeline corridor from Vali-3 to Vali-1	0.72
Vali-2 borrow pit	1.22
Access track (from existing road to Vali-2 pad)	1.98
Vali-2 access track	0.23
Vali-3 access track	0.49
Kudnari bore	0.60
Total Existing Disturbance	**33.63**
Proposed Disturbance	
Vali-4 pad	3.11
Vali-5 pad	3.11
Vali-4 access track from Vali-1	1.79
Vali-5 access track	0.36
Total Proposed Disturbance	**8.36**
Total Disturbance	**41.99**

2. Description of Land Where the Activity/Activities Will Be Carried Out

2.1 Geology, Terrain and Soils

Geological mapping shows that the well sites are primarily situated on a surface geology formation of quartz sand forming dunes. The soil of the well pad area is mapped as red massive earths with the terrain described as plains with longitudinal sand dunes and clay pans (DNRME, 2019). Soils through the centre of PL1125, east of the well pads, are identified as earthy loams, within an undulating and low, hilly terrain (DNRME, 2019).

The Cooper Basin is a sedimentary geological basin (DNRME 2019), and is entirely overlain by the Eromanga Basin. The land type of the Project area is a mixture of dunefields and salt lakes, and is situated between the Strezlecki, Simpson and Sturt Stony deserts.

Mapping access from the Queensland Globe (DNRME, 2019) provides broad land systems across the site and are described below:

- Poongamulla: Characterised by dunes 5 to 12 m high, with steeply sloping (15 to more than 50%) mobile crests and sloping dune flanks (15 to 50%). The dunes are converging and diverging with flat claypans in the interdune area (DNRME, 2019). This is the dominant land system unit located in the eastern and western extent of the PL1125, including the well pads.
- Epsilon: Described as flat claypans and seasonal lakes subject to periodic flooding, with low wind-blown rises (DNRME, 2019). Interspersed in small pockets throughout PL1125.
- Nappamerry: Defined as undulating to gently undulating plains, occasionally slightly dissected, with slopes ranging from 1 to 5% (DNRME, 2019). Dominant land system through the centre of the license area, east of the well pads.
- Plevena: Characterised by gently undulating to undulating rolling plains, with slopes from 1 to 5% (DNRME, 2019). Interspersed as small pockets throughout PL1125.
- Durham: Scarps and flat to gently undulating tops of dissected tablelands, mesas and buttes. Slopes range from less than 2% on the tops, varying to 20% on scarps and 5% to 8% on lower slopes (DNRME, 2019). This is only present to the far north of PL1125.
- Clyde: Defined as flat to gently undulating sandplain with low dunes, frequently with eroded aprons. Poorly defined, well vegetated drainage lines connect the lower parts of the plains (DNRME, 2019). This is only present in a small corner of ATP 2021, northeast of the well pads.

While the majority of ATP 2021 is comprised of the Nappamerry land system, the well pads are located on the dunes and claypans of the Poongamulla system. Isolated pockets of Epsilon and

Plevena land system units are interspersed throughout the area immediately adjacent to the well pads (DNRME, 2019).

2.2 Bioregion and Topography

The Project site is located within the Strzelecki Desert sub-region of the Simpson-Strzelecki Dunefields Interim Biogeographic Regionalisation of Australia. The main threats to this bioregion are overgrazing and trampling (from both stock and wild introduced herbivores such as camels, donkeys, horses and rabbits), introduced predators such as cats and foxes, uncontrolled fires and invasive weeds.

The terrain of the Cooper Basin is dominated by undulating dunefields (Wiltshire & Schmidt, 2003) although also comprises flat gibber plains, sandplains, floodplains and stony rises. Located within the Cooper Creek Basin and the Cooper Creek Sub-basin, drainage within the site flows into the Lake Eyre drainage division (DNRME, 2019), with Lake Eyre located approximately 370 km to the west.

The Vali-1 well site is adjacent to a clay pan depression and a dune rise (see Figure 1.2) and is 102 to 105 m above sea level (asl). The Vali-2 well site is also located adjacent to a clay pan albeit further away from the clay pan edge and from any dune rises (see Figure 1.2) at an elevation of approximately 107 m asl. Vali-3 is located between a clay pan edge and a north to south running dune at an elevation of 103 m asl (see Figure 1.2).

2.3 Cultural Heritage

PL1125 is found within an area with native title. The determination date was 3rd July 2024. The tribunal file number is QCD2024/004 and the name of the area is the Yandruwandha Yawarrawarrka and Wongkumara Peoples – Queensland Part B Area.

A Conjunctive Ancillary Agreement was executed by Metgasco with the Wongkumara applicants in 2018 as the 100% holders of ATP2021 at the time. Vintage Energy signed a Deed of Assumption for the Conjunctive agreement on 5 November 2019, with an effective date of 2 July 2019. Since then, as Operator, Vintage has held annual meetings with the Wongkumara giving details of proposed work. These meetings have been held in Dubbo, although the claimants travel into Dubbo from many locations including Echuca, Bourke, Walgett and Wentworth. Wongkumara have conducted on site cultural heritage clearances for all ground disturbance between 2019 and present day. These have been held in 2019, 2020, 2022, 2023 and 2024.

During surveys, representatives of the Wongkumara claimant group attended site and cleared all proposed ground disturbance areas prior to the commencement of works. In all cases , where requested by the group, Vintage modified locations to avoid areas identified to be of cultural significance. To avoid accidental disturbance contractors were provided with maps etc. indicating the location of areas to be avoided.

2.4 Native Flora and Fauna

Desktop searches of flora and fauna present in the study area were conducted by searching Queensland Globe for regional ecosystems, wetlands and groundwater dependant ecosystems, and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) protected matters search tool (PMST) for threatened ecological communities and species.

The petroleum lease area, PL1125, contains the Vali gas infrastructure including wells and pipelines. The desktop search of Queensland Globe was conducted within this lease area. The results show that all of the vegetation in the area is remnant vegetation. There were six regional ecosystems found in the desktop search, with all of these confirmed during the field survey. These are:

- 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes;
- 5.6.4 *Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia spp*. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes;
- 5.6.5 Variable sparse to open-herbland or *Triodia basedowii* hummock grassland on dune flanks, crests and sandy interdunes;
- 5.6.8 *Zygochloa paradoxa* and/or *Crotalaria eremaea* +/- *Triodia basedowii* open tussock grassland and herbland on mobile crests and slopes of sand dunes;
- 5.9.3 *Astrebla spp*. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments; and
- 5.9.4 *Aristida contorta* sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover.

Wetlands and groundwater dependant ecosystems were also found in the desktop study:

- Eight lacustrine wetlands.
- Minor drainage lines.
- Potential for riverine wetlands of low significance in 78.84%.
- Potential for riverine wetlands of very high significance in 25.16%.
- Non-riverine wetlands of medium significance in 14.72%.
- Groundwater dependant ecosystem of regional ecosystem RE 5.3.22, identified as a regulated vegetation community in a wetland.

No palustrine wetlands, named waterways or springs were found in the desktop search.

The EPBC PMST desktop search was conducted within the PL1125 area with a 50 km buffer. The search found 3 flora and 13 fauna species considered threatened under the EPBC Act (see Attachment A for each species and its likelihood of presence). Threatened is inclusive of EPBC listed classifications of Critically Endangered (CR), Endangered (E) or Vulnerable (V).

Five migratory species were listed in the desktop search in addition to the threatened species.

Extending the search buffer to 100 km, an additional six species were identified. No threatened ecological communities (TECs) under the EPBC Act were identified even with the extended buffer.

2.5 Weeds and Pests

The field ecological survey undertaken in September 2024 identified one introduced species, paddy melon (*Citrullus amarus*). No species recorded are listed as Weeds of National Significance (WoNS) or Declared Pest Plants.

Pest animals that may occur within 10 km of the Project area (DoEE, 2019) include house sparrows, common starlings, camels, goats, cats, house mice, rabbits, feral pigs and foxes.

2.6 Surface Water and Watercourses

The following information sources were reviewed to describe the watercourses relevant to PL1125.

- Published mapping information:
    - Queensland Wetland Information – Nappamerry 100k (DESI, 2013).
    - Queensland Spatial Catalogue – QSpatial (DoR, 2024).
- Smith et al. (2015) Lake Eyre Basin Bioregional Assessment.
- Smith (2024) site-specific desktop review and field survey for PL1125.

PL1125 (shown in Figure 2.1) is situated in the Cooper Creek Basin, approximately 38 km south of Cooper Creek (Figure 2.2) and within the Channel Country Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion, and Simpson-Strezlecki Dunefields and Sturt Stony Desert sub-regions (Smith, 2024). Surface flows in the region are derived from runoff in the catchment headwaters. Cooper Creek originates in southwest Queensland and flows in a southwest direction into South Australia, through a network of braided channels before narrowing into a single channel flowing west toward Innamincka (DNRME, 2021). The system then drains out into a floodplain environment before discharging into Lake Eyre, located approximately 370 km to the west. Review of the hydrological information in Smith et al. (2015) indicates the closest surface water flow gauge to PL1125 is at Nappa Merrie on the Cooper Creek. Electrical conductivity (salinity) is also measured at this gauge station. Surface hydrology mapping (DESI 2013 and DoR 2024) shows Sandy Creek (Figure 2.2) located approximately 5 km to the north of PL1125 which drains into Cooper Creek.

Eight lacustrine[1] (non-riverine) wetlands were identified within PL1125 by the desktop review (Smith, 2024). Although these wetlands were dry at the time, their presence was confirmed during the field survey, with the correct regional ecosystems present to classify them as wetlands. Wetland vegetation types (Regional Ecosystem[2] Identification (RE ID) reference number 5.3.22) associated with lacustrine wetlands are described as '*sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes*'. The desktop review indicated that no

[1] Lacustrine wetlands are lakes that are typically larger than eight hectares located in topographic depressions or damned river channels that lack vegetation cover (Smith, 2024).
[2] Regional Ecosystems (RE) are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (DESI, 2024a cited in Smith 2024).

palustrine[3] wetlands, named waterways, or springs were present within PL1125. Minor drainage lines were also identified. The percent likelihood for wetlands of aquatic conservation significance to be associated with these drainage lines was assessed as follows:

- Riverine wetlands:
    - of low significance (74%).
    - of very high significance (25%).
- Non-riverine wetlands:
    - of medium significance (14%).

Lacustrine and palustrine wetlands are ecosystems that have the potential to be groundwater dependent ecosystems (GDEs) where they rely on surface expression of groundwater. Regional ecosystems (RE) and riverine wetland systems (riverine) are ecosystems that have the potential to be GDEs where they rely on the presence of subsurface groundwater.

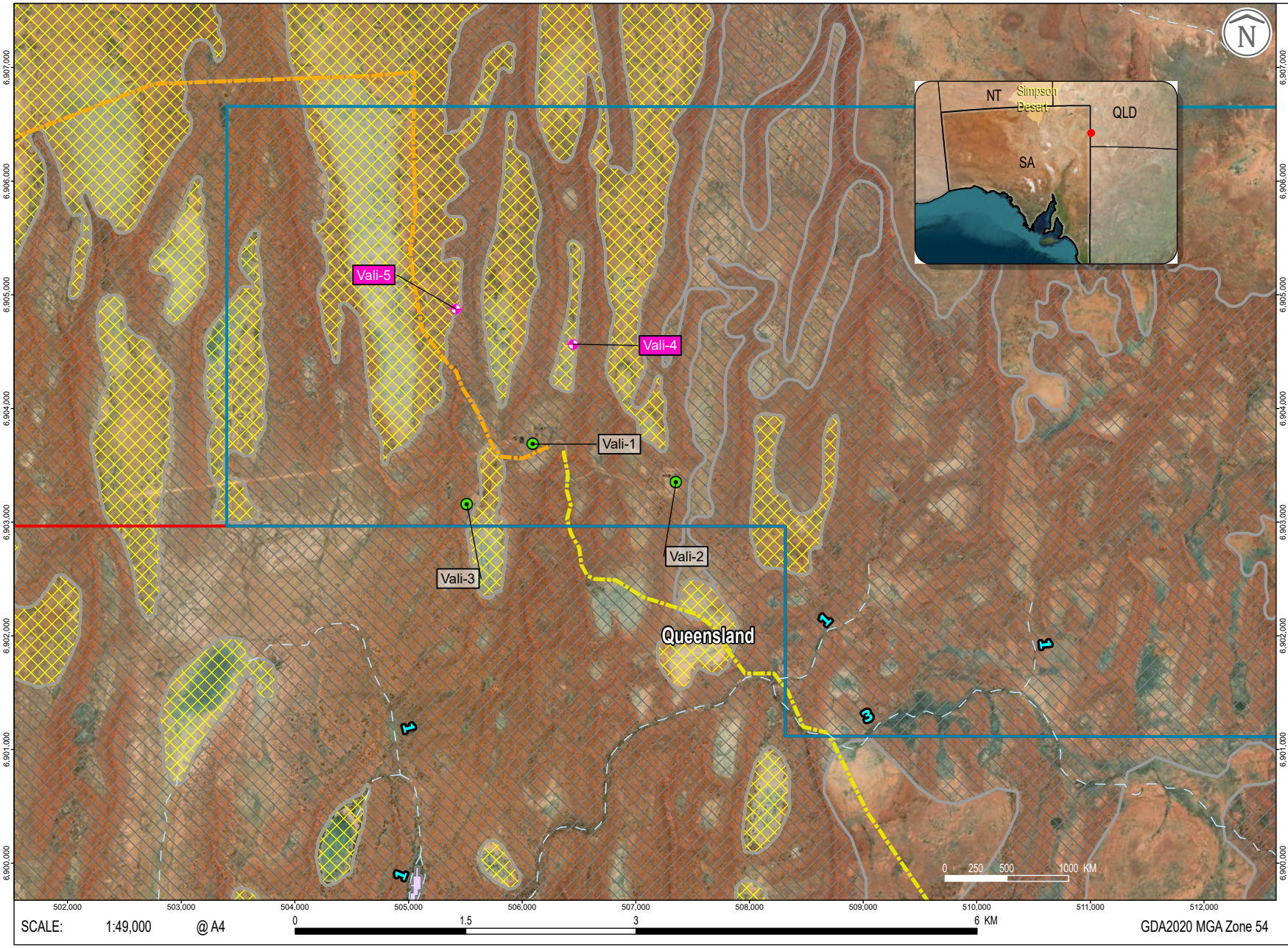
The largest lacustrine wetland is located to the west of the proposed Vali 5 well pad and the wetland adjacent to Vali 3, as well as the south-eastern section of PL1125 (Figure 2.1) are identified as being of state biodiversity significance (Smith, 2024). This is due to potential presence of a wide range of invertebrates and algae and the potential for providing habitat for waterbirds including migratory waders. Other areas of PL1125 were identified in the desktop review as being of regional or local significance. The eight lacustrine wetlands noted in the Biodiversity and Conservation Values (BCV) report presented in Smith (2024) were identified on the map of referable wetlands Matters of State Environmental Significance (MSES) regulated vegetation (defined watercourse). No wetlands of high ecological significance were identified within PL1125 and the biodiversity status of all areas within PL1125 were of 'No concern at present' (DESI 2024b, DESI 2024c cited in Smith, 2024).

[3] Palustrine wetlands are generally non-tidal swamps and marshes dominated by vegetation (>30% cover), or where lacking vegetation they are smaller than eight hectares (Smith, 2024).

MAPPED WATERCOURSES IN PL1125

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FIGURE 2.1



Proposed well locations
Well locations
Dullingari-Vali-1 track
Dullingari-Kappa-Vali-1 track
PL 1125
ATP 2021
Watercourse - Stream order

Legend (Habitat)

Contains Wetlands <50%
Laucustrine Wetlands (hydrologically natural)
Riverine Wetlands (hydrologically natural)

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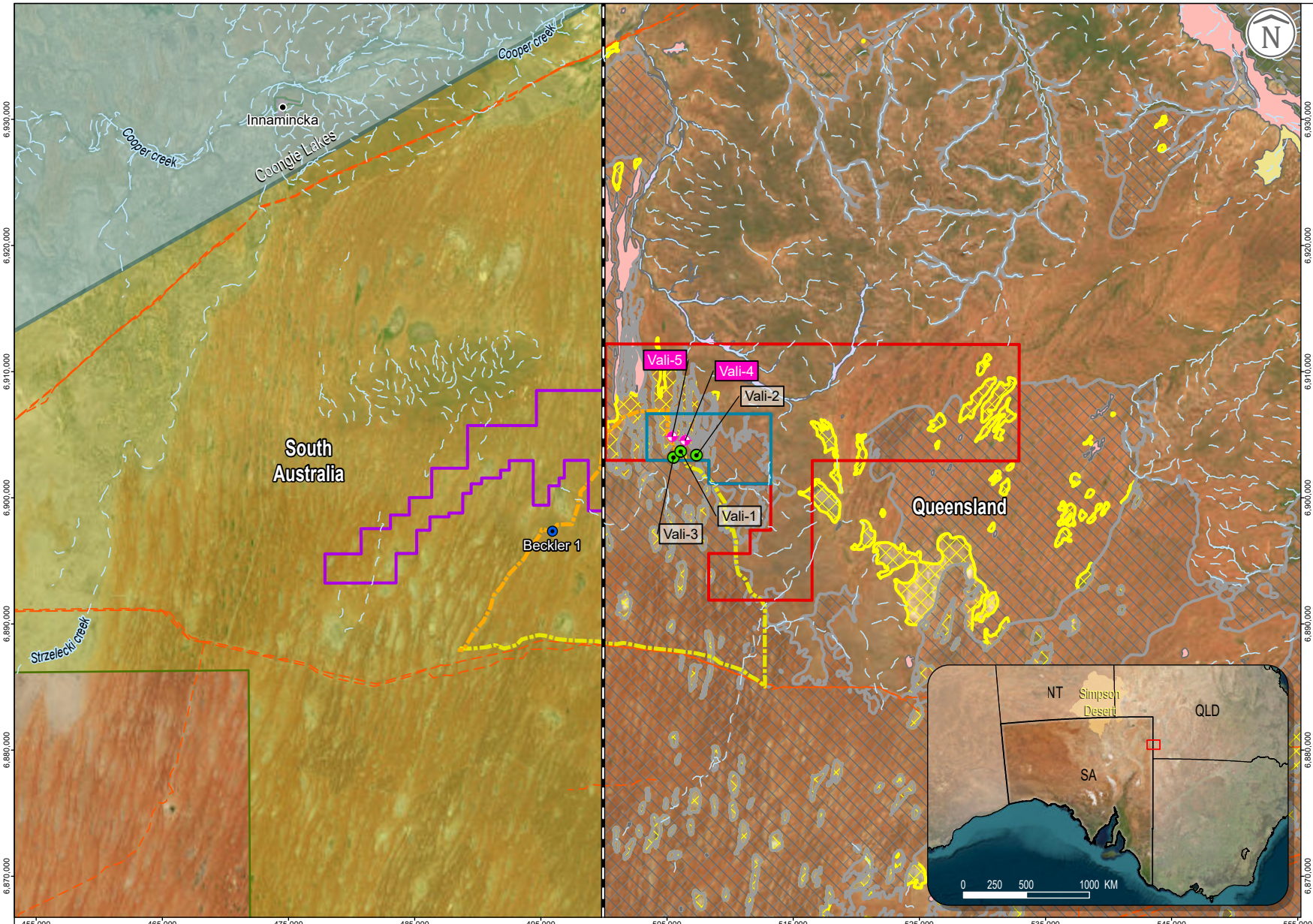
WATERCOURSES IN THE SOUTHWEST OF QUEENSLAND AND THE NORTHEAST OF SOUTH AUSTRALIA

Site-specific Application | Environmental Assessment

FIGURE 2.2

VINTAGE ENERGY

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- Populated place
- Proposed well locations
- Well locations
- Other wells
- State border
- PL 1125
- ATP 2021
- PRL 211
- Watercourse - Stream order
- Dullingari-Vali-1 track
- Dullingari-Kappa-Vali-1 track
- Pipelines
- Coongie Lakes (Ramsar Reserve)

Legend (Habitat)

- Contains Wetlands <50%
- Laucustrine Wetlands (hydrologically natural)
- Palustrine Wetlands (hydrologically natural)
- Riverine Wetlands (hydrologically natural)
- Sub-dominant Wetlands (51%-80%)
- Innamincka Regional Reserve

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Base data from South Australian & Queensland Government and Geoscience Australia, 2021.
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The findings of the desktop review were ground-truthed during a field survey in September 2024 following rains in July 2024. The areas designated as very high significance of riverine wetlands were investigated in the field with no evidence found of waterholes or substantial drainage lines that would support riverine wetlands. The drainage lines present were shallow and sandy and restricted to the south-eastern and north-eastern sections of PL1125.

Based on the desktop review and field survey, PL1125 is characterised by a mosaic of shallow ephemeral lacustrine wetlands and claypans interspersed amongst undulating plains dissected by low sand dunes positioned in a north to south orientation (Figure 2.1). The lacustrine wetlands and clay pans occur in between the dunes and are narrow and elongated with drainage occurring from dune ridges to the lowest-lying areas of the lacustrine wetlands/claypan depressions. Dune rises are typically several metres higher in elevation than the adjacent lacustrine wetlands/claypans.

The topographic contours shown in Figure 2.1 indicate that PL1125 is generally flat with a slight slope towards the west and south. There are an increased number of lacustrine wetlands in the western portion of PL1125 and an ephemeral water course to the south of PL1125.

Flow between the lacustrine wetlands is only likely during flood events. When standing water is present in the lacustrine wetlands (during flood conditions) if water flows it will be slow-moving and is inferred to follow the topography i.e., in a generally westerly direction where there is passage between the north-south oriented dunes. No information was found during the review to confirm if, during extreme flood conditions, surface flows extend to Sandy Creek (approximately 5 km to the north of PL1125).

Following rain and flood events, ponded water will evaporate and infiltrate into the ground. Based on the closest weather station located at Moomba airport, the mean maximum temperatures range from 20ºC in July to 39ºC in January (Smith 2024). The hot and dry climatic conditions mean that there is generally a lack of standing water in the lacustrine wetlands due to hot and dry summers and cold, and dry winters (BOM, 2024). Rainfall in the Cooper Basin is highly variable and unpredictable; however, average total annual rainfall in the region is low and typically less than 200 mm annually (Smith et al, 2015). When rainfall does occur, events can be intense and localised, and the average annual rainfall can occur in a single extreme rainfall event. Consequently, watercourses and waterbodies in PL1125 area are ephemeral.

3. Assessment of the Environmental Impact

3.1 Description of Environmental Values Likely to be Affected by Each Relevant Activity

Environmental values that may be affected by the activity include:

- Local air quality; a reduction in local air quality triggered by project and vehicle emissions, harm to the health of native flora and fauna, livestock and humans.
- Flora and fauna; impacts may include land clearing for new wells and infrastructure, disturbance from existing Project activities, competition from invasive weeds or pests.
- Cultural heritage sites of significance; known or unknown sites of significance may be impacted during well construction and installation of associated infrastructure.
- Surface water (including waterways, wetlands, rivers and/or streams); contamination from hazardous material spills, loss of well integrity or well construction.
- Groundwater; contamination from hazardous material spills, inadequate well plugging or loss of well integrity.
- Long-term site stability; uncontrolled sediment release may impact vegetation regeneration or the site may fail to revegetate after decommissioning.
- Weeds and pests may become established at the site because of accidental introductions during construction or maintenance activity.

Other potential impacts:

- Noise (acoustics); increased noise and vibrations from project facilities disturbing native fauna, livestock or humans.
- Land use; reduced quality of vegetation present for livestock grazing due to contamination, uncontrolled sediment release and clearing.
- Site contamination from the handling or storing of chemicals and fuels on site.
- Site contamination from improper waste management.

3.1.1 Flora and Fauna

3.1.1.1 Significant Residual Impact Assessment

A significant residual impact (SRI) assessment was conducted based on results from the desktop and field surveys. The total footprint, including both existing and proposed disturbance, was used in this assessment. The disturbance footprints of regional ecosystems in PL1125 were used

together with existing information to determine the significance of potential impacts to listed species that occur or potentially occur in the area. The significant impact assessment included eleven species, all of which are EPBC listed as threatened or migratory, that have a potential residual impact. Each of these eleven species is also listed under the Queensland *Nature Conservation Act 1992*, with the Dusky Hopping-mouse listed as Endangered instead of Vulnerable as per the national legislation. In addition, one regional ecosystem was included in the assessment, RE 5.3.22 (sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes).

Assessment was conducted for these eleven species and one regional ecosystem based on the Significant Residual Impact Guidelines (DES, 2014) to determine whether the impact is likely to be significant. The guideline lists a number of outcomes that constitute significant impacts, including but not limited to long-term population decrease, fragmentation, or disease introduction. The assessment identified the following residual impacts (refer to Attachment A for the complete detailed SRI assessment):

- A residual loss of 8.69 ha of habitat for EPBC Endangered species Curlew Sandpiper, Common Greenshank and Australian Painted Snipe. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the risk of an impact from project disturbance is considered to be low and the potential impact is not considered to be significant with no long-term effect on individuals or populations.

- A residual loss of 8.69 ha of potential habitat (RE 5.3.22) for the EPBC Vulnerable Sharp-tailed Sandpiper. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact with no long-term effect on individuals or populations.

- A residual loss of 21.78 hectares of potential habitat (8.69 ha of RE 5.3.22 and 13.09 ha of RE 5.9.3 / 5.9.4) for the EPBC Vulnerable Blue-winged Parrot. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact with no long-term effect on individuals or populations.

- A residual loss of 11.41 ha of potential habitat (RE 5.6.4) for the EPBC: Vulnerable Southern Whiteface that could result in a localised impact to the species. The likelihood of an impact to Southern Whiteface is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'[4]. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the impact was not significant as the impact is unlikely to:

  – lead to a long-term decrease in the size of a local population,

[4] Assessment completed using the DCCEEW risk assessment framework for threatened species within national recovery plans (see Table 7 in Appendix A).

  - reduce the extent of occurrence of the species; or
  - fragment an existing population.

  Using the DCCEEW risk assessment framework for threatened species within national recovery plans the risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

- A residual loss of habitat (8.80 ha of RE 5.6.5/RE 5.6.8 combined) for the EPBC Vulnerable Dusky Hopping-mouse. The likelihood of an impact to Dusky Hopping-mouse is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals are adversely affected but no effect at population level'. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the impact was not significant as the impact is unlikely to:
  - lead to a long-term decrease in the size of a local population,
  - reduce the extent of occurrence of the species; or
  - fragment an existing population.

  Using the DCCEEW risk assessment framework for threatened species within national recovery plans the risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

- A residual loss of 8.69 ha of habitat (RE 5.3.22) for four EPBC Migratory species; Common Sandpiper, Pectoral Sandpiper, Marsh Sandpiper and Red-necked Stint. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact.

The following mitigations measures have been prepared to address the 'Moderate' risk requirement outlined above for the Southern Whiteface and the Dusky Hopping-mouse ('develop mitigation action if required') and will provide additional protection for other species.

- Mark the areas to be cleared before clearing.
- Clearing should be supervised to ensure no 'out of bounds' clearing takes place.
- Clearing should be conducted directionally in a manner that allows fauna species the best opportunity to relocate to native habitat.
- Placing topsoil in uncompacted stockpiles to minimise loss of seed viability and soil biota.
- Vehicles and mobile equipment will be parked only in designated parking areas. Vegetated areas will not be used for parking.
- Use existing tracks, roads and/or seismic lines for access, where practicable, to prevent unnecessary dust emissions and habitat removal.

- Maintain a 40-km/h speed limit on all access tracks, to reduce the risk of animal strike.
- Restrict traffic to established roads and tracks only.

The SRI assessment identified one significant impact.

- The disturbance footprint results in a residual impact to 8.69 ha of RE 5.3.22 (sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes) which lies within mapped wetlands but is not endangered or of concern. This is identified as a significant residual impact to RE 5.3.22 under Section 2.1 of the Significant Residual Impact Guideline due to Criteria 1 and Criteria 2 of being exceeded[5].

In order to mitigate this significant impact, the disturbance areas for Vali-4 and Vali-5 will be refined prior to their construction. As these wells have not been constructed yet, the location and layout of their well pads is still to be determined.

Both of the proposed wells,Vali-4 and Vali-5, are located within the extent of mapped non-perennial interdunal lacustrine wetlands. While likely to change prior to construction, the proposed well pads and access roads for Vali-4 and Vali-5 intersect lacustrine wetlands for the following areas:

- Vali-4 pad – 2.02 ha.
- Vali-4 access road – 0.67 ha.
- Vali-5 pad – 1.93 ha.
- Vali-5 access road – 0.36 ha.

The wells have been placed in their current locations for a number of reasons.

- Firstly, cultural heritage clearance surveys indicated that Vintage Energy should avoid dune habitat as this is more likely to hold cultural heritage significance.
- Secondly, constructing well pads in flat terrain requires less earthworks and area when compared to dune habitat.
- Thirdly, the placement of Vali-4 and Vali-5 close to existing roads and infrastructure will reduce the disturbance to greenfield areas of PL1125.

[5] Criteria 1: For clearing for linear infrastructure: greater than 25 m wide in a grassland (structural category) regional ecosystem; or greater than 20m wide in a sparse (structural category) regional ecosystem; or greater than 10m wide in a dense to mid-dense (structural category) regional ecosystem.
For clearing other than clearing for linear infrastructure: area greater than 5 ha where in a grassland (structural category) regional ecosystem; or area greater than 2 ha where in a sparse (structural category) regional ecosystem; or area greater than 0.5 ha where in a dense to mid-dense (structural category) regional ecosystem.
Criteria 2: Clearing within 50m of the defining bank.

3.1.1.2 Connectivity Analyses

The DETSI Landscape Fragmentation and Connectivity (LFC) tool was used to assess whether significant impacts to connectivity would occur from the existing and proposed disturbance within PL1125. It consists of two analysis tools the Connectivity Impact Assessment (CIA) Tool and the Standalone Landscape Fragmentation Analysis Tool.

Refer to Section 5.4.2 of Attachment A for the tabulated results and detailed description of the connectivity analyses. In summary, due to the linear nature of much of the Project disturbance area, and intact corridors of available habitat surrounding the non-linear footprints, it is considered that the disturbance area for PL1125 has a very low impact on connectivity for wildlife in general at the local scale and at the regional scale.

Of the listed species identified as potentially occurring within PL1125, nine out of eleven are highly mobile bird species. Disturbance on the scale of the Vali Gas Field project would present no barrier to these birds which can move on the scale of tens to hundreds of kilometres within a day. For the remaining two species, the Southern Whiteface and the Dusky Hopping-mouse, the scale of disturbance is not considered to be a significant barrier. It is considered that the disturbance area for PL125 has a very low impact on connectivity for listed species at the local scale and at the regional scale.

3.1.2 Surface Water Environmental Values

PL1125 is within the Lake Eyre Basin Program Area of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (the Policy). Schedule 1 of the Policy lists the Environmental Values (EV) and Water Quality Objectives (WQO) that apply to Program Areas. The Lake Eyre Basin is not listed in Schedule 1 of the Policy. Therefore, the EVs that are likely to apply to PL1125 are inferred considering the site-specific watercourses described in the surface water and watercourse section (see Section 2.6) and information on land use and conservation significance of fauna and flora presented in this application.

The following land uses apply to PL1125 and the immediate surrounds:

- Cattle grazing.
- Oil and gas exploration and production.

While tourism occurs in the area, given the remoteness of the area and being located on an active pastoral lease with no public access, access by recreational visitors is unlikely to occur.

The desktop review by Smith (2024) identified the following numbers of flora or fauna of conservation significance within a 50km buffer of PL1125:

- No *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) listed threatened ecological communities (TEC).
- Three EPBC listed flora species. Of these, one plant species is listed as Endangered (E) and two as Vulnerable (V).

- 13 EPBC listed fauna species (11 bird and two mammals) which are considered threatened.
    - Of these two bird species are listed as Critically Endangered (CR); three bird species listed as Endangered (E) and the remaining species are listed as Vulnerable (V).
- Five species of birds are listed as Migratory under the EPBC Act.

The field survey completed in September 2024 recorded the following flora and fauna within PL1125:

- 131 flora species including one introduced species.
- No flora species listed under the EPBC Act or state legislation were recorded.
- 38 species of birds were recorded during the field survey none of which are listed species.
- A number of boom and bust bird species, including Budgerigar, Flock Bronzewing, and Little Buttonquail were common during the survey which reflects the good environmental conditions at the time.

During the infrequent wet periods, the surrounding ephemeral lakes and clay pans will provide temporary habitat for microalgae, aquatic invertebrates, riparian vegetation and foraging birds.

The EVs listed in Table 3.1 are inferred based on the available information on watercourses as described in the surface water and watercourse section (see Section 2.6) and considering the pastoral land use, and the flora and fauna identified within PL1125.

Table 3.1 – Environmental Values*

Environmental Value	EVs likely to apply
Environmental Values for Water	
Cultural and spiritual	✓
Aquatic ecosystems	✓
Agriculture use (livestock drinking water)	✓
Aquatic foods for human consumption	X
Aquaculture	X
Recreational use (swimming, wading, boating, fishing, aesthetic)	X
Drinking water (raw water supply for humans)	X
Industrial uses (mining and minerals refining/processing)	X
Environmental Values for Wetland	
Health of the wetland ecosystem	✓
Wetland's natural state and biological integrity	✓
Presence of distinct or unique features endemic plants or animals and their habitats, including threatened wildlife and near threatened wildlife under the *Nature Conservation Act 1992*	✓

Environmental Value	EVs likely to apply
Wetland's natural hydrological cycle	✓
Natural interaction of the wetland with other ecosystems, including other wetlands	✓

*Environmental values sourced from the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.

The EV of stock watering is conservatively listed given stock drinking water is extracted groundwater pumped to watering points. Livestock will drink from clay pans when ponded water is present.

3.1.3 Water Quality Objectives

Schedule 1 of the Policy does not list Lake Eyre Basin, and therefore no WQOs are identified. Other than the flow gauge and EC monitoring station at Nappa Merrie, no background water quality information was identified in the literature search and review for PL1125 and surrounds. Furthermore, there are practical constraints to assessing water quality in remote areas that are subject to infrequent rainfall and inundation. When sufficient water is present to allow time to mobilise for monitoring, it is also likely that roads will be impassable to access the area to perform water quality monitoring.

There are no water quality guidelines published by Australian and New Zealand Governments (ANZG, 2018) for cultural or spiritual values. It is possible that existing water quality guidelines designed for other water uses (such as for protection of aquatic ecosystems), may be acceptable to traditional owners.

Although ANZG (2018) provides aquatic ecosystem guidelines (national default guidelines values (DGVs) for toxicants, and regional physical-chemical stressor DGVs), these apply to steady state ecosystems, not ephemeral waters.

Water quality parameters in ephemeral lakes will vary with the wetting-drying hydrological cycle. For example, ephemeral waters will become increasingly saline with evaporation.

Select livestock drinking water values from Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand (ANZECC and ARMCANZ, 2000) are listed below in Table 3.2. These parameters are selected based on a stressors potential to be associated with the activity and represent values at which drinking water should not be harmful, and therefore higher values may be tolerated.

Table 3.2 – Livestock Drinking Water

Parameter (units)	Livestock Drinking Water*
Total dissolved solids (mg/L)	<4000#
Nitrate (mg/L)	<400
Nitrite (mg/L)	<30
Sulphate (mg/L)	<1,000
Calcium (mg/L)	<1,000
Mercury (mg/L)	0.002
Zinc (mg/L)	<20

Parameter (units)	Livestock Drinking Water*
Gross alpha (Bq/L)	<0.5
Gross beta (excluding K-40) (Bq/L)	<0.5

* WQOs listed are to protect livestock (i.e., sheep, cattle, horses, pigs, poultry). Where WQOs specific to cattle are available, this is stated (see note#)
Beef cattle

3.1.4 Potential Impacts to Surface Water Environmental Values

Impacts to environmental values (cultural and spiritual values, aquatic ecosystems, livestock drinking water, wetlands) are possible if a spill or loss of containment occurs.

Spills or loss of containment could entail:

1. A burst or leaking pipe, hose, or tank on the well pad releasing <2,000 L of contaminated waters or fuel.

2. A flood event that inundates the well pads and/or evaporation ponds.

It is possible that a spill or release during dry conditions could have localised impacts to soils on, and surrounding the well pad, and/or sediment in a clay pan adjacent to a well pad. A spill or release when conditions are wet has the potential to transport contamination further away from the well pad, over a more extensive area. However, it is also likely that during wet conditions the increased volume of water will result in reduced concentrations of contaminants whereby the potential for adverse effects to environmental values is reduced. The potential for dispersion and reduction in concentration along the flow path (particularly during a flood scenario) suggests the potential for adverse effects to EVs is unlikely, and would be of short term duration.

Using the risk assessment approach (Attachment B) included in this application, the potential impacts are assessed to be unlikely to occur, and with minor consequence with a risk rating of very low prior to controls being applied.

Several processes, procedures and controls will be in place to limit the potential for impacts on these environmental values if a spill or loss of containment occurred. Impacts from these possible release scenarios are likely to be temporary and can be managed.

The following controls, mitigation and management measures will assist in managing impacts:

- The well pad is elevated relative to surrounding land, and the elevated bunds surrounding the evaporation ponds are unlikely to be inundated during a flood event.

- Water storage ponds are inspected during site visits and their fluid levels are recorded. In-between site visits, fluid discharge to the ponds is metered and the change in level is calculated.

- During drilling, turkeys nests are under constant manual surveillance as there are personnel on site throughout this activity.

- If turkey nests or storage ponds are approaching their maximum capacity, fluid will be removed from site via a suction truck and then transported to an appropriate facility.

- Evaporation ponds are lined with impermeable plastic to prevent leaching of chemicals info the subsurface.
- Low hazard water storage ponds are designed, constructed, operated and maintained in accordance with acceptable engineering standards.
- Hazardous materials are stored in bunded areas and are handled and transported in accordance with applicable standards and guidelines.
- An emergency response plan is in place that includes the availability of spill kits including sorbent booms at all locations where hazardous materials are handled or stored.
- Staff are trained in emergency spill response procedures and responsibilities.
- Incidents resulting in loss of containment will result in clean up actions initiated as soon as reasonably practicable.

The pre-mitigation risk rating would not change post-mitigation. The potential for impact to EVs during upset conditions (loss of containment) are nevertheless summarised below in Table 3.3.

Table 3.3 – Residual Risk Ranking for Impacts on Environmental Values

Environmental Value	Risk Ranking (Loss of Containment)
Environmental Values for Water	
Cultural and spiritual	Very Low
Aquatic ecosystems	Very Low
Agriculture use (livestock drinking water)	Very Low
Environmental Values for Wetland	
Health of the wetland ecosystem	Very Low
Wetland's natural state and biological integrity	Very Low
Presence of distinct or unique features endemic plants or animals and their habitats, including threatened wildlife and near threatened wildlife under the Nature Conservation Act 1992	Very Low
Wetland's natural hydrological cycle	Very Low
Natural interaction of the wetland with other ecosystems, including other wetlands	Very Low

3.2 Emissions or Releases

3.2.1 Air

Air contaminants:

- Dust – the site is remotely operated with no permanent human presence, therefore there is minimal activity which can generate dust emissions. During standard Project operations, a light vehicle, used fortnightly to undertake monitoring activities, is the only dust generating vehicle on site. However, during the drilling of the proposed wells Vali-4

and Vali-5, there will be increased vehicle use to transport the drill rig and accommodation camp to site. During this period, dust suppression from water trucks may be used if dust emissions are difficult to contain. The three operational well sites (Vali-1, Vali-2 and Vali-3) are all clay capped to minimise dust emissions. The proposed wells Vali-4 and Vali-5 will also be clay capped.

- Odour – no odour has been generated from previous petroleum activities in PL1125 and none is expected during the drilling of Vali-4 and Vali-5 wells.
- Light – no lighting present on site during normal operations. If the Vali-4 and Vali-5 wells are drilled, then lighting will be required at night for a three week period for the safe operation of the drilling rig and around the accommodation camp.

Fugitive emissions:

- Estimated at 4.3 tCO_2e per year per active well in the greenhouse gas emissions forecast (Attachment C).

Venting or flaring emissions:

- There are no flares present in PL1125.
- Venting estimated at 81.2 tCO_2e to drill a new well, but once operational, the venting rate for all active wells in PL1125 has been fixed at the 2024 level of 30 tCO_2e (Attachment C).

Vehicle exhaust emissions:

- Fortnightly light vehicle monitoring activities on site will produce exhaust emissions (included in Attachment C modelling).
- The drilling of new wells will require trucks to deliver the drill rig and other Project components onto site. Diesel combustion emissions for this activity are included in Attachment C.

Point source air emissions:

- Within PL1125 there are no point sources from fuel burning equipment that are capable of burning 500 kg or more of fuel per hour.
- A diesel generator is the only piece of permanent fuel burning equipment that burns less than 500 kg of fuel per hour that is found at the PL1125 site.

3.2.2 Greenhouse Gas Emissions Inventory

A detailed emissions forecast is provided in Attachment C (ERCE, 2025). This forecast estimates yearly Scope 1 and Scope 3 emissions from 2025 to 2061. There are no estimated Scope 2 emissions as no electricity is purchased to support operations. Vali-3 is currently shut in and has not been included in the online wells and total well tallies.

Table 3.4 below presents the estimated Scope 1 greenhouse gas emissions for the drilling of a new well.

Table 3.4 – Greenhouse Gas Emissions Inventory

Emissions Classification	Emission Source/Category	Total Emissions (tonnes CO_2e)			
		CO_2e	CO_2	CH_4	N_2O
Scope 1	Flaring	-	-	-	-
	Venting	81.2	1.9	79.3	-
	Fugitive	4.3	0.1	4.2	-
	Combustion – diesel (drilling)	94.8	94.4	0.1	0.3
	Combustion – diesel (miscellaneous)	40.6	40.5	0.1	0.1
	Total Scope 1	221.0	136.9	83.7	0.4

Source: ERCE, 2025

3.2.3 Noise

The terrain is dominated by undulating dunefields (Wiltshire & Schmidt, 2003) although also comprises flat gibber plains, sandplains, floodplains and stony rises. The predominant wind direction in the Cooper Basin is typically from the southeast, with lighter winds occurring more frequently in May to July, and stronger winds in September to January (Santos, 2017).

The existing noise environment is characteristic of a remote, unpopulated area with low levels of background noise. Regular natural sources of background noise include the wind and native animals, more infrequent background noise includes cattle and vehicle activities of the nearby landowners.

There are no sensitive receptors located within PL1125 and the closest sensitive residential receptor is the township of Innamincka which is located approximately 40 km away in a north westerly direction (see Figure 1.1). There is a closer industrial receptor, the Santos Dullingari gas hub (labelled Dullingari on Figure 1.1), which is located approximately 20 km away in a south westerly direction.

Due to the remote nature of PL1125 and the lack of nearby sensitive receptors, background noise monitoring has not been undertaken. In the absence of this data, the deemed background levels are as per the prescribing noise conditions for petroleum activities guideline (Table 3.5; DESI, 2024d).

Table 3.5 – Deemed Background Noise Levels

Time Period	Deemed Background Noise Level (dB(A))
7:00 am – 6:00 pm	35
6:00 pm – 10:00 pm	30
10:00 pm – 6:00 am	25
6:00 am – 7:00 am	30

The construction of three of the well pads, their associated flowlines and the Vali pipeline has already been undertaken. During normal operations there is no Project human presence within PL1125, other than regular monitoring which occurs once every two weeks at a maximum. A light vehicle is used to complete this regular monitoring. Typical noise emissions generated on site during operations include:

- Generator use at the workshop container at the Vali metering facility (located on the Vali-1 pad). The LG9D1 diesel generator is used only when maintenance work occurs at the Vali facility, on average for 2 to 3 hours per month. This generator functions at 65 dBA at 7 m. This generator is only used during daylight hours.
- The gas separator at the Vali metering facility with minor noise expected of gas flowing.
- Gas flowing in exposed flowlines and pipelines at the Vali metering facility (the large majority of flowlines and pipelines are buried in PL1125).
- Light vehicle use on site (once every two weeks).

The drilling of the Vali-4 and Vali-5 wells will result in heightened noise levels on site for a short period of time. While the expected date for the drilling of these wells is not known, it is anticipated that each would take three weeks to drill. During this period, non-standard operational noise emissions would be expected from the following:

- Excavation of the well pad using earth moving machinery.
- Trucks delivering the accommodation camp and drill rig to site.
- Generator use at the accommodation camp (housed within the pad area).
- Drilling rig operations.
- Trucks providing supplies to drilling operations and accommodation camp.
- Trucks removing the accommodation camp and drill rig from the site.

3.2.4 Spill Response and Remote Detection

As the site is unmanned remote monitoring occurs 24/7 with pressure, temperature and flow information collected and displayed via a graphical interface to Vintage Energy personnel and maintenance contractors. Leaks from infrastructure would be manifested in pressure changes and in this case, valves automatically close to minimise any loss of containment. Leak detection for ponds is by visual inspection when personnel visit site. This is planned to be every two weeks and there are often additional ad hoc visits when maintenance is required.

In the event of a release of product the system is automated and subsequently the facility would be shut down immediately and maintenance team notified. Attendance at site for any manual work would depend on location of available personnel but would be between 3 hours and 36 hours.

3.3 Description of the Risk and Likely Magnitude of Impacts on the Environmental Values

Table 3.6 describes the risks, potential impacts and magnitudes of impacts for the relevant environmental values. Details on the risk assessment approach are provided in Attachment B.

3.4 Details of the Management Practices Proposed to be Implemented to Prevent or Minimise Adverse Impacts

Table 3.6 lists the management measures which will mitigate the potential adverse impacts of this activity and reduce their severity.

Table 3.6 – Natural Environmental Impacts and Risk Assessment

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
Air emissions	Reduction in local air quality	Low	• Use existing tracks, roads and/or seismic lines, where practicable, to prevent unnecessary dust emissions • Maintain a 40-km/h speed limit on all access tracks, to prevent unnecessary dust emissions • Operate and maintain vehicles according to manufacturer specifications to prevent unnecessary exhaust emissions • Undertake induction and training sessions for all site personnel, to ensure an understanding of air emission prevention	Unlikely	Moderate	Very Low
	Harm to health of native flora and/or fauna	Low		Unlikely	Minor	Very Low
	Harm to health of livestock	Low		Unlikely	Minor	Very Low
	Harm to human health	Low		Unlikely	Moderate	Very Low
Cultural heritage and sites of significance	Damage to sites of significance and/or removal of item of cultural significance	Medium	• Complete cultural heritage surveys with suitably qualified archaeologists and Wongkumara (Traditional Owners) prior to any additional works • Mark known cultural heritage sites to prevent accidental access/damage. • Stop all works immediately and implement a Chance Finds Procedure if suspected indigenous or non-indigenous culturally significant material or artefacts are identified within the Project area. • Undertake induction and training sessions for all site personnel, to ensure an understanding of cultural heritage considerations • Establish and maintain an exclusion zone around chance finds heritage items observed on site until authorisation granted for works to commence. • Notify Vintage Energy Operations Manager immediately if potentially culturally significant items are found on site. • Notifying the relevant government agency in Queensland	Unlikely	Significant	Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
Fire or explosion	Loss of native vegetation	Low	• Maintain and appropriately sign all fire-fighting equipment • Fire access tracks will be maintained to ensure ease of access to site • Store all dangerous goods and hazardous substances in accordance with manufacturers recommendations and workplace health and safety requirements • Design, construct and operate all equipment and infrastructure to reduce the potential for ignition • Restrict smoking to areas clear of any vegetation and prohibit disposal of cigarette butts to land • Monitor fire conditions, weather conditions, current fires in the area and high fire risk days • Develop an Emergency Response Plan, which includes procedures for response to fire • Undertake induction and training sessions for all site personnel, to ensure an understanding of fire prevention and response procedures	Unlikely	Moderate	Very Low
	Loss of infrastructure	Low		Unlikely	Minor	Very Low
	Disturbance, injury or death to fauna	Low		Unlikely	Minor	Very Low
	Danger to the health and safety of humans	Low		Unlikely	Moderate	Low
Groundwater contamination	Groundwater and soil contamination from inadequate well plugging	Medium	• Case and cement well, to prevent contamination • Plug each hydrocarbon formation, groundwater aquifer intersected and well at the surface, with cement plugs • Monitor well fluid pressures and take remedial action immediately in the event of pressure decreases • Fuel and oil storage facilities to be constructed in accordance with Australian Standard (AS) 1940-2004	Unlikely	Significant	Low
	Intersection of aquifers	Medium		Unlikely	Significant	Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
	Harm to health of native flora, fauna and ecosystems	Low	• Store produced water on site, in frac ponds, until completion of project activities when any remaining water will be transported offsite for appropriate disposal • Residual drilling material will be placed into sumps for the duration of drilling activities, and buried once water has evaporated • Manage sewage effluent and/or grey water in accordance with conditions of environmental authority • Monitor sumps for overflow during periods of high rainfall	Rare	Moderate	Very Low
Hazardous materials – storage, handling, spills/leaks	Site contamination (soil, surface water and/or groundwater)	Medium	• Store all dangerous goods and hazardous substances in accordance with manufacturers recommendations and workplace health and safety requirements • Volume of chemicals stored onsite will not exceed those listed under Schedule 2 (Part 2 Section 8) of the *Environmental Protection Regulation 2008* • Safety Data Sheets (SDS) to be available for all chemicals stored onsite • Minimise fuel transfer where possible, and use drip trays at all times • Store residual drilling material in sumps • Drilling fluids will not be oil-based or synthetic oil-based • Store spill response kits at all locations where hazardous materials are handled or stored • Undertake induction and training sessions for all site personnel, to ensure an understanding of SDS application and spill prevention/response	Unlikely	Significant	Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
Light emissions (during construction only)	Disturbance to native fauna	Low	• Operate and maintain lighting equipment according to manufacturer specifications • Position lighting equipment to face inwards, to provide adequate lighting for safe operations and ensure minimal overflow • Remove infrastructure promptly following well drilling • Develop Environmental Nuisance and Complaint Management Procedures according to the conditions of the environmental authority	Unlikely	Minor	Very Low
	Disturbance to livestock	Low		Unlikely	Minor	Very Low
	Visual impact	Low		Unlikely	Minor	Very Low
Long-term site instability	Ongoing uncontrolled sediment release impacting vegetation regeneration and/or surface water quality	Medium	• Implement sediment and erosion control measures to prevent soil loss and deposition beyond Project sites • Rehabilitate the site promptly following decommissioning, include the following: – remove hardstand areas – reshape disturbed areas to a stable landform – re-profile contours to be re consistent with the surrounding landform – re-establish surface draining lines – reinstate top soil • Monitor performance of rehabilitation activities until final acceptance criteria are met • Develop a rehabilitation report and submit to the administering authority	Unlikely	Significant	Low
	Failure of site to recover/ revegetate following decommissioning	Medium		Unlikely	Significant	Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
Loss of well integrity	Environmental contamination (soil, surface water and/or groundwater)	Medium	• Perform all activities in accordance with applicable industry and regulatory standards • Assess well bore integrity prior to commencing drilling, and rectify any issues immediately • Develop an Emergency Response Plan, which includes procedures for response to well issues (e.g. blow out) • Undertake induction and training sessions for all site personnel, to ensure an understanding of emergency response procedures	Unlikely	Significant	Low
Noise and vibration emissions	Disturbance to native fauna	Low	• Operate and maintain all equipment according to manufacturer specifications • Undertake induction and training sessions for all site personnel, to ensure an understanding of noise and vibration emission prevention • Develop Environmental Nuisance and Complaint Management Procedures according to the conditions of the environmental authority	Unlikely	Minor	Very Low
	Disturbance to livestock	Low		Unlikely	Minor	Very Low
	Disturbance to humans	Low		Unlikely	Minor	Very Low
Surface water contamination	Contamination to cultural and spiritual water values, aquatic ecosystems, livestock drinking water, wetlands and waterways	Very Low	• Implement sediment and erosion control measures to prevent soil loss and deposition beyond Project sites • Undertake project activities to avoid watercourses • Implement and maintain measures to minimise stormwater entry • Store produced water on site, in ponds, until completion of project activities when any remaining water will be transported offsite for appropriate disposal	Unlikely	Minor	Very Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
			• Residual drilling material will be placed into sumps for the duration of drilling activities, and buried once water has evaporated • Manage sewage effluent and/or grey water in accordance with conditions of environmental authority • Monitor sumps for overflow during periods of high rainfall • Locate access tracks to avoid surface water features such as wetland areas and to maintain pre-existing water flows • Lower any artificially elevated area to original ground level following decommissioning			
Vehicle movements	Injury or death to native fauna and/or livestock	Low	• Use existing tracks, roads and/or seismic lines, where practicable, to prevent unnecessary dust emissions and habitat removal • Maintain a 40-km/h speed limit on all access tracks, to prevent unnecessary dust emissions • Operate and maintain vehicles according to manufacturer specifications to prevent unnecessary exhaust emissions • Inspect and certify vehicles as weed-free prior to accessing the Project site • Monitor Project site for new or increased weed issues, and manage accordingly • Undertake induction and training sessions for all site personnel prior to working on site	Unlikely	Minor	Very Low
	New or increased weed infestations	Low		Unlikely	Minor	Very Low
Waste – storage, handling and disposal	Localised site contamination (soil, surface water and/or groundwater)	Low	• Mange waste in accordance with the waste and resource management hierarchy and the waste and resource management principles	Unlikely	Minor	Very Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
	Attraction of fauna	Low	• Segregate waste streams to maximise reuse and recycling • No disposal or use of regulated waste • General waste disposal will not exceed 10,000t/yr • Transport waste, including fluids off site (Moomba) • Label all waste bins clearly • Cover all waste bins to prevent fauna intrusion, where practicable • Manage sewage effluent and/or grey water in accordance with conditions of environmental authority • Store produced water on site, in ponds, until completion of project activities when any remaining water will be transported offsite for appropriate disposal • Residual drilling material will be placed into sumps for the duration of drilling activities, and buried once water has evaporated • Transport hazardous waste through an approved operator and dispose of at a licenced facility • Track all waste to ensure the correct volumes are delivered and received at waste disposal facility • Undertake induction and training sessions for all site personnel prior to working on site	Unlikely	Minor	Very Low
Water use	Groundwater extraction affects other users and/or the environment	Medium	• Keep extracted volumes of groundwater to a minimum • Monitor and record all extraction volumes of groundwater • Earthen embankment storage (e.g., turkey nests) will be used for water storage with fauna entrapment measures implemented	Unlikely	Significant	Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
Water storage	Water storage pond failure resulting in sudden release of water	Medium	• Low hazard water storage ponds operated and maintained in accordance with accepted engineering standards appropriate for the purpose for which the pond is intended to be used • Design pond floor and sides with material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during operation and decommissioning and rehabilitation • Undertake an initial hazard assessment • Monitor for early signs of loss of structural or hydraulic integrity as specified in the initial hazard assessment • When no longer required, low hazard water storage ponds to be decommissioned to no longer accept inflow from petroleum activities and: – Rehabilitated; or – Agreed to in writing by the administering authority and landholder to remain in situ, with the contained water of a quality suitable for the intended ongoing uses(s) by the landholder	Unlikely	Significant	Low
Introduction of invasive flora and fauna	Harm to health of native flora, fauna and ecosystems	Low	• Inspect and certify earth moving equipment as weed-free prior to accessing the Project site • Restrict traffic to established roads and tracks only • Restrict the availability of domestic waste by covering bins to prevent access by scavenging species.	Unlikely	Moderate	Low
Land clearing	Direct loss or disturbance of native vegetation and/or fauna habitat.	Medium	• Mark the areas to be cleared before clearing. • Clearing should be supervised to ensure no 'out of bounds' clearing takes place	Possible	Moderate	Low

Risk / Hazard	Potential Impact	Pre-mitigation Risk Rating	Mitigation and Management Measures	Risk Assessment		
				Likelihood	Consequence	Residual Risk Ranking
	Reduction in native flora species abundance, density and diversity.	Medium	• Clearing should be conducted directionally in a manner that allows fauna species the best opportunity to relocate to native habitat • Placing topsoil in uncompacted stockpiles to minimise loss of seed viability and soil biota • Vehicles and mobile equipment will be parked only in designated parking areas. Vegetated areas will not be used for parking • Maintain a 40-km/h speed limit on all access tracks, to reduce the risk of animal strike	Possible	Moderate	Low
	Reduction in native fauna species abundance density and diversity as a result of habitat loss and fragmentation.	Medium		Possible	Moderate	Low

3.5 Rehabilitation

All rehabilitation of disturbed sites will be undertaken progressively through construction and operational phases where practicable. Currently no sites within PL1125 have been rehabilitated as all Project infrastructure is still in use.

The Vali pipeline has undergone rehabilitation after it was buried and photo point monitoring locations have been established in different vegetation types along its route. However, this pipeline falls under a different environmental authority (P-EA-100271494) and will not be considered further in this application.

During the next phase of the Project, the following sumps and turkey nests will be rehabilitated.

- Vali-1 – one turkey nest.
- Vali-2 – four turkey nests.
- Vali-3 – the sump and four turkey nests.
- Vali-4 and Vali-5 – no disturbance has occurred at these proposed sites, but after drilling the turkey nests and sumps will be rehabilitated.

This will occur through the backfilling of the sump or turkey nest with material excavated during their construction.

The drill sump will store the drill cuttings and biodegradable fluid and remain open to enable evaporation and consolidation. Using previous well designs and a conservative estimate of drilling fluid volumes, proposed sumps would be approximately 350 m^3 in volume. Sumps are designed to contain total drilling fluids plus a contingency for rain and solids and represent a maximum volume of drilling material. The project uses a water based mud system with additives to ensure hole stability and limit formation damage and fluid invasion while drilling. Common additives to drilling muds are presented in Table 3.7. Water-based mud avoids synthetic or oil-based drilling fluids, reducing the risk of hydrocarbon contamination.

Table 3.7 – Common Additives to Water-based Muds

Additive	Function	Typical Max On-site Quantity (kg)	Typical Use Rate (kg/m^3)
Bentonite	Viscosifier	4000	30
Barite	Weighting agent	10000	50
PAC-L (polyanionic cellulose)	Filtrate reducer	500	1-3
Xanthan gum	Viscosifier	300	0.5-2
Potassium chloride	Shale inhibitor	2000	20-40
Sodium carbonate	pH control	200	1-2
Cellulose fibres	Loss control/bridging	500	2-10
Mica	Loss control/bridging	200	1-5

Mechanical separation of solids and fluids occurs on site to maximise reuse of fluids and subsequently minimise the use of additives. No solids or fluids from drilling are discharged. Upon

completion of drilling, the sump remains fenced and the ground up rock and fluids are allowed to dry and consolidate before material excavated to dig the sump is then backfilled over the top of the ground up rock. The backfilled material is placed in layers with topsoil being the last layer applied.

The sump will be covered by 1 to 1.5 m of clean excavated material ensuring it will not be exposed during the life of the Project. The chemical composition of the dried drilling material will be tested prior to the sump being backfilled. Testing will occur to ensure that drill material will not prevent the rehabilitation of the site (i.e., salinity and metals).

Excavated top soil will be respread on top of turkeys nests if they are located on the edge of the drill pad. However, no top soil will be spread on the backfilled sump as it will form part of the operational area. If there is any hydrocarbon contamination this will be identified and removed before rehabilitation occurs. Photo point monitoring will be established at rehabilitated sump and turkey nest sites after reinstatement has occurred so that revegetation can be tracked. Monitoring will also be completed at these locations to ensure that soil profiles have correctly re-established.

Once the Projects operational life has expired, estimated at 20 years, the wells will be decommissioned and the well pads rehabilitated. Associated activities will include:

- Plugging and cement of the well, and cement testing.
- Removal of all program infrastructure, equipment and waste.
- Re-profiling of land contours to surrounding landform (unless agreed with the landowner).
- Re-establishment of surface drainage lines.
- Replacement of topsoil.

Any associated flowlines and access tracks will be rehabilitated once the Project no longer requires them.

In reference to the published guideline (DESI, 2024e) and rehabilitation hierarchy, the proponent seeks to reinstate the environment to the previous land use (grazing). Final acceptance criteria for the PL1125 and proposed rehabilitation methods are as presented in Table 3.8.

Table 3.8 – Final Acceptance Criteria and Proposed Rehabilitative Methods

Acceptance Criteria	Proposed Rehabilitative Methods
All significantly disturbed land is reinstated to the pre-disturbed soil suitability class including remediation of contaminated land	• Prior to earthworks commencing an inspection of the site is completed to identify any areas of potential contamination. If there is uncertainty the material is tested • Any material identified as contaminated is removed and disposed at a licenced landfill
The landform is safe for humans and fauna	• Drilling sump backfilled • Well plugged and well cellar removed and backfilled

Acceptance Criteria	Proposed Rehabilitative Methods
	• All rubbish is removed
The landform is stable with no subsidence or erosion gullies as evidenced by 3 years of monitoring	• Drill sump is allowed to dry out before being covered with clean material • Drill pad and any roads are removed and material returned to borrow pit • Drill pad is reshaped to align with surrounding landscape • Implement monitoring program (see below)
All significantly disturbed land is reinstated so that the distribution of vegetation communities represents the surrounding undisturbed environment	• Stockpiled topsoil is respread together with any vegetative matter • Rehabilitated areas are contour ripped to increase surface roughness, retain moisture and facilitate the capture of wind-blown seed • Undertake rehabilitation monitoring program
The water quality of water bodies constructed by the petroleum activity meets criteria for subsequent uses and does not have potential to cause environmental harm	• No permanent water bodies will be constructed by Vintage. • Remove any ponds constructed as part of the project
There is no ongoing contamination to waters	• Inspection of site to identify any contamination • Any contaminated material identified to be removed from site to a licenced facility • Any material identified as potentially contaminated to be tested before determining disposal method
There is no ongoing contamination to groundwater from water storage ponds (demonstrated via groundwater monitoring or bores)	• Temporary water storage ponds lined with plastic • Temporary water storage ponds to be removed at completion of the project
The maintenance requirements for rehabilitated land are no greater than that required for the land prior to its disturbance caused by carrying out the petroleum activities	• Inspection of rehabilitation works following completion of earthworks and remedial action taken • Inspection of rehabilitation 1 year following rehabilitation (if no or very limited rainfall received inspection will be in year 2 or 3)

A rehabilitation monitoring program will be established and will include the following:

- Monitoring of performance indicators will be carried out on rehabilitation activities until final acceptance criteria (see above) have been met for the rehabilitated area.
- Photo point monitoring will occur at the rehabilitated well pads as well as along previously buried pipeline and flowline routes.
- Analogue sites in areas of PL1125 not disturbed by the petroleum activity will be established so that final rehabilitation success can be compared to a site which hasn't directly been influenced by the Project. A minimum of three analogue sites will be included in the rehabilitation monitoring program with a randomised block design. Sites will be selected in a combination of the four regional ecosystems (5.6.4, 5.6.5/5.6.8, 5.3.22 and 5.9.3/5.9.4) that have been recorded in the Project area intersecting the current and proposed footprint. The sites will be selected at random from a candidate list

of sites prepared by a trained botanist. A botanist will collect data on species richness, vegetation cover and native species composition in both the analogue sites and the rehabilitation sites. They will then undertake an analysis of variance to determine differences/similarities between sites and therefore be able to demonstrate rehabilitation success.

- During the operational phase of the Project, rehabilitation monitoring will occur once per year at sites which have already been rehabilitated. After the completion of the Project, monitoring will occur yearly during alternating seasons of autumn and spring. This will continue until final acceptance criteria have been met.
- A trained botanist will complete the rehabilitation monitoring with a focus on species richness, vegetation cover and native species composition when compared to the analogue sites.

3.6 Erosion and Sediment Control

In addition to the information provided in Table 3.6, erosion and sediment control measures will be implemented during the construction of new Project components. Measures to be implemented include:

- Minimise the area of disturbance.
- Redirect surface runoff away from disturbed areas with runoff being directed along the contour.
- If required install silt fences to intercept sediment laden runoff particularly if disturbance is adjacent to lacustrine wetlands.
- Locate topsoil stockpiles away from drainage lines and construct along the contour.
- Place vegetative material on top of topsoil stockpiles.
- Undertake inspections following rainfall events and repair any areas impacted by erosion.

4. Details of Waste and Wastewater Management

4.1 Site Management Plan

A search of the Environmental Management Register and the Contaminated Land Register found that PL1125 is not included in either register (see Attachment D). Therefore, a site management plan is not required for the tenure PL1125.

4.2 Residual Drilling Fluids Management

All residual drilling material (muds) and drilling fluids will be diverted to a sump and stored on-site for the duration of drilling activities. Drilling muds will be allowed to settle and water evaporate. At the conclusion of the drilling programs at Vali-4 and Vali-5, residual drilling material will be disposed of on-site by backfilling the sump with material excavated to construct the sump. There will be no mixing of drill cuttings with adjacent soils. The dried drill cuttings will be covered with clean excavated material.

4.3 Sewage and Grey Water

Domestic wastewater produced from the temporary accommodation camp, including both treated sewage effluent and grey water, will be temporarily stored on site prior to being disposed of off-site at a licensed waste facility in Moomba.

4.4 Produced Water and Flowback Fluids

During production testing activities at the proposed Vali-4 and Vali-5, produced water will require temporary on-site storage. During production testing, all produced water will be separated from gas, and directed to an above ground temporary holding pond (turkey nest) which is lined with impermeable plastic. If the produced water is considered contaminated, as per the livestock drinking water guidelines (ANZG, 2018), water will be allowed to evaporate before the solid residue and plastic liner will be transferred by a licensed waste handler to an appropriate facility (Moomba) for disposal.

Produced water from the already drilled wells, Vali-1, Vali-2 and Vali-3, is separated from the gas and then stored in the two operational lined water storage ponds at the Vali-1 facility. Since the reuse of produced water is desirable, Vintage Energy has commenced investigations into using it for future drilling campaigns, road construction and dust suppression. These investigations are ongoing. Currently, the produced water is contained in ponds and evaporated.

4.5 Solid Waste

All solid waste generated from domestic activities will be disposed of in designated and covered waste skips located next to the temporary camp, according to the waste classification. Skips for recyclable waste will be segregated from putrescible waste (food scraps) paper and cardboard. All domestic waste types will be stored on-site prior to transport and disposed at a licensed facility (Moomba).

4.6 Mitigation Measures

Mitigation measures to be implemented during the construction and operation phases of the Project to mitigate potential hazardous materials and waste impacts include:

- Installing, operating and maintaining all plant and equipment according to manufacturer specifications.
- Handling, storing and transporting fuel, oil and chemicals in accordance with applicable standards and guidelines e.g.AS 1940, ADG Code, EPA guidelines 080/07 Bunding and Spill Management.
- Developing and implementing an Emergency Response Plan.
- Providing training in emergency spill response procedures and responsibilities to relevant staff.
- Ensuring that incidents resulting in loss of containment are reported, recorded, and clean up actions initiated as soon as reasonably practicable.
- Maintaining a hazardous materials register.
- Maintaining a copy on site of Safety Data Sheets (SDS) for all chemicals present.
- Ensuring that spill response kits are provided at all locations where hazardous materials are handled or stored.
- Arranging for any waste streams to be segregated on site where appropriate.
- Labelling all waste bins clearly and covering all waste bins.
- Transporting off-site for lawful re-use, remediation, recycling or disposal, waste, including waste fluids unless the waste is specifically authorised by Standard Conditions.
- Transporting waste outside of the licence undertaken by an EPA licenced transport company and relevant waste transport certificates obtained.
- Transporting hazardous waste through an approved operator and dispose of at a licenced facility.
- Disposing of all sewage to a licensed facility in Moomba.
- Water storage ponds are inspected during site visits and their water levels are recorded. In-between site visits, water discharge to the ponds is metered and the change in level is calculated.
- During drilling, turkeys nests are under constant manual surveillance as there are personnel on site throughout this activity.
- If turkey nests or storage ponds are approaching their maximum capacity, water will be removed from site via a suction truck and then transported to an appropriate facility.

5. Exercising Underground Water Rights

Vintage Energy commissioned Australasian Groundwater and Environmental Consultants (AGE) to prepare an Underground Water Impact Report (UWIR) for PL1125. This document is included in this application as Attachment E.

5.1 Part A – A Statement that the Applicant Proposes to Exercise Underground Water Rights

Vintage Energy propose to exercise underground water rights.

5.2 Part B – A description of the Area/s in Which Underground Water Rights are Proposed to be Exercised

Water rights will be exercised in the proposed PL1125. This PL is found within ATP2021 and encompass the three existing wells Vali-1, Vali-2 and Vali-3 (see Figure 1.2, Table 5.1). There are also two proposed well locations (Vali-4 and Vali-5) within PL1125.

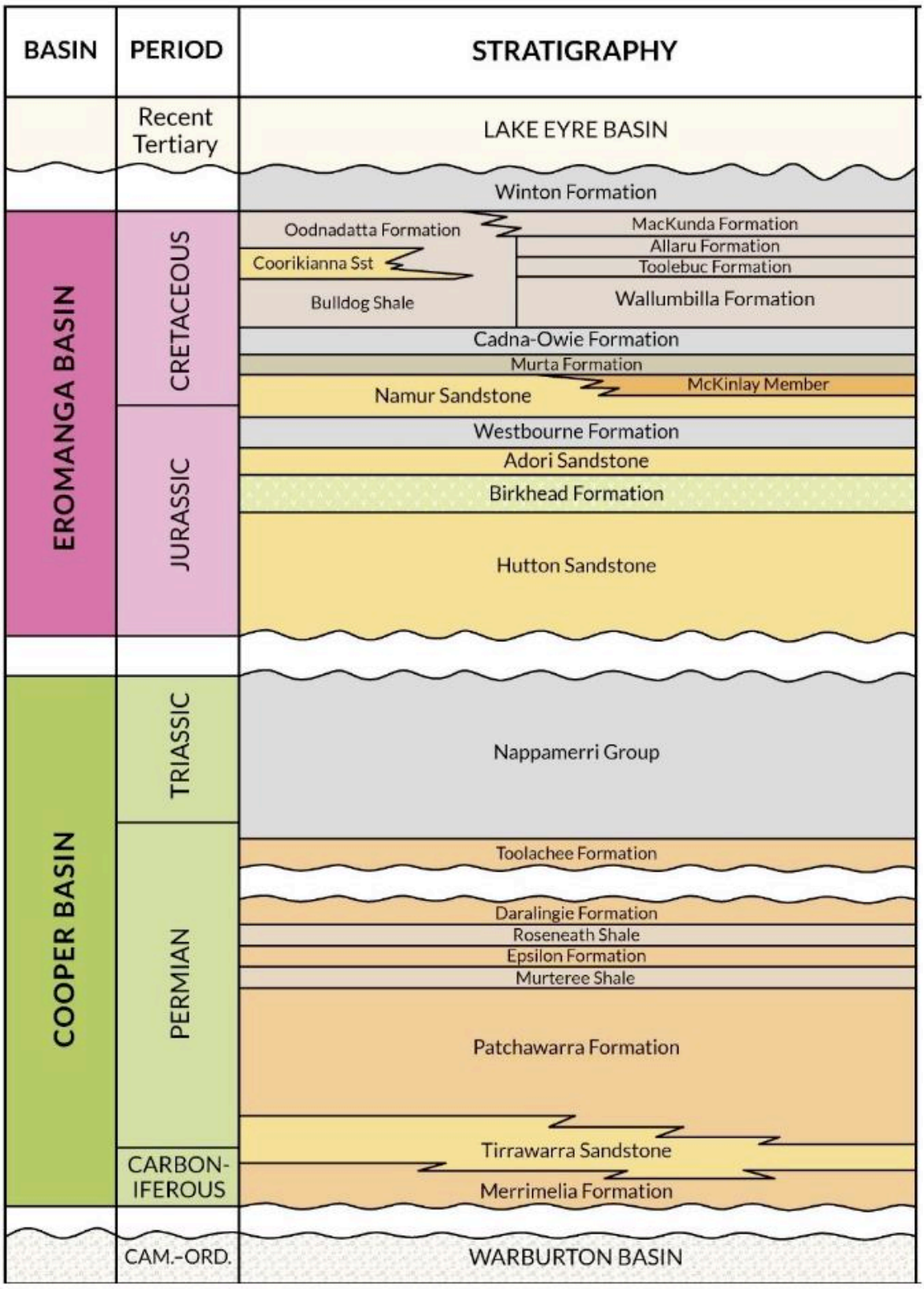
Table 5.1 – Well Locations

Well	Easting	Northing	Lithology 1	Lithology 2
Existing				
Vali-1	141° 3' 48.71"E	27° 59' 32.90"S	Patchawarra	–
Vali-2	141° 4'29.35"E	27° 59' 42.50"S	Toolachee	Patchawarra
Vali-3	141° 3' 21.78"E	27° 59' 48.48"S	Toolachee	Patchawarra
Proposed				
Vail-4	141° 3' 56.1594"E	27° 59' 2.4"S	Patchawarra	–
Vali-5	141° 3' 18.36"E	27° 58' 52.32"S	Patchawarra	–

5.3 Part C – A Description of the Aquifer/s Affected or Likely to be Affected

Figure 5.1 summarises the stratigraphy of the Project area. The targets for gas production in PL1125 comprise the Toolachee and the Patchawarra Formations within the Cooper Basin. The surface geology of PL1125 is dominated by Quaternary sands and the total average thickness of the surface deposits is 850 m.

Figure 5.1 – Stratigraphy of the Eromanga Basin and Cooper Basin



Source: AGE, 2025

The Winton Formation is underlain by a series of sedimentary deposits which comprise the Eromanga Basin which represents the largest sub-basin within the Great Artesian Basin (GAB). The total sedimentary thickness of the Eromanga Basin at the site is approximately 1,050 metres. It comprises several stacked formations. The Hutton Sandstone is one of the major sandstone formations of the GAB and is present at the base of the Eromanga Basin in the Project area with a thickness averaging 105 metres. The base of the Eromanga Basin is approximately 2,000 metres below ground level (mbgl) at the Project area. A major unconformity at the base of the Eromanga Basin separates it from the underlying Cooper Basin.

The Eromanga Basin unconformably overlies the Cooper Basin. The Cooper Basin is a non-marine sedimentary pile and can be subdivided into three major geological groups:

- Triassic Nappamerri Group: which comprises the Tinchoo Formation (interbedded siltstone and sandstone, minor coal seams and intraclast conglomerate) and the Arraburry Formation (mudstone, siltstone and fine-grained sandstone). The total thickness of the Nappamerri Group is approximately 350 metres in the Project area.
- Permian Gilgealpa Group: which includes the two target formations for the Vali gas wells (i.e. the Toolachee and the Patchawarra Formations).
  - The Toolachee Formation comprises interbedded fine to coarse-grained sandstone, siltstone and carbonaceous shale. It is approximately 160 metres thick in the Project area (between 2,400 and 2,550 metres below ground level) and unconformably overlies the mudstones and siltstones of the Daralingie Formation.
  - The Daralingie Formation, The Roseneath Shale, Epsilon Formation and Murteree Shale overlie the Patchawarra Formation. The cumulative thickness of these deposits in the Project area is around 350 metres which predominantly comprises interbedded mudstone, siltstone and shale.
  - The Patchawarra Formation predominantly comprises interbedded sandstone, siltstone, shale and coal. It is approximately 310 metres thick at the three existing production wells. Depths are approximately between 2,800 and 3,110 metres below ground level.
  - The underlying Tirrawarra Sandstone predominantly comprises fine to coarse-grained sandstone interbedded with conglomerate and minor carbonaceous siltstone, shale and coal.
- Late Carboniferous Group: which includes the Merrimelia Formation, it is of glacial origin.

The main aquifers which may be targeted for water extraction by pastoralists or other users in the Project area include the following:

- Shallow Quaternary and Tertiary sediments.
- The Winton Formation.
- The Great Artesian Basin (GAB) aquifers of the Eromanga Basin which include: Mackunda Formation, Wallumbilla Formation, Cadna-Owie Formation, Hooray and Hutton Sandstones.

- Other Cooper Basin aquifers including: Toolachee Formation, Epsilon Formation, Patchawarra Formation and Tirrawarra Sandstone.

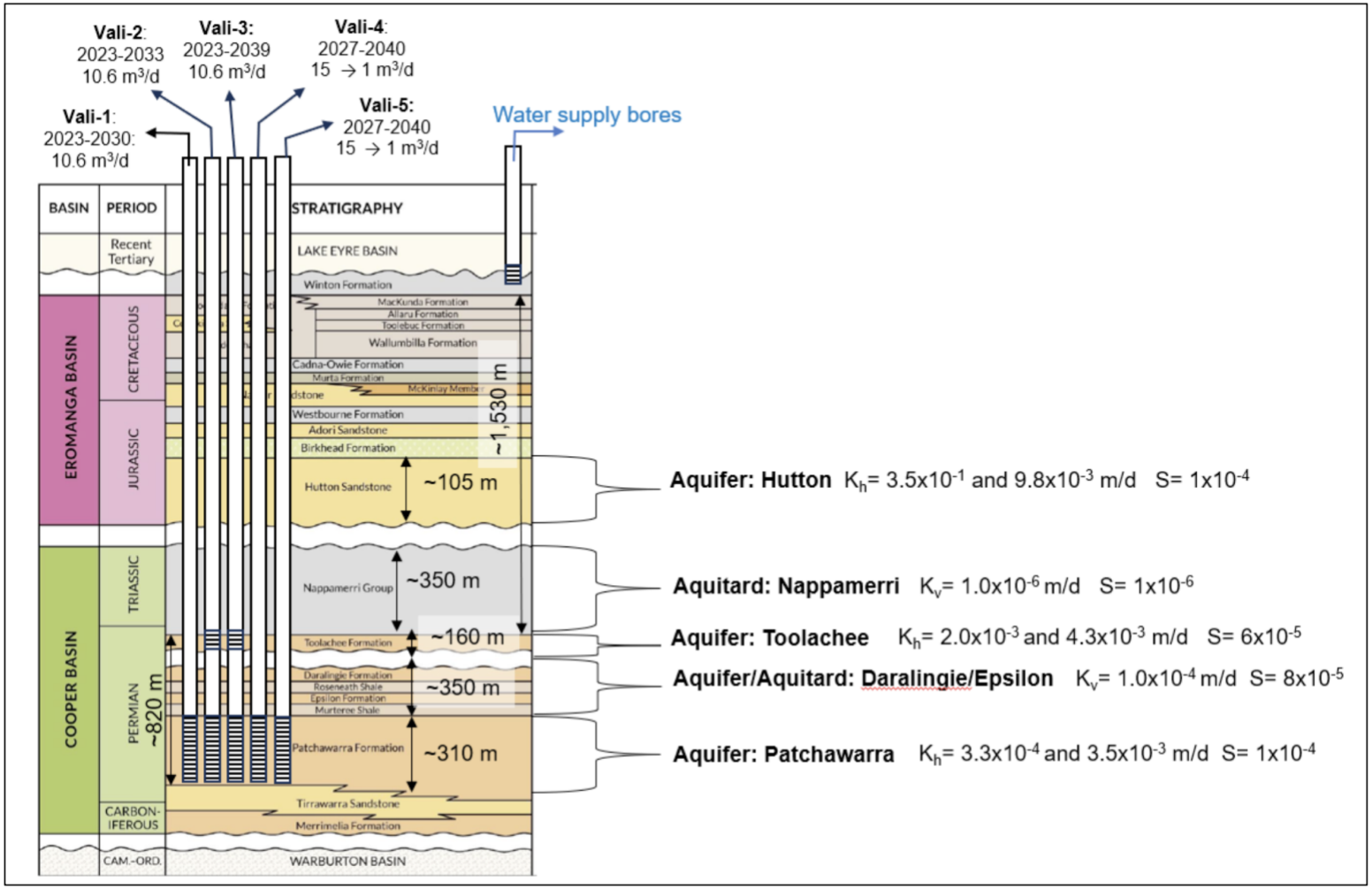
The potential impacts from water extraction from the Cooper Basin are unlikely to extend into the overlying Eromanga Basin. This is due to the geological discontinuity between the two basins (Cooper and Eromanga), the thickness (approximately 350 m) of the Nappamerri Group and the low permeability of the Tinchoo Formation, a known regional aquitard (Lech et al. 2020), which sits immediately below the base of the Eromanga Basin. Modelling considered the aquifers which could potentially be impacted by the Vali production wells and identified the following aquifers:

- Hutton Sandstone: typically, comprises fine to coarse-grained quartzose porous sandstones interbedded with minor finer-grained siltstones. It lies unconformably over the Cooper Basin. Thickness is approximately 105 metres (between 1,900 and 2,000 mbgl) and sits approximately 350 m above the Cooper Basin.
- Toolachee Formation: typically comprises porous sandstones interbedded with finer-grained siltstones, mudstones and shales with thin coal seams and some conglomerates. It unconformably overlies older formations across the whole Cooper Basin. Thickness is around 160 metres (between 2,380 and 2,540 mbgl in Vali-1).
- Epsilon Formation: predominantly siltstone with minor coal and sandstones. The thickness averages 50 metres.
- Patchawarra Formation: consisting of variable porous sandstone interbedded with siltstone, mudstone and shale with thin coal seams. The thickness is 310 m at the project area (between 2,805 and 3,115 mbgl at Vali-1).
- The Tirrawarra Sandstone: consisting of fine to coarse-grained and pebbly sandstone interbedded with conglomerate, minor carbonaceous siltstone, shale and coal. The Tirrawarra Sandstone is on approximately 80 metres.

5.4 Part D – An Analysis of the Movement of Underground Water to and From the Aquifer

Figure 5.2 presents a hydrogeological conceptual model of the Vali gas wells. Other local water supply bores in the Project area extend to less than 300 metres below ground level and are therefore thought to be extracting from the Winton or Glendower Formations. The Eromanga Basin unconformably overlies the Cooper Basin where the three active production bores, Vali-1, Vali-2 and Vali-3 are extracting water from between 2,380 and 3,110 m below ground level (i.e. more than 2,080 m below local groundwater extractions). Vali-1 is screened within the deepest formation, the Patchawarra Formation. The production well Vali-3 is currently screened within the Toolachee Formation and the Vali-2 extracts gas from both the Toolachee and Patchawarra Formations. In 2026, Vali-3 will be reconfigured to target the Patchawarra Formation, which will also be the target formation for the upcoming Vali-4 and Vali-5 wells. Adopted hydraulic conductivity and storativity values are based predominantly on values available for adjacent lease areas (Santos 2019; Beach Energy, 2020) which are shown in Figure 5.2.

Figure 5.2 – Hydrogeological Conceptual Model



Source: AGE, 2025

As would be expected given the depth of the target formations in the Project area, information on groundwater levels and flow directions in the Toolachee and Patchawarra formations and the Cooper Basin in general are somewhat limited. Groundwater movement even within coarse sandstone units present at such depths is likely to be limited by its reduced capacity to transmit water as permeability tends to decrease with increasing depth. Similarly, groundwater recharge through the overlying 2,400 m thick sedimentary pile which includes significant thicknesses of aquitard material is likely to be negligible. Toolachee and Patchawarra formations are saline and likely to be relatively old, when compared to waters from the overlying GAB aquifers in the Eromanga Basin. The implication here is that the recharge of the Cooper Basin aquifers may be considered minimal to none (Keppel at al., 2016). In general, groundwater flow, if it occurs at all given the expected low permeability, follows the sedimentary bedding, towards lower-lying areas. Evidence gathered from drill stem testing showed “over-pressuring” in the Toolachee, Daralingie and Patchawarra Formations (i.e., pressures which increase with depth and are above the hydrostatic pressure line), which suggests the existence of highly effective seals (i.e. aquitards) within the Nappamerri Group (Lech et al., 2020). Movement of groundwater into and out of the Cooper Basin formations via the overlying Eromanga Basin aquifers is therefore only likely to occur where a connected pathway through the Nappamerri group exists or is subsequently established. Hypothesized pathways include locations where the unit abuts basement highs which could, in combination with localised faulting, create preferential pathways for vertical fluid migration.

5.5 Part E – A Description of the Area of the Aquifer Where the Water Level is Predicted to Decline Because of the Exercise of Underground Water Rights

A model was constructed to predict impacts on groundwater due to the exercise of underground water rights. For detail of the models construction, assumptions and limitations, refer to Attachment E.

Table 5.2 presents the maximum drawdown, the immediately affected area (IAA) and long-term affected area (LTAA), with five-metre drawdown contours.

Table 5.2 – Predicted Maximum Drawdown (Initial Scenario)

Aquifer	Immediately Affected Area (Year 3)		Long-term Affected Area	
	Drawdown (m)	*5 m Drawdown Extent Radius (km)*	*Maximum Drawdown (m)*	*5 m Drawdown Extent Radius (km)*
Hutton	0.003	NA	0.02	NA
Toolachee	55	1.5	55	2.5
Patchawarra	153	1.5	183	3

The predicted IAA area, i.e. the area where more than 5 m of drawdown is predicted during the 2023 to 2026 UWIR reporting period for the Toolachee and the Patchawarra formations is presented in Figure 5.3. The maximum drawdown predicted in the Hutton Sandstone during this period is 3 millimetres and hence there is no IAA for this aquifer. No drawdown impacts are

therefore predicted on any units overlying the Hutton Sandstone. The maximum predicted drawdown is 183 m at Vali-4 within the Patchawarra Formation.

As shown in Figure 5.3 and Table 5.2 the predicted IAA for the Toolachee and the Patchawarra formations are very similar (since the Vali-2 bore is screened in both formations and hence provides a location connection between the two units) and extend around 3 km from the production wells Vali-1, Vali-2 and Vali-3.

The predicted LTAA area, i.e. the area where more than 5 m of drawdown is predicted at any time in the future for the Toolachee and the Patchawarra formations is presented in Figure 5.4. Maximum predicted drawdown in the Hutton Sandstone at the end of the production period is 0.02 m and hence there is no LTAA for this aquifer. No drawdown impacts are therefore predicted on any units overlying the Hutton Sandstone. The maximum predicted drawdown for the Vali field is 183 m within the Patchawarra Formation.

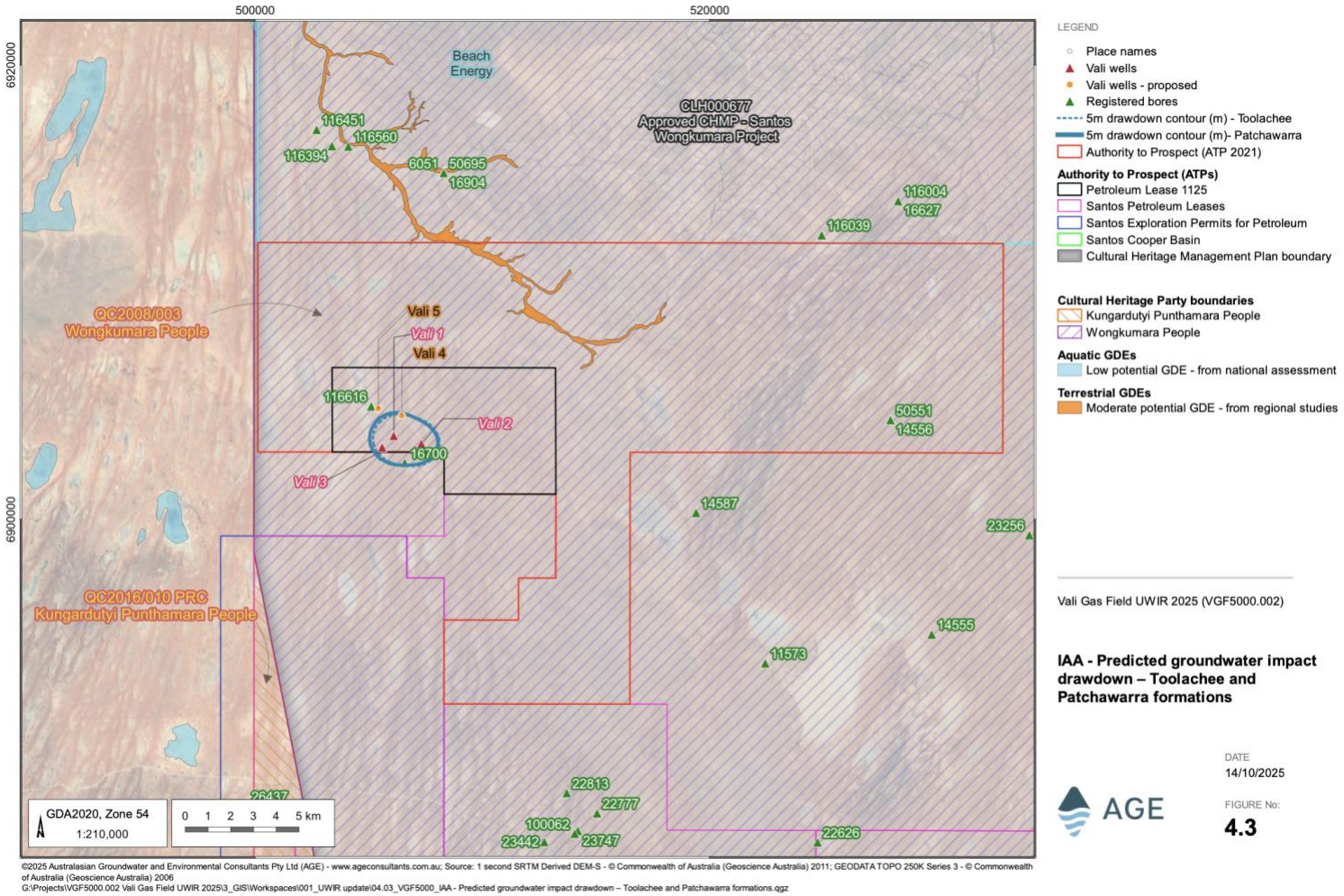
As shown in Figure 5.4 and Table 5.2 the predicted LTAA for the Toolachee and the Patchawarra formations is largely similar. This is primarily due to the Vali-2 production well being screened across both formations, providing a hydraulic connection between the two units. The LTAA extends approximately 8 kilometres from the production wells, Vali-1, Vali-2, Vali-3, Vali-4, and Vali-5.

However, the LTAA is slightly larger in the Patchawarra Formation compared to the Toolachee Formation. This difference is attributed to the planned cessation of water extraction from the Toolachee Formation and the expansion of production activities targeting the Patchawarra Formation.

5.6 Part F – The Predicted Quantities of Water to be Taken or Interfered with Because of the Exercise of Underground Water Rights

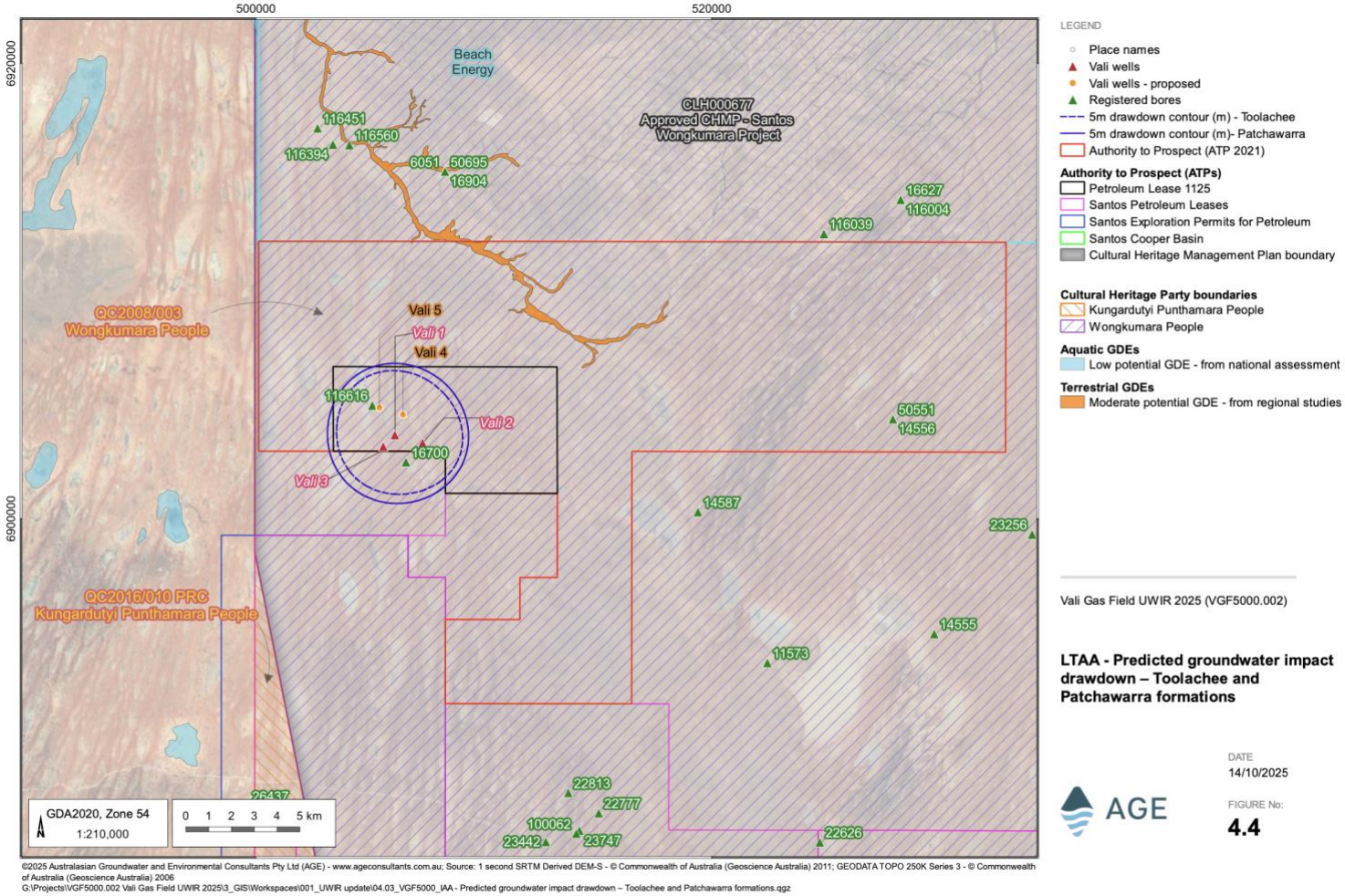
Commencing in the 2024/2025 reporting period, 11,600 kL of water is predicted to be produced in PL1125. This production rate is anticipated for two additional years, before the Vali-4 and Vali-5 wells come online and water production peaks at 20,717 kL. Total water extracted then reduces each year until it is only 467 kL in 2039/2040. For detailed water extraction predictions for each year, refer to Table 4.3 from Attachment E.

Figure 5.3 – The Immediately Affected Area of Predicted Groundwater Impact Drawdown for the Toolachee and Patchawarra Formations



Source: AGE, 2025

Figure 5.4 – The Long-term Affected Area of Predicted Groundwater Impact Drawdown for the Toolachee and Patchawarra Formations



Source: AGE, 2025

5.7 Part G – Information on Predicted Impacts to the Quality of Groundwater that will, or may, Happen Because of the Exercise of Underground Water Rights

Water samples taken from the Toolachee and Patchawarra units in the Project area are highly saline with electrical conductivity ranging between 10,000 and 19,000 µS/cm. This range is well above the upper limits for drinking, stock watering or irrigation. Change in underground water quality may occur through inter-aquifer flow where higher salinity water is leaking into a low salinity aquifer. However, these potential changes are not expected above the top of the Cooper Basin which is around 2000 m below ground and at least 350 m below the Great Artesian Basin.

No impacts on water quality, water levels and flows are anticipated on any surficial aquatic ecosystems.

5.8 Part H – Information on the Environmental Values that will, or may, be Affected by the Exercise of Underground Water Rights

There are no springs mapped within 15 km of the Project area. The nearest known GAB springs are located 100 km to the southwest in South Australia. The first mapped springs in Queensland are approximately 300 km to the east of PL1125.

There are 8 registered water bores within 15 km of the Vali production wells. Details of each are provided in Table 5.3. The majority of the bores are screened within the Winton Formation at depths up to 294 m below ground. This is at least 1,600 m above the top of the Hutton Sandstone and hence based on the model results of the UWIR, these registered bores are not expected to experience any Project related drawdown. Therefore, there are no expected changes in water quality in the registered bores outlined in Table 5.3 resulting from extraction of groundwater from the Vali production wells.

Table 5.3 – Queensland Registered Water Bores Within 15 km of Vali Wells

RN	Bore Name	Easting	Northing	Ground elevation (mAHD)	Year Drilled	Formation	Top Screen (mbgl)	Bottom Screen (mbgl)	Bore Depth (mbgl)
14556	Watties bore	527944	6904365	80.5	1960	Glendower Formation or Winton Formation	NA	81.1	NA
16700	Christmas Yard bore	506583	6902489	96.3	1966	Winton Formation	125	154.2	NA
50551	Watties No 2	527944	6904365	NA	1980	Winton Formation	NA	81.1	NA
116616	Kudnari	505108	6904981	NA	2023	Winton Formation	145.9	148.2	150.2
116394	NA	503380	6916450	NA	2013	–	NA	76	77
116560	Anakin bore	504101	6916428	NA	2013	Winton Formation?	260	272	294

RN	Bore Name	Easting	Northing	Ground elevation (mAHD)	Year Drilled	Formation	Top Screen (mbgl)	Bottom Screen (mbgl)	Bore Depth (mbgl)
50695	NA	508297	6915261	122	1990	Winton Formation	NA	NA	125
14587	Roundhill bore	519404	6900298	76.5	1961	Winton Formation	NA	168.6	168.6

Source: AGE, 2025

No GDEs have been identified within PL1125 according to the GDE Atlas (Bureau of Meteorology online tool). The only GDE present within PL1125 is a vegetation community classified as RE 5.3.22, belonging to the ephemeral wetland group. Additionally, a moderate potential terrestrial GDE has been identified by the Bureau of Meteorology (BOM) along the ephemeral Sandy Creek to the north of the Project area. Any groundwater flow to GDE's in this area will be provided by aquifers at or close to the ground surface. Therefore, potentially significant drawdown impacts of more than 0.2 m drawdown are not expected to extend beyond the top of the Cooper Basin at more than 2,000 m below ground. No qualitative and quantitative impacts of this or any other terrestrial GDEs present in the area are therefore predicted as a result of previous or proposed groundwater extraction activities associated with the Project.

Several lacustrine and palustrine intermittent wetlands are present within the project area, with claypans adjacent to the well sites. As no groundwater level impacts are expected above the top of the Cooper Basin which is around 2000 m below ground, no impacts on quality, water levels and flows are anticipated on any surficial aquatic ecosystems.

The three production wells are within the traditional lands of the Wongkumara People. There are no known mound springs or other similar features within 300 km of the Project area and subsequently no predicted impacts on any water dependent cultural or spiritual features. There is no known use of groundwater for aquaculture purposes within 15 km of the Project area. There are also no known primary or secondary recreational waters within the same area.

5.9 Part I – Information on strategies for avoiding, mitigating or managing the predicted impacts on environmental values or predicted impacts on the quality of groundwater

Strategies for avoiding, mitigating or managing the predicted impacts on the environmental values or predicted impacts on the quality of groundwater could include:

- Case and cement well, to prevent contamination.
- Plug each hydrocarbon formation, groundwater aquifer intersected and well at the surface, with cement plugs.
- Monitor well fluid pressures and take remedial action immediately in the event of pressure decreases.

- Construct bunds around fuel and oil storage facilities according to Australian Standard (AS) 1940-2004.
- Store produced water on site, in ponds, until completion of project activities when any remaining water will be transported offsite for appropriate disposal.
- Residual drilling material will be placed into sumps for the duration of drilling activities, and buried once water has evaporated.
- Earthen embankment storage (e.g., turkey nest) will be used for water storage.
- Manage sewage effluent and/or grey water in accordance with conditions of environmental authority.
- Monitor sumps for overflow during periods of high rainfall.
- Store all dangerous goods and hazardous substances in accordance with manufacturers recommendations and workplace health and safety requirements.
- Volume of chemicals stored onsite will not exceed those listed under Schedule 2 (Part 2 Section 8) of the *Environmental Protection Regulation 2008*.
- Display Safety Data Sheets (SDS) for all chemicals present onsite.
- Minimise fuel transfer where possible, and use drip trays at all times.
- Drilling fluids will not be oil-based or synthetic oil-based.
- Store spill response kits at all locations where hazardous materials are handled or stored.
- Undertake induction and training sessions for all site personnel, to ensure an understanding of SDS application and spill prevention/response.
- Perform all activities in accordance with applicable industry and regulatory standards.
- Assess well bore integrity prior to commencing drilling, and rectify any issues immediately.
- Develop an Emergency Response Plan, which includes procedures for response to well issues (e.g. blow out).
- Undertake induction and training sessions for all site personnel, to ensure an understanding of emergency response procedures.
- Transport hazardous waste through an approved operator and dispose of at a licenced facility.
- Track all waste to ensure the correct volumes are delivered and received at waste disposal facility.
- Keep extracted volumes of groundwater to a minimum.
- Monitor and record all extraction volumes of groundwater.

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Attachment A:
Vali Field PL 1125 Ecological Assessment Report

Vintage Energy: Vali Field (PL 1125) Ecological Assessment Report

November 2025



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Citation

Smith, G. B. 2025. Vintage Energy Vali Field (PL 1125) Ecological Assessment, Report to ERIAS, GBS Consulting, Adelaide.

Executive Summary

Vintage Energy is seeking to begin gas production from its Vali gas field within the Cooper Basin, in the Shire of Bulloo in Queensland. Vintage Energy and their joint venture (JV) partners are seeking to partially convert the existing Authority to Prospect (ATP) 2021(environmental authority BRPG005)) into a Petroleum Lease (PL) 1125 (Vali Gas Field) in the Cooper Basin for conventional gas production.

ERIAS, on behalf of Vintage Energy, has prepared an Environmental Authority (EA) application for the Vali Field and submitted this to the Queensland Department of Environment, Science and Innovation (DESI). This EA application is the first step in procuring a Petroleum Lease for the Vali field (PL 1125) which has an area of 4542.41 ha. DESI has provided feedback on the EA application with several key issues relating to the ecological assessment to be resolved prior to a re-submission of the application including ecological. GBS Consulting was engaged to undertake a desktop assessment followed by a field survey of PL 1125 of groundwater dependant ecosystems, surface water values and protected flora and fauna followed by a significant residual impact (SRI) assessment for PEM listed within Schedule 2 of the Environmental Offsets Regulation 2014 to contribute to a re-submission of the EA application.

The Vali gas field infrastructure that has already been constructed includes the Vali-1, Vali-2 and Vali- 3 wells and associated flowlines and infrastructure which is the disturbance footprint assessed within this report. It is proposed to construct two more wells, Vali 4 and Vali 5 and associated infrastructure. The area of the disturbance footprint for all elements of the project including infrastructure constructed and that which is proposed is 41.99 hectares.

PL 1125 consists of 100 % remnant vegetation (DESI 2024c) and contains six regional ecosystems (RE) which are mapped within the Queensland Globe website and were ground-truthed during the field survey. The are as follows:

- 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes;
- 5.6.4 *Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia* spp. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes;
- 5.6.5 Variable sparse to open-herbland or *Triodia basedowii* hummock grassland on dune flanks, crests and sandy interdunes;
- 5.6.8 *Zygochloa paradoxa* and/or *Crotalaria eremaea* +/- *Triodia basedowii* open tussock grassland and herbland on mobile crests and slopes of sand dunes;
- 5.9.3 *Astrebla* spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments; and
- 5.9.4 *Aristida contorta* sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover.

Desktop survey results relevant to the presence of wetlands and groundwater

dependant ecosystems within PL 1125 included the following; eight Lacustrine wetlands, no palustrine wetlands, no named waterways but some minor drainage lines, potential for riverine wetlands of low significance in 3,399.59 ha (74.84%) and very high in 1,142.83 ha (25.16%), non-riverine wetlands of medium significance in 652.71 ha (14.37%) and no springs present within PL 1125. The areas designated as very high significance for riverine wetlands is based on the potential presence of '*Permanent water holes' that 'never go dry over 100+ year timeframes and are critically important as refugia for aquatic species in arid landscapes* (DESI 2024a). No permanent waterholes or substantial drainage lines which would support them were observed during the field survey and none are identified for PL 1125 in any of the desktop sources reviewed. One vegetation community (RE 5.3.22) was identified as a groundwater dependant ecosystem within a wetland and this is identified as a regulated vegetation community.

The EPBC protected matters searches (PMS) did not identify any threatened ecological communities (TECs) listed under the EPBC Act 1999 as potentially present within the desktop survey 50 km buffer zone or within a 100 km buffer zone (DCCEEW 2024); Appendix 1 and Appendix 2). The PMS results for PL 1125 with a 50 km buffer identified three listed flora species and 13 EPBC listed fauna species (11 bird and two mammals) which are considered threatened (DCCEEW 2024a). Of these two bird species are listed as Critically Endangered (CR); three bird species and one plant species are listed as Endangered (E), and the remaining 11 species are listed as Vulnerable (V) (Appendix 1). An additional five species of birds listed as Migratory under the EPBC Act were also identified in the results (Appendix 1). When the buffer radius from PL 1125 was extended from 50 km to 100 km an additional six species, two birds, two mammals and two plants were included in the results (Appendix 2).

A total of 131 flora species were recorded within PL 1125 during the field survey. The only introduced species recorded was *Citrullus amarus* (Paddy Melon) which was recorded at a number of locations, primarily in dunes. No flora species listed under the EPBC Act or state legislation were recorded during the survey. A total of 38 species of birds were recorded during the field survey none of which are listed species. A number are boom and bust species, such as Budgerigar, Flock Bronzewing, and Little Buttonquail were common during the survey which reflects the good environmental conditions at the time.

The Significant Residual Impact Assessment identified the following residual impacts:

- The disturbance footprint results in a residual impact to 8.69 ha of RE 5.3.22 which lies within mapped wetlands but is not endangered or of concern. This is identified as a significant residual impact to RE 5.3.22 under Section 2.1 of the Significant Residual Impact Guideline due to Criteria 1 and Criteria 2 of being exceeded.
- A residual loss of 8.69 ha of habitat for EPBC Endangered species Curlew Sandpiper, Common Greenshank and Australian Painted Snipe is identified. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the risk of an impact from project disturbance is considered to be low and the potential

impact is not considered to be significant with no long-term effect on individuals or populations.

- A residual loss of 8.69 ha of potential habitat (RE 5.3.22) for the EPBC Vulnerable Sharp-tailed Sandpiper is identified. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact with no long-term effect on individuals or populations.
- A residual loss of 21.78 hectares of potential habitat (8.69 ha of RE 5.3.22 and 13.09 ha of RE 5.9.3 / 5.9.4) for the EPBC Vulnerable Blue-winged Parrot is identified. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact with no long-term effect on individuals or populations.
- A residual loss of 11.41 ha of potential habitat (RE 5.6.4) for the EPBC: Vulnerable Southern Whiteface that could result in a localised impact to the species. The likelihood of an impact to Southern Whiteface is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the impact was not significant as the impact is unlikely to:
    - lead to a long-term decrease in the size of a local population,
    - reduce the extent of occurrence of the species; or
    - fragment an existing population.

  Using the DCCEEW risk assessment framework for threatened species within national recovery plans the risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.
- A residual loss of habitat (8.80 ha of RE 5.6.5 / RE 5.6.8 combined) for the EPBC Vulnerable Dusky Hopping-mouse. The likelihood of an impact to Dusky Hopping-mouse is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals are adversely affected but no effect at population level'. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the impact was not significant as the impact is unlikely to:
    - lead to a long-term decrease in the size of a local population,
    - reduce the extent of occurrence of the species; or
    - fragment an existing population.

  Using the DCCEEW risk assessment framework for threatened species within national recovery plans the risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

- A residual loss of 8.69 ha of habitat (RE 5.3.22) for four EPBC Migratory species; Common Sandpiper, Pectoral Sandpiper, Marsh Sandpiper and Red-necked Stint. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact.

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1. Introduction

1.1. Background

Vintage Energy Limited (Vintage Energy), and its joint venture (JV) partners Metgasco Limited (Metgasco) and Bridgeport (Cooper Basin), are the joint licence holders of Authority to Prospect (ATP) 2021 within the Cooper Basin, in the Shire of Bulloo in Queensland, in which the Vali gas field is located. Currently Environmental Authority BRPG005 authorises Non-Scheduled Petroleum Activity - Authority to Prospect (ATP) on ATP2021 (located on Lot plan 450SP274333). Vintage Energy and their joint venture (JV) partners are seeking to partially convert the existing Authority to Prospect (ATP) 2021 into a Petroleum Lease (PL) 1125 (Vali Gas Field) in the Cooper Basin for conventional gas production. PL 1125 is 4542.41 ha and currently includes the Vali-1, Vali-2 and Vali- 3 wells and associated flowlines (authorised under ATP 2021 and Vali pipeline and Vali processing facility, permitted under Pipeline Licence (PPL) 2070 (environmental authority P-EA-100271494) (Table 1). All this infrastructure has already been constructed. Two additional wells, Vali 4 and Vali 5 are proposed to be constructed along with tracks and other associated infrastructure (Table 1).

Table 1. Infrastructure elements for the Vali Field project, status of the disturbance and disturbance areas for each.

Infrastructure Element	Disturbance status	Area (ha)
Vali-3 pad	Existing	5.63
Vali-1 pad	Existing	7.16
Vali-2 pad	Existing	2.68
Flowline (Vali-1 pad to Odin border)	Existing	10.04
Access track (at Vali-2)	Existing	0.29
Pipeline corridor from Vali-2 to Vali-1	Existing	2.58
Pipeline corridor from Vali-3 to Vali-1	Existing	0.72
Vali-2 borrow pit	Existing	1.22
Access track (from existing road to Vali-2 pad)	Existing	1.98
Vali-2 access track	Existing	0.23
Vali-3 access track	Existing	0.49
Kudnari bore	Existing	0.60
Vali-4 pad	Proposed	3.11
Vali-5 pad	Proposed	3.11
Vali-4 access track from Vali-1	Proposed	1.79
Vali-5 access track	Proposed	0.36
Total		**41.99**

In order to procure a Petroleum Lease for the Vali field (PL 1125) ERIAS, on behalf of Vintage Energy, prepared an Environmental Authority (EA) application for the Vali Field and submitted this to the Queensland Department of Environment, Science and Innovation (DESI). Several key issues in the application were identified by the DESI in

their feedback to the EA application including issues relating to ecological description on PL 1125 and impact assessment. The identified issues are as follows:

- Section 125(1)(l)(A) of the EP Act requires the application material to provide a description of the environmental values likely to be affected by each relevant activity;
- The application provides general information about waterways present within the Cooper Creek Basin, however, does not provide site-specific information on the watercourses within PL 1125, nor their associated surface water environmental values and water quality objectives as per section 9 of the EP Act and the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.
- The application states that there are no groundwater dependant ecosystems (GDE) present within ATP2021. However, Queensland Globe mapping indicates PL 1125 to have 81-100% Derived GDE - moderate confidence. It is not clear in the application material whether there was any ground-truthing undertaken to confirm there are no GDE values on the tenure.
- The application does not seem to identify a number of environmental values for protected flora and fauna species. The application states, "No federal or state listed flora and fauna species were recorded on site during the ecological field surveys, and an assessment of potential impacts to Environment Protection and Biodiversity Conservation Act 1999 (EPBC)-listed species determined no referral under the EPBC Act is required for the Project." Protected wildlife habitat may not be mapped directly over the project area and requires ground-truthing to determine its presence. However, neither the referenced ecological field survey report nor assessment of EPBC species was provided.

These and other issues are required by DESI to be addressed prior to a re-submission of the application. The tasks required to address the identified issues include a desktop assessment to be completed prior to a site survey being conducted.

1.2. Objectives of this study

This report addresses the requirements identified in the PL 1125 EA application feedback from DESI. The specific objectives of the desktop assessment are to:

- Complete a desktop investigation on the presence or absence of Groundwater dependent ecosystems (GDEs) within PL 1125 and provide a clear explanation of the methodology utilised.
- Complete a comprehensive desktop assessment for the tenure area with a buffer distance from the tenure set to 100 km which includes the Atlas of Living Australia, the Birdlife Atlas, Wildnet, Species Profile and Threats (SPRAT) databases and associated Recovery Plans.
- The Vegetation management regional ecosystem map data under the

Vegetation Management Act 1999.

- The Queensland Wetland Data mapping.
- Watercourse and drainage features mapping in QGlobe.
- The DESI threatened species search tool.
- An EPBC Act Protected Matters Searches for PL 1125with a 50 km buffer and a 100 km buffer.
- Provide results of the desktop study, including a discussion on the likely presence or absence of each protected matter/species identified in the search.
- Undertake ground truthing to confirm the desktop investigation results for vegetation communities and GDEs in PL 1125.
- Documentation of any temporary or permanent waterbodies or watercourses found within the PL 1125 tenure.
- Undertake infield searches for listed species identified in the desktop study.

1.3. Location and Site Description

The Vali field is located within the Cooper-Eromanga Basin in southwest Queensland approximately 1,100 km west of Brisbane, Queensland and approximately 80 km east of the Moomba gas processing facility operated by Santos in South Australia. The nearest population centre is the Innamincka township, approximately 35 km west of the Vali Field in South Australia, which has a population of 44 (ABS, 2020). The closest Queensland town is Thargomindah, which has a population of 270 people (ABS, 2020) and is located approximately 250 km east of the site.

The Vali Field sits within PL 1125 (Figure 1) located within the Channel Country biogeographic region on Crown Land under a rolling term Pastoral Holding lease (Lot plan 450SP274333) on native pastures currently operated for cattle grazing by the Nappamerry (or Nappa Merrie) and Orientos cattle stations. Access to the site is from the Moomba Road and off-road dirt tracks. The Cooper-Eromanga Basin is Australia's largest onshore oil and gas exploration and production area. As such, the existing commercial interest in the land to date is largely related to oil and gas operations, with numerous explorations and producing wells and facilities existing in the area. Recreation and tourism in the area is predominantly focussed on the natural and cultural values of the Innamincka area across the border in South Australia, including the Burke and Wills Dig Tree, the Malkumba- Coongie Lakes National Park, the Cooper Creek and the Innamincka Regional Reserve.

The survey area has limited topographical relief and is dominated by undulating plains dissected by low sand dunes and shallow ephemeral wetlands. The area has been used for pastoral activities for more than 100 years.

1.4. Climate and Rainfall

The Moomba Airport weather station is approximately 80 km west and is the closest to the survey area as Innamincka does not have a weather station. It has weather records for the previous 28 years. Moomba has an annual mean rainfall of 173.9 mm with the highest mean monthly rainfall occurring in February. Rainfall is however highly erratic and strongly influenced by heavy episodic rainfall events storm and extensive periods of little to no rainfall. Moomba experiences a mean maximum temperature of 38.9 °C in January, with overnight mean minimum temperatures of 24.9 °C. July is the coolest month with a mean maximum and minimum temperatures with 19.8 °C and 6.4 °C respectively.

1.5. Bioregions

PL 1125 is located in the Channel Country IBRA Bioregion and Simpson - Strzelecki Dunefields and Sturt Stony Desert subregions. The Channel Country Bioregion is characterised by vast braided, flood and alluvial plains surrounded by gravel or gibber plains, dunefields and low ranges. The Simpson - Strzelecki Dunefields Bioregion is characterised by dunes with variable interdune corridors and plains; clay pans and ephemeral drainage lines. Sturt Stony Desert subregions is characterised by stoney gibber plains

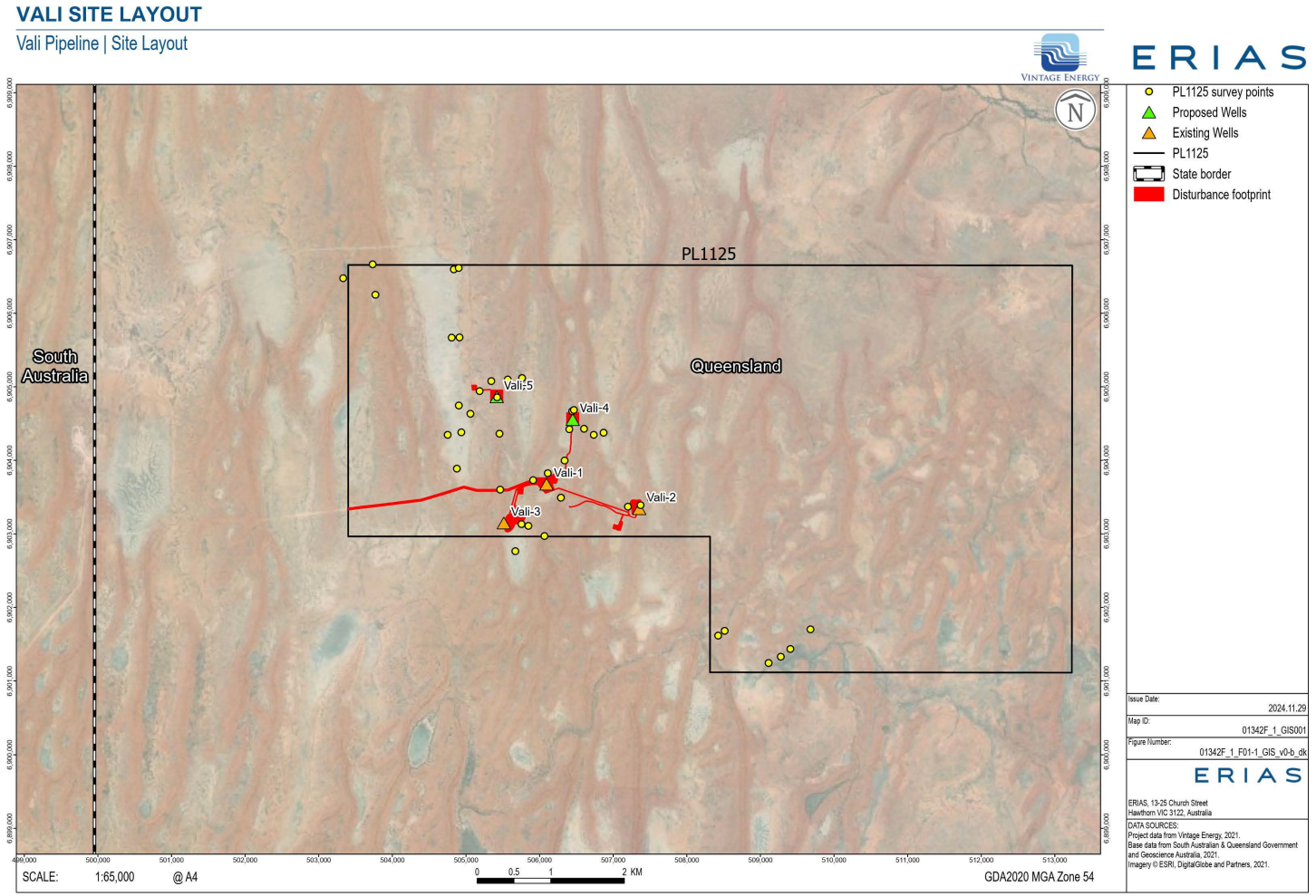


Figure 1 – Location of the survey area

2. Methodology

2.1. Desktop Assessment

The desktop assessment was conducted using the following sources:

- Queensland Government, Department of Environment, Science and Innovation, Environmental Reports accessed online PL 1125 (17 June 2024) for PL 1125 at https://www.qld.gov.au/environment/management/environmental/environmental-reports-online:
  - Matters of State Environmental Significance Report (Appendix 1);
  - Biodiversity and Conservation Values, Biodiversity Planning Assessments and Aquatic Conservation Assessments Report (Appendix 2);
  - Regional Ecosystems Report (Appendix 3);
  - WildNet Species Records Report (Appendix 4);
  - WildNet Conservation Significant Species Report (Appendix 5).
- Environmental Protection and Biodiversity Act (EPBC) Protected Matters Search Tool (PMST) for potentially occurring EPBC listed species and Threatened Ecological Communities (TECs) occurring within the survey area and a 50 km (Appendix 6) and a 100 km buffer (Appendix 7).
- QGlobe web-based Tool.
- Atlas of Living Australia (ALA) Area Records Report for PL 1125 (Appendix 8).
- Atlas of Living Australia (ALA) Area records for the survey area with a 50 km buffer and a 100 km buffer which include Birdlife Australia records, Queensland WildNet records and records from many other sources (provided under separate cover).

2.1.1. Biodiversity Planning Assessment

The Queensland Department of Environment, Science and Innovation (DESI) uses Biodiversity Planning Assessments (BPAs) to attribute biodiversity significance on a bioregional scale (DESI 2024a). A BPA involves the integration of ecological criteria using the Biodiversity Assessment and Mapping Methodology (BAMM) and is developed using: 1) diagnostic criteria, and 2) expert panel criteria. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion (DESI 2024a).

The BAMM methodology identifying areas with various levels of biodiversity significance such as threatened ecosystems or taxa, large tracts of habitat in good

condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat which are important for the maintenance of biodiversity or ecological processes. Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

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

2.1.2. Surface Water Value

Conservation values for wetlands are determined in Queensland using DESI's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM). It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area (DESI 2024a).

The AquaBAMM, assesses eight criteria to derive an overall conservation value of a wetland. The criteria have a variable number of indicators and measures and may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature (similar to the Biodiversity Assessment and Mapping Methodology). These are, are:1

- Criteria 1: Naturalness (aquatic),
- Criteria 2: Naturalness (catchment),
- Criteria 3: Diversity and richness,
- Criteria 4: Threatened species and ecosystems,
- Criteria 5: Priority species and ecosystems,
- Criteria 6: Special features,
- Criteria 7: Connectivity and
- Criteria 8: Representativeness.

The criteria are described in Appendix 2.

Results of this assessment can be accessed by generating a *Biodiversity and Conservation Values: Biodiversity Planning Assessments and Aquatic Conservation*

Assessments report via the Online Environmental Reports web page (https://www.qld.gov.au/environment/management/environmental/environmental-reports-online).

Wetlands are categorised as either Riverine Wetlands (including fringing riverine wetlands) or Non-riverine Wetlands. Riverine wetlands are defined as 'all wetlands and deepwater habitats within an open non-vegetated channel' which are 'naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water' (DESI 2024a). Non-riverine Wetlands include both lacustrine and palustrine wetlands. Lacustrine wetlands are lakes which are typically larger than 8 hectares situated in a topographic depression or damned river channel and lack vegetation cover. Palustrine wetlands are generally non-tidal swamps and marshes which are dominated by vegetation (greater than 30 % cover) or if lacking vegetation they are smaller than 8 hectares.

When applied to riverine wetlands AquaBAMM uses a discrete spatial unit termed a subsection. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. In an Aquatic Conservation Assessment (ACA), an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such (DESI 2024a).

2.1.3. Vegetation assessment

The desktop assessment was conducted by generating and reviewing the reports listed in 2.1 above and producing vegetation maps in QGlobe.

In Queensland, vegetation has been mapped across the state by the Queensland Herbarium using broad vegetation groups (BVGs) and regional ecosystems (vegetation communities) which communicate higher-level ecological groupings (DESI 2024c). Broad vegetation groups are the first aggregation in the hierarchical classification and are determined on the basis of vegetation structure (cover, height and growth form) of the ecologically dominant layer. BVGs are ordered broadly to reflect the vegetation structure along a mesic gradient from wet closed forests (rainforests) of the coast and northeast to the arid spinifex hummock grasslands of the south west of Queensland but may also consider other factors such as water salinity and landscape situation (Neldner et al 2023).

Regional ecosystems (RE) are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (DESI 2024c). Hierarchically, regional ecosystems sit within broad vegetation groups. Regional ecosystem descriptions are contained in the Regional Ecosystem Description Database (REDD) at (https://www.qld.gov.au/environment/management/environmental/environmental-reports-online) and have been mapped by the Queensland Herbarium. The classification system uses floristic, structural functional, biogeographic and landscape attributes to determine broad vegetation groups (DESI 2024c). Descriptions are

compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data.

Vegetation communities present within PL 1125 were identified from the Regional Ecosystems; Biodiversity Status report via the DESI Online Environmental Reports web page. These included vegetation associations associated with wetlands as well as non-wetland communities.

2.1.4. Groundwater dependant ecosystems

The Groundwater Dependant Ecosystems: EIS information guideline (DESI 2024e) identified three types of GDEs as follows:

- Aquifer and cave ecosystems;
- Ecosystems dependent on the surface expression of groundwater; and
- Ecosystems dependent on the subsurface presence of groundwater.

Aquifer and cave ecosystems include subterranean wetlands such as karst aquifer systems, fractured rock, or saturated sedimentary rock that may host stygofauna, troglofauna or other biota (Table 2).

Ecosystems dependent on the surface expression of groundwater include typical wetland systems such as wetlands, lakes, seeps, springs, mound springs, river baseflow, coastal areas and estuaries and marine ecosystems where pressure brings groundwater above the surface of rocks, soils or sediments (Table 2). Palustrine, lacustrine and riverine water bodies are included in this category.

Ecosystems dependent on the subsurface presence of groundwater where groundwater is not visible on the surface but the water table is permanently or episodically within the root zone of plants (Table 2). These include some regional ecosystems and riverine wetland systems.

Table 2. Types and subtypes of GDEs

Type	**Subtype**
Aquifer and cave ecosystems	Wetland system (subterranean wetland–aquifer)
	Wetland system (subterranean wetland–cave)
Ecosystems dependent on the surface expression of groundwater	Wetland system (lacustrine)
	Wetland system (palustrine)
	Wetland system (riverine waterbody)
	Wetland system (estuarine)
	Wetland system (near-shore marine)
Ecosystems dependent on the subsurface presence of groundwater	Regional ecosystem
	Wetland system (riverine regional ecosystem)

A desktop assessment to obtain information about potential GDEs in the impact area was undertaken using the following sources:

- Aquatic conservation assessments (ACA) and AquaBAMM
- Biodiversity planning assessments
- National groundwater dependent ecosystems atlas
- Queensland groundwater dependent ecosystem mapping
- Queensland springs database
- Regional ecosystem mapping
- WetlandMaps.

GDEs identified within the PL 1125 were designated as one of the subtypes listed in Table 2 above and the regional ecosystem was identified as described in the regional ecosystem description database (DESI 2024). The GDE's attributes and environmental values were described as far as possible from information available in sources used. The habitat value of each GDE for wildlife and threatened or listed wildlife was identified. GDEs are also assessed to determine whether they are matters of state environmental significance and/or matters of national environmental significance.

2.1.5. Protected flora and fauna species

The desktop assessment of listed species used relevant data obtained from the sources listed in 2.1 above.

The collated desktop information was used to conduct an assessment of the 'likelihood of occurrence' within PL 1125 for protected flora, fauna and ecological communities. The criteria used to define 'likelihood of occurrence' are outlined in Table 3. Some ecological notes are provided for species listed as Highly Likely/Known or Likely to occur.

An assessment of the likelihood of occurrence within PL 1125 of flora and fauna species listed as threatened under the *EPBC Act 1999* and the *Queensland NC Act 1992*, migratory fauna species and Threatened Ecological Communities (TECs).

Table 3. Criteria Used to Define Likelihood of Occurrence in PL 1125.

Likelihood of Occurrence	Criteria
Highly Likely/Known	Recorded in the last 10 years, the preferred habitat is present and falls within the known range of the species distribution and/or the species was recorded as part of field surveys.
Likely	Recorded within the desktop study area (with a 50km buffer) within the last 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Records that are 20 – 50 years old for the desktop study area (with a 100 km buffer), the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species.
Unlikely	Either no records or records that are older than 50 years within the study area (with a 100 km buffer); the area provides no or very limited preferred habitat or feeding resources.

2.2. Field Survey

The field survey was composed of the following elements:

- Undertake infield searches for listed species and protected matters including assessment of potential habitats for relevant listed species (as determined by the desktop assessment).
- Documentation of any temporary or permanent waterbodies or watercourses found within the PL 1125 tenure, and
- Ground truth vegetation communities mapped for PL 1125.

The ecological assessment consists of:

- Targeted searches for species listed under the EPBC Act 1999 and NC Act 1992 identified as Highly Likely or Likely to occur in PL 1125 by the desktop assessment.
- Documentation of habitats for target listed species where present.
- Vegetation rapid assessment surveys.
- Structured bird surveys.
- Opportunistic recording all fauna species observed.

These methods are described further below.

2.2.1. Flora

Flora was surveyed using a rapid assessment approach which:

- identified dominant species,
- compiled a list of plants within an approximate area of 30 x 30 m,
- searched for the presence of listed species, and
- determined the regional ecosystem at the survey location.

Plant species were identified in the field wherever possible. Where plants could not be identified, detailed photographs were taken for identification at a later stage where necessary. Location details were recorded and GPS points logged at each site. Opportunistic fauna observations were also recorded.

2.2.2. Fauna surveys and opportunistic observations

Fauna surveys were undertaken adjacent to Vali field infrastructure and throughout accessible areas of PL 1125 to cover the range of regional ecosystems present (Figure 1). This included ecologically significant areas observed such as areas identified in the desktop survey as potentially having high fauna diversity (for example RE 5.6.4, DESI 2024b) as well as surface water bodies and ecotones where two regional ecosystems meet. Surveys consisted of observational surveys that systematically searched the target area for fauna. The time the survey commenced was recorded and each species was recorded as either heard or with the number seen. Opportunistic observations were also recorded with the species, number and location (eastings and northings) noted.

2.2.3. Target searches for listed species

The desktop assessment identified a range of listed species including EPBC Act 1999 and NC Act 1992 threatened and migratory fauna and flora as highly likely/Known or Likely to occur in the PL 1125. Targeted searches for these species were conducted in PL 1125 within appropriate habitats identified in the desktop assessment. Observations of target species were recorded including the number observed and location. Preferred habitats for these species were also recorded when observed.

2.3. Significant residual impact (SRI) assessment

Feedback provided by DESI on the EA Application included the following requirement: *'Using the Queensland Environmental Offsets Policy Significant Residual Impact Guideline, undertake a significant residual impact (SRI) assessment for Prescribed Environmental Matters (PEMs) listed within Schedule 2 of the Environmental Offsets Regulation 2014, including, but not limited to:*

- *Matters of State Environmental Significance (MSES) Protected Wildlife habitat for species identified as 'confirmed, likely or possible'.*
- *'Connectivity Area' MSES trigger, by providing the results from the*

Environmental Offset Landscape Connectivity Assessment Tool.

- *MSES - Regulated vegetation within the defined distance of the defining banks of a watercourse. Information should address how this area was calculated in relation to defined distance of a watercourse.*
- *MSES - Regulated vegetation within the defined distance of the defining banks of a drainage line (drainage line mapped under the Water Act 2000).'*

A significant residual impact is described as: *'an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:*

a) remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site avoidance and mitigation measures for the prescribed activity; and

b) is, or will or is likely to be, significant.' (DEHP 2014).

A significant residual impact (SRI) assessment was conducted in accordance with the Queensland Environmental Offsets Policy: Significant Residual Impact Guideline (2014) with consideration of Prescribed Environmental Matters (PEMs) identified above as well as other Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) identified in the Environmental Offsets Regulation as considered in the SRI process. The SRI Guideline provides guidance and criteria for assessment of the following:

- Regulated vegetation,
- Connectivity areas,
- Wetlands and Watercourses,
- Protected wildlife habitat for endangered and vulnerable wildlife (including essential habitat),
- Koala habitat in South East Queensland, and
- Protected areas.

The Prescribed Environmental Matters (PEMs) are provided in the identified in the *Streamlined model conditions for petroleum activities* under Biodiversity Condition 10, Table 2. Thes largely overlap with the categories contained within the SRI Guidelines but with some additions.

The project disturbance footprint used for the SRI assessment is cumulative and includes areas already disturbed and areas proposed to be disturbed. The total cumulative disturbance footprint is provided as a whole and is also broken down into the Regional Ecosystems present within the disturbance area.

Matters of National Environmental Significance include the following as defined by relevant sections of the EPBC Act 1999:

- a declared World Heritage property;
- a National Heritage place;
- a declared Ramsar wetland;

- a threatened species;
- a threatened ecological community;
- a migratory species;
- a Commonwealth marine area;
- the Great Barrier Reef Marine Park;
- a water resource.

In Queensland matters of state environmental significance as defined in Schedule 2 of the Environmental Offsets Regulation 2014 (DES 2024) include:

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

The SRI guideline provides a test and or criteria for determining a significant impact for each of the MSES categories listed above with MNES categories incorporated into the assessment in relevant sections (DEHP 2014).

3. Desktop Survey Results

3.1. Regional Ecosystems (RE) - Vegetations communities

PL 1125 consists of 100 % remnant vegetation (Figure 2, DESI 2024c). Six Regional Ecosystems (RE) (vegetation communities) have been mapped for PL 1125 (QGlobe 2024) as follows:

- RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes; 945.22 ha (20.81 % of PL 1125). This RE is contained within Broad Vegetation Group 34a. Lacustrine wetlands. Lakes, ephemeral to permanent. Includes fringing woodlands and sedgelands.
- RE 5.6.4 *Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia* spp. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes; 66.91 ha (1.47 % of PL 1125). This RE is contained within Broad Vegetation Group 23a Woodlands to low woodlands dominated by *Acacia aneura* on red earth plains or sandplains (soft mulga).
- RE 5.6.5 Variable sparse to open-herbland or *Triodia basedowii* hummock grassland on dune flanks, crests and sandy interdunes; 2,011.35 ha (44.28 % of PL 1125). This RE is contained within Broad Vegetation Group 33a Hummock grasslands dominated by *Triodia basedowii* (hard spinifex) or *Zygochloa paradoxa* (sandhill canegrass) associations on dunefields or sandplains.
- RE 5.6.8 *Zygochloa paradoxa* and/or *Crotalaria eremaea* +/- *Triodia basedowii* open tussock grassland and herbland on mobile crests and slopes of sand dunes; 140.19 ha (3.09 % of PL 1125). This RE is contained within Broad Vegetation Group 33a Hummock grasslands dominated by *Triodia basedowii* (hard spinifex) or *Zygochloa paradoxa* (sandhill canegrass) associations on dunefields or sandplains.
- RE 5.9.3 *Astrebla* spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments; 818.97 ha (18.03 % of PL 1125). This RE is contained within Broad Vegetation Group 30b Tussock grasslands dominated by *Astrebla* spp. (mitchell grass) or *Dichanthium* spp. (bluegrass) often with *Iseilema* spp. on undulating downs or clay plains.
- RE 5.9.4 *Aristida contorta* sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover. 559.78 ha (12.32 % of PL 1125). This RE is contained within Broad Vegetation Group 31b Short grass / forb associations on stony downs.

Mapping of the broad vegetation groups (BVGs) is provided in Figure 2 as the regional ecosystems are intermixed at a scale that makes mapping difficult. The regional ecosystems are described in more detail in Appendix 9.

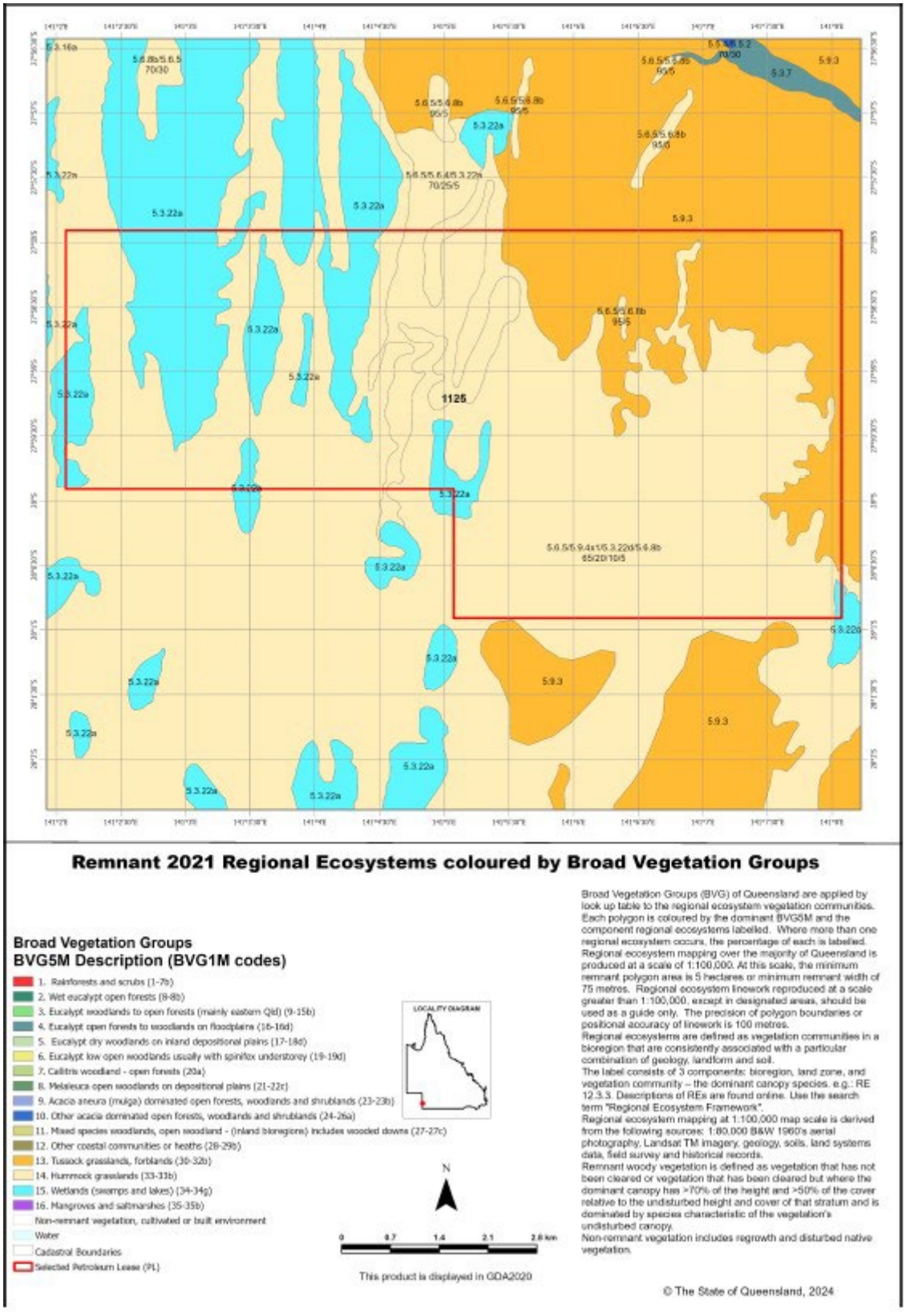


Figure 2. Broad Vegetation Groups mapped within PL 1125 (DESI 2024c).

3.2. Wetlands and Groundwater Dependant Ecosystems

The PL 1125 area of interest is covered within the Biodiversity Planning Assessments (BPAs) for the Channel Country (v1.1) and by the Aquatic Conservation Assessment (riverine and non-riverine) for Lake Eyre and Bulloo Basins (v1.1). An Aquatic Conservation Assessment (ACA) is conducted using the Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton et al. 2006) which was developed to assess conservation values of wetlands in Queensland (DESI 2024b). It is a comprehensive method that uses available data, and expert opinion to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The method uses criteria, indicators and measures including naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness (DESI 2024b).

The Biodiversity and Conservation Values: Biodiversity Planning Assessments and Aquatic Conservation Assessment (BCV) Report for PL 1125 (Appendix 2, DESI 2024b) identifies the following results relevant to the presence of wetlands and groundwater dependant ecosystems:

- Eight Lacustrine wetlands (Non-riverine wetland types intersecting the area of interest) present identified within PL 1125.
- No palustrine wetlands are mapped for PL 1125.
- No named waterways intersecting with PL 1125.
- Aquatic conservation significance (riverine wetlands) (Figure 3):
    - Low: 3,399.59 ha (74.84% of PL 1125)
    - Very High: 1,142.83 ha (25.16% of PL 1125)
- Aquatic conservation significance (non-riverine) (Figure 4):
    - Medium: 652.71 ha (14.37% of PL 1125).
- No springs identified within the Queensland Springs Database are present within PL 1125.

Mapping layers within Queensland Globe identify groundwater dependant ecosystems described as non-perennial interdunal lacustrine wetlands and some minor unnamed non-perennial drainage lines present in the southern and north-eastern sections of PL 1125 (Figure 5, DESI 2024a).

The largest of the lacustrine wetlands, to the north of the pipeline and west of the proposed Vali 5 well along with the wetland adjacent to Vali 3 and south-eastern section of PL 1125 are identified as being of state biodiversity significance (Figure 6). This is due to potential presence of a wide range of invertebrates and algae and its potential habitat for waterbirds including migratory waders (expert decision number chc_l_16, DESI 2024a). Other areas of PL 1125 are identified as being of regional or local significance. The eight lacustrine wetlands identified in the BCV report (Figure 4) are identified on the map of referable wetlands MSES regulated vegetation (defined

watercourse). No wetlands of high ecological significance are identified within PL 1125 and the biodiversity status of all areas within PL 1125 is 'No concern at present' (DESI 2024a, DESI 2024b).

One wetland of National significance, Cooper Creek Swamps - Nappa Merrie (Wetland Identification: QLD026) is located approximately 37 kms northeast of PL 1125.

The are no groundwater dependant ecosystems (GDEs) identified within PL1125 by the Groundwater Dependant Ecosystems Atlas with the closest approximately 2 km north of the north-east corner of PL1125 (Figure 5). The only GDE identified by the desktop survey within PL 1125 (DESI 2024b) are ephemeral wetlands categorised as Broad Vegetation group *34a Lacustrine wetlands. Lakes, ephemeral to permanent, fresh to brackish; water bodies with ground water connectivity including fringing woodlands and sedgelands*. Within this broad vegetation group one vegetation community was identified within desktop survey results as a wetland: *RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes*.

This community was mapped for a number of interdunal areas where surface water is present following rainfall events (Figure 5) which was confirmed during the field survey (see section 5.1). It is identified as providing wetland habitat for flora and fauna. It has a biodiversity status of no concern at present although it has a low representation within the conservation estate (DESI 2024c).

Vegetation community 5.3.22 is split into a number of sub communities of which only one is present within PL 1125; 5.3.22a, which is within BVG 34a, and is associated with lacustrine wetlands. This is described as follows (Neldner et al. 2023):

- 5.3.22a: Bare areas, water or scattered ephemeral vegetation of variable floristic and structural composition. Locally *Eleocharis pallens* and/or *Eragrostis setifolia* may predominate. An ephemeral herbland will often dominate bare areas exposed by receding water. Very occasional low shrubs such as *Chenopodium auricomum, Duma florulenta and Tecticornia* spp. may be present. Occurs on lakes and larger clay pans (area generally greater than 8 ha) in interdunes or on sandplains or less frequently on clay plains. Soils very deep, grey cracking clays. Lacustrine. (BVG1M: 34a).

The Queensland Springs Database did not identify any springs in PL 1125, ATP2021 or Nappamerry Station and hence none are depicted in Figure 5 which included the Queensland springs dataset. The closest springs are more than 300 kms away to the south-east of Thurgomindah (DESI 2024a).

3.2.1. Riverine Wetlands

In Queensland riverine wetlands are defined as all wetlands and deepwater habitats within a channel which is naturally or artificially created, periodically or continuously containing moving water, or connecting two bodies of standing water (DESI 2024b). The Biodiversity Assessment and Mapping Methodology (BAMM) methodology for

mapping of riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. An Aquatic Conservation Assessment (ACA), an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

The BCV report for PL 1125 (DESI 2024b) identifies that 1,142.83 hectares (25.16 %) have a riverine aquatic significance of 'very high' and 3,399.59 hectares (74.84%) have a low significance (Figure 3). The aquatic conservation significance is identified as being based on expert panel decision cp_r_fa_07 identifying potential special features of 'Permanent water holes' that 'never go dry over 100+ year timeframes and are critically important as refugia for aquatic species in arid landscapes (DESI 2024b). These areas identified as of very high aquatic significance are primarily in the north and west of PL 1125 and do not align with mapped drainage lines in the south-east of PL 1125 (Figure 3). The south-west corner of PL1125 including the western section of the Flowline is depicted as having a very high riverine catchment significance (Figure 3). The field survey found that there are no riverine channels, defined drainage lines, springs or permanent surface water present in this area or any other areas surveyed of PL 1125. All drainage lines surveyed are shallow and sandy. The only wetlands in this area are non-riverine ephemeral wetlands containing RL 5.3.22.

Given that the BAMM is based on discrete spatial unit (subsections) it appears that areas mapped as 'very high' riverine significance are based on catchment areas for sub-sections of the Cooper Creek and its tributaries rather than on riverine wetland features contained within PL 1125.

3.2.2. Non-riverine wetlands

The Biodiversity Planning Assessments and Aquatic Conservation Assessment Report (BCV report) for PL 1125 (DESI 2024b) identified 652.71 hectares (14.37 %) of PL 1125 as being of medium conservation significance for non-riverine wetlands (Figure 4). The aquatic conservation significance is identified as being based on expert panel decision cp_nr_ec_02 identifying potential special features of ''Temporary claypan wetlands'. The description associated with this decision is: *'temporary claypan wetlands not fed by rivers have different biota adapted to different desiccation cycles e.g. fairy shrimp. For the majority of their time they are dry and are susceptible to cattle damage and woody debris removal. The REs associated with this decision are: 4.3.12b, d; 5.3.13b; 5.3.15a, b; 5.3.16a;* 5.3.22a; 5.3.8b; 6.3.11; 6.3.11b.

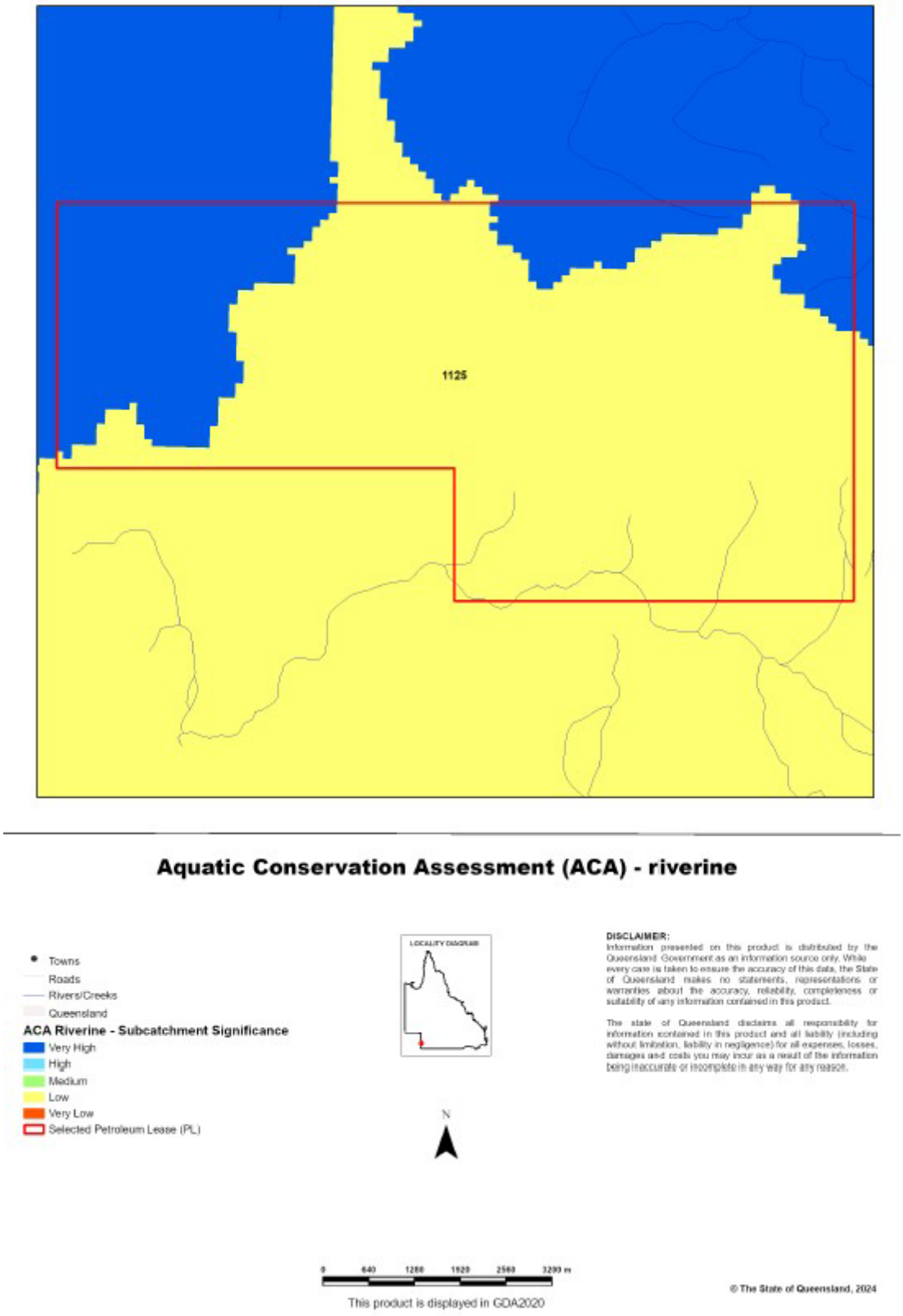


Figure 3. Aquatic Conservation Assessment for riverine wetlands within PL 1125 (DESI 2024b)

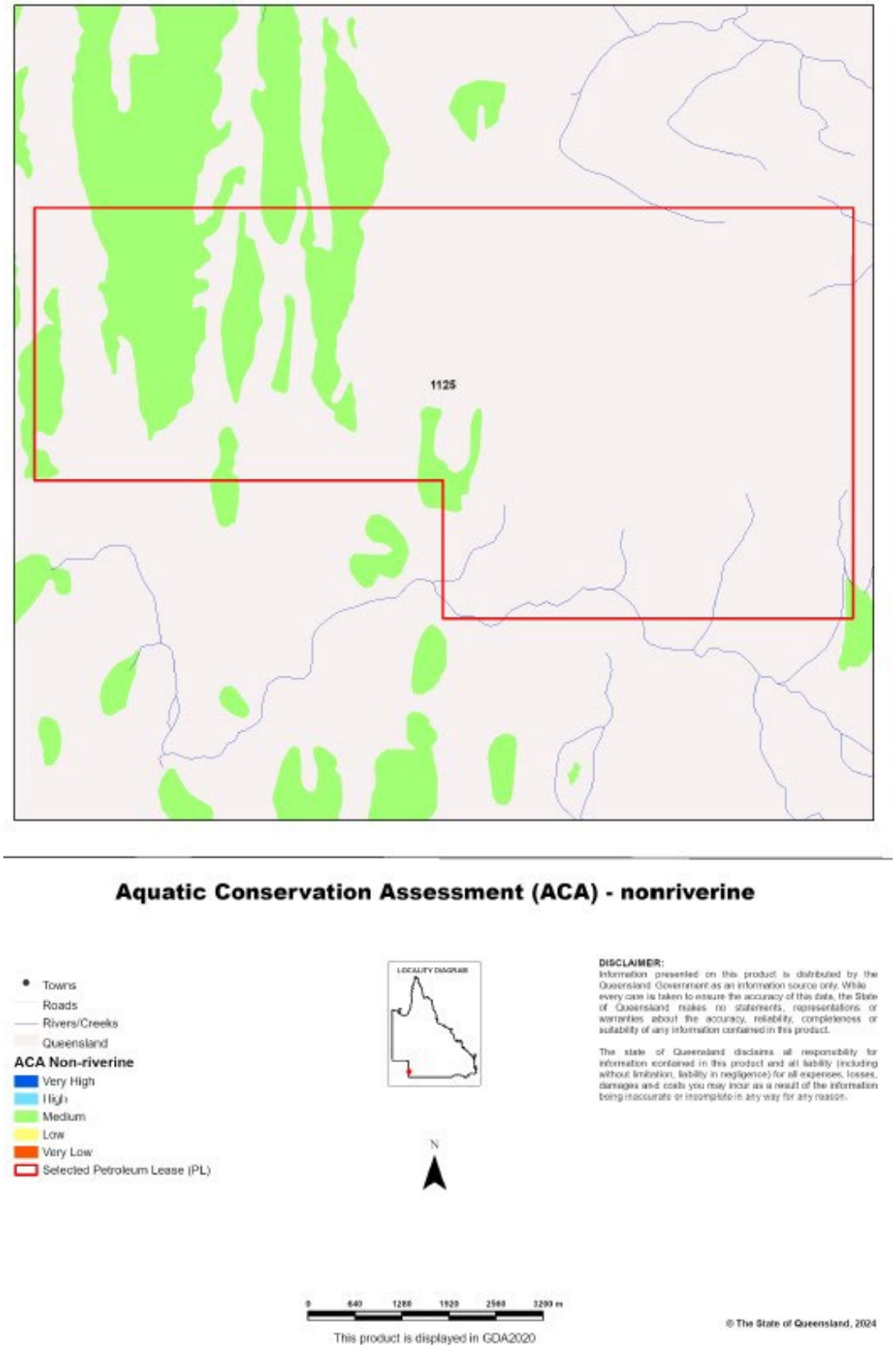


Figure 4. Aquatic Conservation Assessment for non-riverine wetlands within PL 1125 (DESI 2024b)

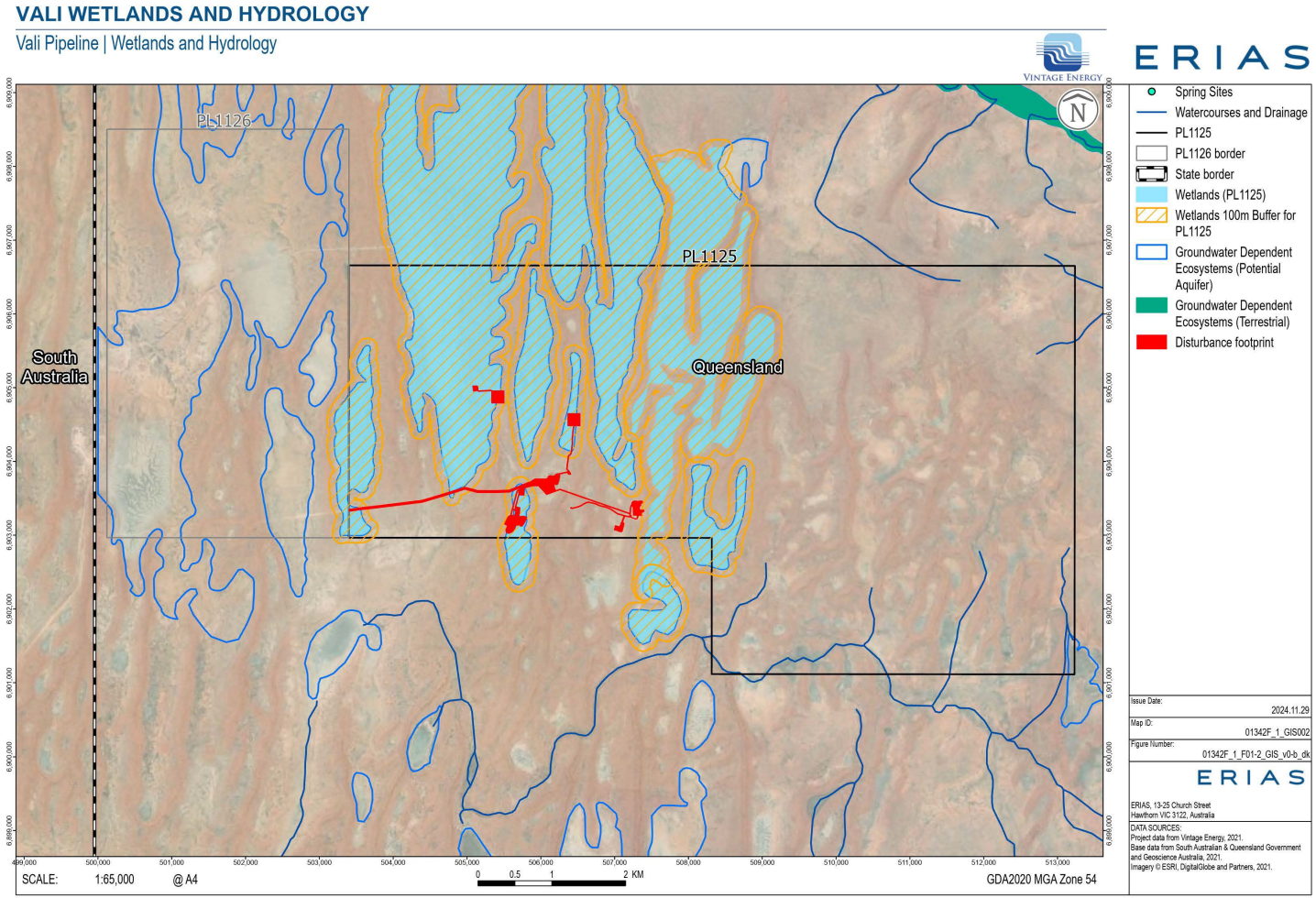


Figure 5. Wetlands and hydrology of PL 1125

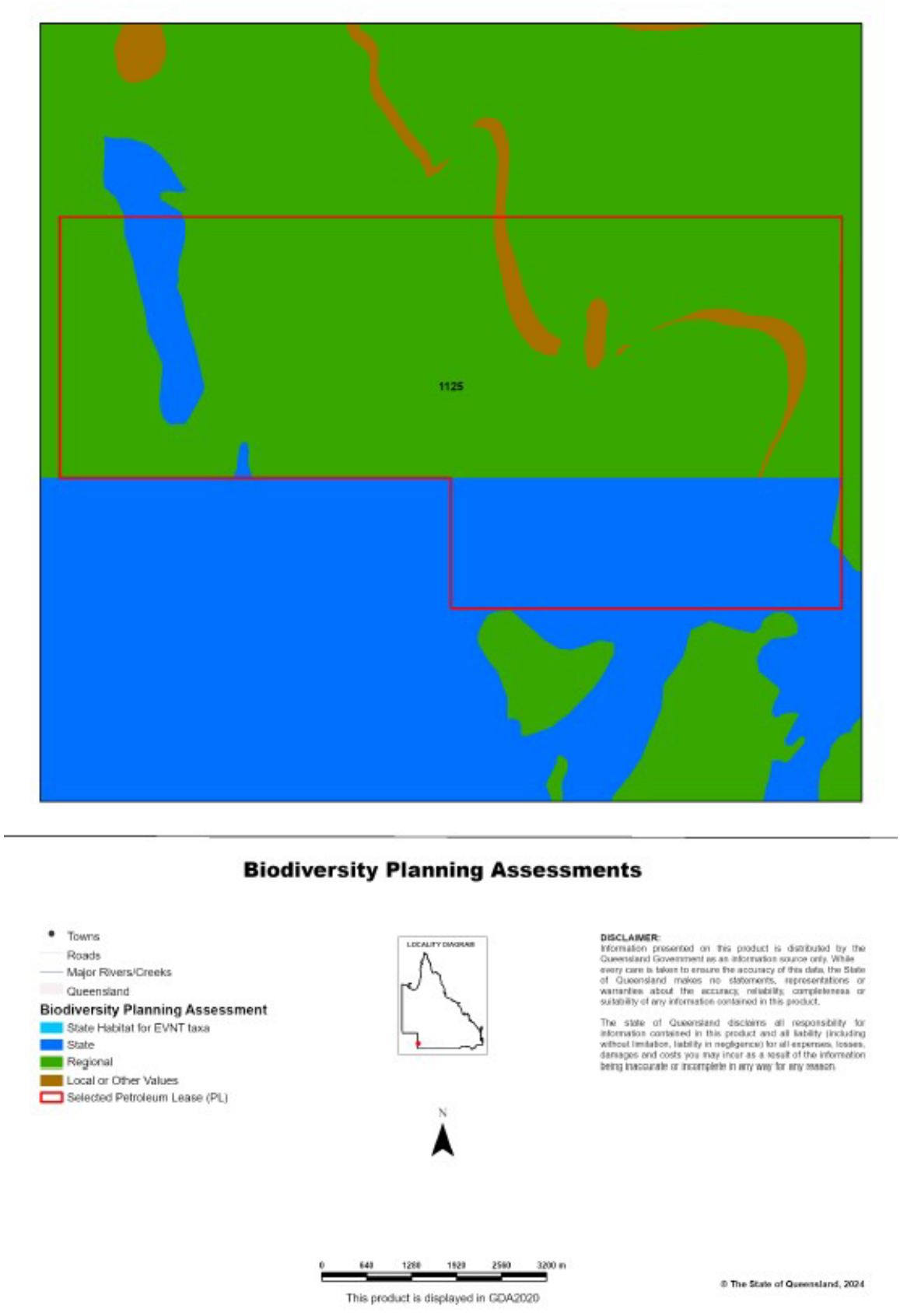


Figure 6. Biodiversity Planning Assessment significance areas for PL1125 (DESI 2024b)

3.3. Biodiversity Value

The Biodiversity and Conservation Values: Biodiversity Planning Assessments and Aquatic Conservation Assessment Report (BCV report) for PL 1125 identifies that the biodiversity status the whole of PL 1125 is 'No concern at present' (DESI 2024a) and that the area is not within any protected areas including:

- National Parks,
- Regional Parks,
- Nature Refuges,
- Conservation Park Zones,
- Preservation Zones,
- Legally Secured Offset Areas (offset register areas or vegetation offsets through a Property Map of Assessable Vegetation); or
- any other state conservation area (DESI 2024a).

The BCV Report identified the biodiversity significance of PL 1125 as follows (DESI 2024a):

- Local or Other Values: 132.33 ha (2.91% of PL 1125);
- Regional: 3,344.93 ha (73.64% of PL 1125);
- State: 1,065.16 ha (23.45% of PL 1125);

A biodiversity status of 'No concern at present' was given for the entire area of PL 1125. Identified biodiversity values for regional ecosystems present in PL 1125 include the following (DESI 2024c):

- 5.3.22: Provides wetland habitat for flora and fauna.
- 5.6.4: High fauna diversity.
- 5.6.5: High reptile diversity. Potential habitat for threatened fauna species including Mulgara *Dasycerus cristicauda*.
- 5.6.8: Habitat for the endemic Eyrean Grasswren *Amytornis goyderi* and threatened fauna species including the Dusky Hopping mouse *Notomys fuscus*, Mulgara *Dasycercus cristicauda* and plant and flora species.
- 5.9.4: Habitat for threatened fauna species including Kowari *Dasyuroides byrnie*.

The biodiversity values identified above are values attributed to the regional ecosystems on a statewide basis and do not necessarily reflect existing values for these habitats within PL 1125. This will be discussed further in the residual impact section below.

3.4. Matters of State Significance

The Matters of State Environmental Significance Report for PL 1125 identified two categories of MSES values were identified as being present within PL 1125:

- Regulated Vegetation - intersecting a watercourse: 10.2 km; and
- Regulated Vegetation - within 100m of a Vegetation Management Wetland: 1041.48 ha.

The MSES report also found that none of the following MSES values are present within PL 1125 (Table 2 in DESI 2024b):

- Protected Areas;
- State Marine Parks endangered or of concern regional ecosystems;
- Fish habitat areas (A and B);
- Strategic environmental area (SEA);
- High Ecological Significance wetlands on the Map of Queensland;
- High Ecological Value (HEV) wetlands;
- High Ecological Value (HEV) waterways;
- Threatened (endangered and vulnerable) wildlife;
- Special least concern animals;
- Wetland Environmental Values;
- Koala habitat;
- Sea turtle nesting areas;
- Regulated Vegetation - Endangered/Of concern in Category B (remnant);
- Regulated Vegetation - Endangered/Of concern in Category C (regrowth);
- Regulated Vegetation - Category R (GBR riverine regrowth);
- Regulated Vegetation - Essential habitat;
- Legally Secured Offset Areas - offset register areas;
- Legally Secured Offset Areas vegetation offsets through a Property Map of Assessable Vegetation).

In addition, the MSES report found that there were no records of protected fauna or special least concern animal species and that shorebird habitat from critically endangered, endangered, vulnerable or least concern species has not been mapped for PL 1125 (DESI 2024b).

3.5. Threatened Ecological Communities

The EPBC protected matters searches did not identify any threatened ecological communities (TECs) listed under the EPBC Act 1999 as potentially present within the desktop survey 50 km buffer zone or within a 100 km buffer zone (DCCEEW 2024); Appendix 1 and Appendix 2).

3.6. EPBC Threatened species

Six fauna species (five birds and one mammal) are identified in the EPBC PMST results as 'Known' to occur in the 50 km radius area and all have records from within 50 km of the project area (ALA 2024, DCCEEW 2024a):

- Grey Falcon *Falco hypoleucos*, EPBC Vulnerable, 14 records within 50 km, 35 records within 100 km;
- Blue-winged Parrot *Neophema chrysostoma,* EPBC Vulnerable, 10 records within 50 km, 19 records within 100 km;
- Sharp-tailed Sandpiper *Calidris acuminata*, EPBC Vulnerable, 2 records within 50 km, 13 records within 100 km;
- Southern Whiteface *Aphelocephala leucopsis*, EPBC Vulnerable, 45 records within 50 km, 115 records within 100 km;
- Painted Honeyeater *Grantiella picta,* EPBC Vulnerable, 1 record within 50 km, 5 records within 100 km; and
- Dusky Hopping-mouse *Notomys fuscus*, EPBC Vulnerable, 14 records within 50 km, 77 records within 100 km.

A further three fauna bird species are identified in the EPBC PMST results as 'Known' to occur in the 100 km radius area (DCCEEW 2024b) but not the 50 km radius area. There are desktop records for only two of these species:

- Curlew Sandpiper *Calidris ferruginea*, EPBC Critically Endangered, 1 record within 50 km, 3 records within 100 km;
- Bulloo Grey Grasswren *Amytornis barbatus barbatus*, EPBC Endangered, no records within 50 km, 10 records within 100 km; and
- Latham's Snipe *Gallinago hardwickii,* EPBC Vulnerable, no records within 100 km.

An additional two bird species and three plant species were identified in the EPBC PMST results as 'Likely' to occur in the 50 km or 100km radius areas (DCCEEW 2024a, DCCEEW 2024b) however there are desktop records within 100 km for only one species:

- Common Greenshank *Tringa nebularia* EPBC Endangered, no records within 50 km, 5 records within 100 km;
- Night Parrot *Pezoporus occidentalis*, EPBC Endangered, no records within 100

km;

- *Frankenia plicata* EPBC Endangered, no records within 100 km;
- *Sclerolaena walkeri* EPBC Vulnerable, no records within 100 km; and
- *Xerothamnella parvifolia*, EPBC Vulnerable, no records within 100 km.

Eight species were identified in the results as 'May' occur in either the 50 km or 100km radius areas (DCCEEW 2024a, DCCEEW 2024b):

- Australian Painted Snipe *Rostratula australis* EPBC Endangered, 1 record within 50 km, 1 record within 100 km;
- Major Mitchell's Cockatoo *Lophochroa leadbeateri* EPBC Endangered, no records within 50 km, 7 records within 100 km;
- Plains Wanderer *Pedionomus torquatus*, EPBC Critically Endangered, no records within 100 km;
- Greater Bilby *Macrotis lagotis* EPBC Vulnerable, no records within 100 km;
- Kowari *Dasyuroides bynei* EPBC Vulnerable, no records within 100 kms;
- Plains Mouse *Pseudomys australis*, EPBC Vulnerable, 1 record within 50 km, 2 records within 100 km;
- Flame Spider-flower *Grevillea kennedyana* EPBC Vulnerable, no records within 100 kms; and
- Slender Swainson-pea *Swainsona murrayana* EPBC Vulnerable, no records within 100 kms.

3.6.1. EPBC Migratory Species records

The desktop searches identified eight additional migratory or marine bird species potentially or recorded as occurring within 50 or 100 km of the project:

- Common Sandpiper *Actitis hypoleucos,* 3 records within 50 km, 7 records within 100 km;
- Pectoral Sandpiper *Calidris melanotos,* 1 record within 50 km, 1 record within 100 km;
- Marsh Sandpiper *Tringa stagnatilis,* 4 records within 100 km;
- Red-necked Stint *Calidris ruficollis,* 2 records within 100 km;
- Oriental Plover *Charadrius veredus,* 1 record within 100 km;
- Fork-tailed Swift *Apus pacificus,* 2 records within 50 km, 4 records within 100 km;
- Grey Wagtail *Motacilla cinerea*; and
- Yellow Wagtail *Motacilla flava*.

There are records within the Atlas of Living Australia database for the first six of these

species listed above in either the 50 km or 100 km radiuses. Yellow Wagtail is considered as Known to occur within the 50 km PMS results although there are no desktop records for this species within 100 km of the project area. Another species Grey Wagtail is returned as 'May' occur in the 50 km PMS results and there are no ALA records for this species.

3.7. State (NC Act 1992) Listed Species

In addition to EPBC listed species there are desktop records within 100 km for one fauna species:

- Yellow Chat *Epthianura crocea crocea* NC Act Vulnerable;1 record from within 50 km and 4 records from within 100 km.

4. Field Survey Results

The survey area was in good condition following successive rainfall events over the previous 12 months including one in July 2024. Much vegetation growth was evident and many plant species were in flower. Bird abundances were high, and many species showed evidence of breeding.

4.1. Flora

A total of 131 flora species were recorded within PL 1125 during the field survey (Appendix 10). The only introduced species recorded was *Citrullus amarus* (Paddy Melon) which was recorded at a number of locations, primarily in dunes. No flora species listed under the EPBC Act or state legislation were recorded during the survey. A full species list is presented in Appendix 10.

Regional ecosystems (REs) recorded during the field survey were consistent with vegetation mapping in QGlobe. The field survey confirmed that the six Regional Ecosystem Description Database (REDD) vegetation communities mapped for PL 1125 were present:

- 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes;
- 5.6.4 *Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia* spp. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes;
- 5.6.5 Variable sparse to open-herbland or *Triodia basedowii* hummock grassland on dune flanks, crests and sandy interdunes;
- 5.6.8 *Zygochloa paradoxa* and/or *Crotalaria eremaea* +/- *Triodia basedowii* open tussock grassland and herbland on mobile crests and slopes of sand dunes;
- 5.9.3 *Astrebla* spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments; and
- 5.9.4 *Aristida contorta* sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover.

Regional ecosystems have been mapped for areas of PL 1125 where infrastructure has been and is planned to be located as shown in Figure 7.

RE 5.3.22 was present in interdunal areas identified in vegetation mapping as ephemeral lacustrine wetlands including at the Vali 3 well pad area, adjacent to the Vali 2 well pad area and some areas of the pipeline. A total of 59 species were recorded in RE 5.3.22 during the survey which mostly consisted of herbs and grasses without a shrublayer however in some locations a shrublayer consisting of *Chenopodium auricomum* was present. *Duma florulenta* was also present to a lesser degree and in a few locations dominated the shrublayer. Most ephemeral wetlands had some areas which contained such a shrublayer and it is likely that these are the areas which hold water for the longest period of time. In some locations, such as the wetland just south of Vali 3, small stands of *Eucalyptus coolabah* (Coolibah) were

present at the edge of this community. Coolibah is not identified as part of RE 5.3.22 and is identified as being associated with regional ecosystem RE 5.3.16 which is not mapped for PL 1125. RE 5.3.16 is defined by the presence of *Eragrostis australasica* which was not recorded within the survey area but otherwise has some floristic similarities with RE 5.3.22. Areas with Coolibah are consequently included within 5.3.22.

RE 5.6.4 was widespread on dune flanks and benches as well as open plains where neither ephemeral wetlands nor dunes were present. It was recorded in the southern section of PL 1125 along, and adjacent to, the mapped drainage line. It was also present in elevated interdunal sandy flats in the northern section of PL 1125. It appeared to be much more widespread than indicated in the Regional Ecosystems report which stated that PL 1125 contains 66.91 (1.47 %) of this regional ecosystem. This was the most species diverse community surveyed with 76 species recorded. It was mostly dominated by *Atalaya hemiglauca* often with *Hakea leucoptera* as a major component. *Acacia aneura* was dominant to a much lesser extent either with or without other *Acacia* species. *Corymbia terminalis* was present on flat sandy plans as a scattered tree with or without other canopy trees. Grasses and herbs were prevalent throughout this community with the ground layer dominated by a mixture of these, or by grasses in some areas and herbs and larger shrubs in other areas.

RE 5.6.5 and RE 5.6.8 were prevalent and intermixed on dunes with RE 5.6.8 probably more widespread of the two communities. These two communities often merged with no clear line of delineation. The species diversity of these communities was lumped due to the difficulties in delineating them and 29 species were recorded. RE 5.6.8 were dominated by *Crotalaria eremea* and *Crotalaria cunninghamii* as well as a range of other shrubs such as *Acacia ligulata, Lechenaultia divaricata, Scaevola depauperata* and *Cullen pallidum*. *Zygochloa paradoxa* was a minor component of this community within PL 1125. Triodia was present in both communities but 5.6.5 was dominated by this species with less prevalence of shrubs.

RE 5.9.3 and RE 5.9.4 were present throughout PL 1125 apart from on dunes and 36 species were recorded in the former and 13 species recorded in the later community. The low species diversity for RE 5.9.4 reflects few sites where it was clearly the vegetation community. It was surveyed on a clay pan at Vali1 just to the east of the ponds and was dominated by *Astrebla pectinata*, *Sclerolaena* spp., various daisy species and a range of grasses. The delineation of these communities from RE 5.6.4 and at time from RE 5.3.22 was not always clear with communities merging into one another in some areas.

4.1.1. Propose Vali 4 and Vali 5 infrastructure

Vegetation at the proposed Vali 4 well pad is located within an ephemeral wetland between two dunes. It was confirmed as being primarily within RE *5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes* which was dominated by a diversity of native herbs (19 recorded species) and native grasses (nine recorded species) of with no introduced species recorded.

Patches of *Chenopodium auricomum* (Golden Goosefoot) were present. A proportion of Vali 4 extends onto a dune flank with RE 5.6.4 *Atalaya hemiglauca* low open woodland over chenopod shrubland. This is consistent with Queensland Government vegetation mapping as contained in the Queensland Globe (DESI 2024b).

The proposed Vali 5 infrastructure was confirmed as being located within three regional ecosystems RE 5.3.22, RE 5.9.3 and RE 5.6.4. The existing pond and water bore is located within RE 5.3.22 at the edge of the wetland area and is dominated by herbs and grasses with no larger shrubs present. The planned track to the well pad is within RE 5.9.3 *Astrebla* spp., *Aristida* spp. and *Enneapogon* spp. open tussock grassland with diverse forbs. Some sparse larger shrubs (*Senna* spp. and *Maireana* spp.) were also present. The Vali 5 well pad is located within RE 5.6.4 which has a an overstorey of *Atalya hemiglauca* with a shrublayer of *Senna* spp., *Acacia tetragonophylla* and *Maireana astrotricha* as well as diverse grasses and forbs in the ground layer.

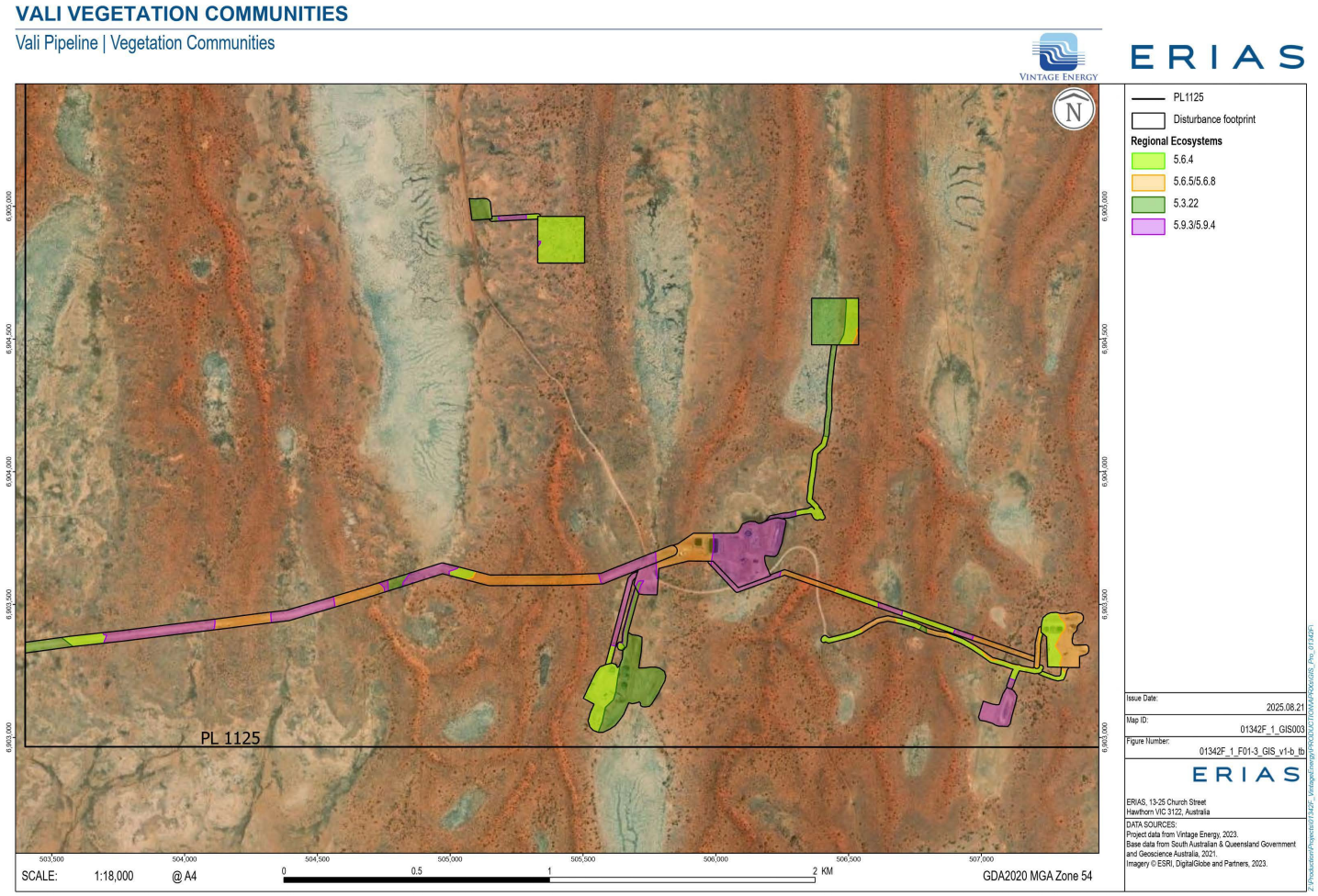


Figure 7. The Vali Field disturbance area showing vegetation associations previously mapped within PL 1125.

4.2. Fauna

A total of 38 species of birds were recorded during the field survey within PL 1125 (Table 4). Common species included Budgerigar, Brown Songlark, Australian Pratincole, Crimson Chat, White-winged Wren, Little Buttonquail, Masked Woodswallow, Zebra Finch and Flock Bronzewing. These species are typical of arid areas of Australia. A number are boom and bust species, such as Budgerigar, Flock Bronzewing, and Little Buttonquail were common during the survey which reflects the good environmental conditions at the time. One Little Buttonquail nest with 4 eggs was discovered adjacent to Vali 4 and Flock Bronzewing was observed performing display flights on a number of occasions. Many young birds were observed and several other species were also suspected to be breeding during the survey.

The sites with the highest recorded diversity were the drainage line in the south-west corner of PL 1125, Vali 1 and the ephemeral wetland site identified as RE 5.3.22 which had 18, 16 and 15 recorded species respectively (Table 4). This is likely to be influenced by survey effort as well as habitat diversity as these sites were all surveyed twice compared to once for most other sites.

No listed species were recorded during the field survey.

Table 4. Fauna species recorded at survey sites in PL 1125.

Location	PL 1125	Vali 1	Vali 2	Vali 3	Vali 4	Vali 5	PL 1125 Drainage Line SW Corner	PL 1125 RE 5.3.22	PL 1125 North Dune RE 5.6.4
		141.062	141.073	141.056	141.066	141.053	141.094	141.05	141.038
		-27.992	-27.995	-27.997	-27.983	-27.981	-28.013	-27.986	-27.965
Species diversity	**38**	**16**	**9**	**11**	**11**	**10**	**18**	**15**	**13**
Australian Magpie	1			1					
Australian Pipit	1						1	1	
Australian Pratincole	1	1		1		1		1	
Australian Raven	1		1		1	1	1	1	1
Banded Lapwing	1	1	1						1
Black-faced Woodswallow	1		1		1	1	1		1
Black Falcon	1							1	
Black Kite	1						1		
Brown Falcon	1	1						1	1
Bluebonnet	1			1			1		
Brown Songlark	1				1			1	1
Budgerigar	1	1	1	1	1	1	1		1
Cockatiel	1	1		1	1				
Crested Pigeon	1						1		
Crimson Chat	1	1	1		1	1	1		1
Diamond Dove	1	1	1						
Fairy Martin	1	1		1					
Flock Bronzewing	1	1			1			1	
Galah	1			1			1		
Gull-billed Tern	1	1						1	

Location	PL 1125	Vali 1	Vali 2	Vali 3	Vali 4	Vali 5	PL 1125 Drainage Line SW Corner	PL 1125 RE 5.3.22	PL 1125 North Dune RE 5.6.4
Horsfield's Bushlark	1							1	
Horsfield's Bronze-cuckoo	1	1							
Little Buttonquail	1			1	1	1	1	1	1
Masked Woodswallow	1		1		1		1	1	
Nankeen Kestrel	1					1	1		
Orange Chat	1							1	
Pied Honeyeater	1	1	1		1	1			1
Red-backed Kingfisher	1	1							
Rufous Songlark	1	1					1		1
Singing Honeyeater	1						1		
Spotted Harrier	1						1	1	
Straw-necked Ibis	1							1	
White-fronted Honeyeater	1								1
White-winged Triller	1						1		
White-winged Wren	1	1	1	1					1
Willie Wagtail	1						1		
Yellow-throated Miner	1			1					
Zebra Finch	1	1		1	1	1	1	1	1

5. Significant residual impact (SRI) assessment

5.1. Listed Species Likelihood of Occurrence and Potential for Residual Impact

An assessment of potential impacts to listed species from vegetation clearance within the disturbance footprint (Figure 7). The Vali Field disturbance area showing vegetation associations previously mapped within PL 1125.) identified above is presented here. This impact assessment considers the following:

- Results of the EPBC Protected Matters Search (PMS);
- Matters of State Environmental Significance, Biodiversity and Conservation Value, Regional Ecosystem and WildNet reports for PL 1125;
- Desktop records obtained for Atlas of Living Australia, Birdlife Australia, WildNet;
- Field observations;
- Extent and location of the disturbance footprint; and
- Documented ecology of listed species.

The impact assessment covers the species which were identified in is sections 3.7 and 3.8 above and the results of the listed species impact assessment are provided in Table 5. For each species a likelihood of occurrence within PL 1125 and a potential for a residual impact occurring from development of the project footprint is provided.

Table 5. EPBC Act and NC Act Listed species that potentially occur within the desktop search areas of PL 1125 with a 50km buffer and a 100 km buffer. The number and year of last record from the Atlas of Living Australia data set is given for each species.

Species	NC Act	EPBC Act	Number of records	Year of last record	EPBC PMST Likelihood	Preferred habitats and distribution	Impact assessment for activities within PL 1125.
EPBC Act Threatened Species							
Birds							
Amytornis barbatus barbatus *Bulloo Grey Grasswren, Grey Grasswren (Bulloo)*	NT	EN	50km: 0 100km: 10	2012	50km: Likely 100km: Known	Occurs in southwestern Qld, north-east SA and north-western NSW. Within Queensland it is found in the drainage basin of the Bulloo River and the Cooper Creek system as well the Diamantina and Eyre Creek systems near Birdsville. This species typically occurs in Lignum *Duma florulenta* shrubland on periodically inundated swampy floodplains, waterholes and channels (Black and Gower 2017). It has also been recorded in surrounding samphire *Tecticornia* sp shrublands and Swamp Canegrass *Eragrostis australasica* and/or clumps of *Atriplex nummularia*. Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely. There are no records within 50 kms and Lignum *Duma florulenta* is limited to small patches within the survey area with no connectivity to known populations of this species. This species is sedentary and only undertakes local movements (Higgins et al. 2001). **Potential for residual impact:** Unlikely.

Aphelocephala leucopsis Southern Whiteface	V	VU	50km: 45 100km: 115	2017	50km: Known 100km: Known	Its range is across most of mainland Australia south of the tropics in a wide variety of open woodlands and shrublands where there is an understorey of grasses and, or shrubs. It occurs in habitats dominated by Acacia or eucalypts on ranges, foothills and plains (Higgins & Peter 2002, cited in DCCEEW 2023b). Prefers habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat. Living and dead trees with hollows and crevices are used for roosting and nesting (DCCEEW 2023b). Not recorded during the field survey although a related species Banded Whiteface was observed.	**Likelihood of Occurrence:** Possible **Potential for residual impact:** Possible. **Area of potential impact:** 11.0 hectares (RE 5.6.4)

Calidris acuminata Sharp-tailed Sandpiper	-	VU, MW	50km: 2 100km: 13	2017	50km: Known 100km: Known	This species is a non-breeding migratory shorebird that occurs in coastal and inland areas of Australia. It prefers non-tidal fresh or brackish wetlands with exposed mud. It will also use damp grassland and shrubland areas as well as artificial wetland habitats such as dams and sumps. It also uses tidal flats in coastal areas to a lesser extent (Geering et al. 2008, Simpson and Day 2019, Mehkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence**: Possible following large rainfall events **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 hectares (RE 5.3.22)
Calidris ferruginea Curlew Sandpiper	CR	CE, MW	50km: 1 100km: 3	2018	50km: May 100km: Known	A non-breeding migrant wader with a widespread distribution across Australia, in spring and summer (Geering et al. 2008, ALA 2024). This species has suffered a dramatic decline in abundance over the last 20 years due to loss of migrating habitat. Juveniles may remain in Aus for first Austral Winter (2 years old) (Menkhorst et al. 2017). Prefers coastal or inland mudflats but will also visit artificial dams and inland water habitats, freshwater and brackish wetlands (Simpson & Day 2010, Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence**: Possible following large rainfall events **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 hectares (RE 5.3.22)

Falco hypoleucos Grey Falcon	V	VU	50km: 14 100km: 35	2020	50km: Known 100km: Known	The species has a widespread, but sparse distribution across Australia (ALA 2024). Preferred habitat includes treed watercourses and open plains in arid inland areas. When not actively hunting roosts in shady trees or communications towers (Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence:** Possible There are records of this within 50 kms and it is possible that this species may occur in PL1125 however its preferred habitat of wooded watercourses is not present within the disturbance footprint. **Potential for residual impact:** Unlikely. Preferred habitat of wooded watercourses is not present within the area of disturbance and is very limited within PL 1125. **Area of potential impact:** 0 hectares

Gallinago hardwickii Latham's Snipe	-	VU, M	50km: 0 100km: 0	-	50km: May 100km: Known	The species has a widespread distribution throughout eastern Australia (ALA 2024). This species breeds in Japan and migrates to eastern and southern Australia. South-west Queensland is not considered part of its normal range. Prefers tussock grass and low dense sedges surrounding freshwater wetland, including marshes and flooded grassland. In dense cover by day, forage dawn dusk or at night. (Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely. The project is not within its normal range and there are no records within 100km. **Potential for residual impact:** Unlikely.

Grantiella picta Painted Honeyeater	V	VU	50km: 1 100km: 5	2020	50km: Known 100km: Known	This species is sparsely distributed in semi-arid and arid areas of eastern Australia including western Queensland. It is most common west of the Great Dividing Range but is considered irregular to the channel country of south-west Queensland. The Queensland population is augmented in winter by migrants from southern areas (Blakers et al. 1984; Storr 1984; Garnett 1992b; Higgins et al. 2001). The painted honeyeater lives in dry, open forests and woodlands (box, ironbark, yellow gum, melaleuca, casuarina, callitris, acacia). The species usually occurs in areas with flowering and fruiting mistletoe and flowering eucalypts. (Eddy 1961; Stewart 1988; Pizzey & Knight 1997; Higgins et al. 2001; Oliver et al. 2003). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely The modelled habitat map for this species does not show any habitat. or records for the project area (Appendix 11). **Potential for residual impact:** Unlikely. This species primarily relies on trees containing mistletoe. The project infrastructure is primarily located in grassland and shrubland with minimal loss of trees.

Lophochroa leadbeateri leadbeateri Major Mitchell's Cockatoo (eastern)	EN	EN	50km: 0 100km: 7	1988	50km: No likelihood returned 100km: May	The eastern subspecies of Major Mitchell's Cockatoo occurs in the Murray-Darling, Eyre and Bulloo River basins, from Isisford and Roma in the north, through western New South Wales to north-west Victoria and west to eastern South Australia (Higgins 1999). There are no records from within 50 km of the survey area and the records from within 100 km are from the Bulloo drainage basin. This species inhabits a wide range of plant communities, mostly in arid and semi-arid woodlands, always within easy reach of surface water. Habitat critical to the survival of the Eastern Major Mitchell's cockatoo consist of arid and semi-arid woodlands dominated by mulga (*Acacia aneura*), mallee and box eucalypts, slender cypress pine (*Callitris gracilis*) or belah (*Casuarina pauper/cristata*). Large mature trees with suitable hollows are critical for breeding and corridors of suitable habitat are important for dispersal across the landscape (DCCEEW 2023b). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely The modelled habitat map for this species does not show any habitat or records for the project area (Appendix 11). There are no records within 50 km. **Potential for residual impact:** Unlikely.

Neophema chrysostoma Blue-winged Parrot	V	VU	50km: 10 100km: 19	2021	50km: Known 100km: Known	Blue-winged parrots breed on mainland Australia south of the Great Dividing Range in southern Victoria, and sometimes in the far southeast of South Australia, and the northwestern, central and eastern parts of Tasmania. During the non-breeding period, from autumn to early spring, birds are migratory and recorded from northern Victoria, eastern South Australia, southwestern Queensland and western New South Wales (Higgins 1999 cited in DCCEEW 2023d). The project area occurs within the species occasional range. This species occurs in a range of habitats from coastal, subcoastal and inland areas, through to semi-arid zones. It favours grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones (Higgins 1999). The species can also be seen in altered environments such as airfields, golf-courses and paddocks. Not recorded during the field survey however this species is primarily present in winter months.	**Likelihood of Occurrence:** Likely **Potential for residual impact:** Possible. **Area of potential impact:** 21.6 ha in total consisting of 8.6 ha of RE 5.3.22 and 13.0 ha of RE 5.93 / RE 5.94 combined.

Pedionomus torquatus Plains-wanderer	CR	CE	50km: 0 100km: 0	-	50km: May 100km: May	This species occurs in very localised scattered in Qld, NSW, Vic and SA areas in eastern however there are no records within 100 km of the survey area. Plains Wanderer occurs in sparsely vegetated tree-less plains dominated by sparse native grasses and chenopods (Marchant and Higgins 1993, Bellchambers and Baker-Gabb 2006). Typical habitat contains approximately 50% bare ground, with most vegetation less than 5 cm in height and some widely spaced plants up to 30 cm high (Garnett et al., 2011). It does not occur in cultivated areas (Garnett et al., 2011). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely There are no records within 100 km and PL 1125 is not modelled as habitat for the species (Appendix 11). **Potential for residual impact:** Unlikely.
Pezoporus occidentalis	E	EN	50km: 0	-	50km: Likely	Night Parrot was though extinct for more than 50 years until a population was rediscovered in south-west Queensland in the Diamantina basin.	**Likelihood of Occurrence:** Unlikely The modelled habitat map for this species does not show any habitat or records for the project area or for the Bulloo Shire region (Appendix 11). There are no records within 100 km. Open plains in the project area primarily consist of grasses such as *Astrebla, Aristida* and *Enneapogon* which are not preferred habitats for Night Parrot.

Night Parrot			100km: 0		100km: Likely	It lives in spinifex (*Triodia*) grasslands or shrubby samphire and chenopod associations in arid and semi-arid regions of Australia (Higgins 1999). It is primarily active a night and is known to roost in dense clumps of spinifex during the day. Not recorded during the field survey.	**Potential for residual impact:** Unlikely.
Rostratula australis Australian Painted Snipe	E	EN	50km: 1 100km: 1	Unknown	50km: May 100km: May	Australian Painted Snipe has a widespread distribution across eastern and northern Australia (ALA 2024). It occurs in freshwater wetland habitats with dense reeds and rushes/ well vegetated margins (Simpson and Day 2019, Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence:** Possible The modelled habitat map shows very limited habitat for the project area but records to the south-east and north-west (Appendix 11). Habitat within PL 1125 is considered sub-optimal. **Potential for residual impact:** Possible **Area of potential impact:** 8.6 ha (RE 5.3.22)

Tringa nebularia Common Greenshank	-	EN, MW	50km: 0 100km: 5	2008	50km: No likelihood returned 100km: Likely	Common Greenshank is a migratory shorebird that has a widespread distribution throughout Australia, in summer (Geering et al. 2008, ALA 2024). It occurs in intertidal mudflats, fresh and saltwater wetlands along the coast or inland (Geering et al. 2008). Also occupies artificial habitats. Not recorded during the field survey.	**Likelihood of Occurrence:** Possible There are no records within 50 km and this species but may potentially be present following large rainfall events. **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 ha (RE 5.3.22)

Mammals							
Dasyuroides bynei Crest-tailed Mulgara, Kowari	E	EN	50km: 0 100km: 0	-	50km: No likelihood returned 100km: May	The Crest-tailed Mulgara occurs in scattered populations in sparsely vegetated stony deserts of the Lake Eyre drainage basin (Menkhorst and Knight 2017). It inhabits crests and slopes of sand ridges, or around salt lakes in inland Australia. During the day it shelters in burrows which are located at the base of sandhill canegrass (*Zygochloa paradoxa*) clumps or Nitre bush (*Nitraria billardieri*) growing around the edges of salt lakes (ALA 2024). Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records within 100 km with the nearest records from north-west NSW. **Potential for residual impact:** Unlikely.
Macrotis lagotis	E	VU	50km: 0	-	50km: No likelihood returned	Bilbies were once widespread across semi-arid and arid Australia but are now reduced to scattered populations in arid parts of Western Australia, northern Territory and south-west Queensland. They are primarily found in *Acacia* shrubland and spinifex grassland but also in clay and stony downs in the channel country of SW Queensland (Menkhorst and Knight 2001).	**Likelihood of Occurrence**: Unlikely The modelled habitat map does not show any habitat or records for the project area (Appendix 11). There are no records within 100 kms with records from south-west Queensland occurring north of Birdsville in the Diamantina River Catchment.

Greater Bilby			100km: 0		100km: May	Bilbies are active at night and shelter during the day in long deep burrows that they dig. Bilbies are solitary animals and can breed all year round if conditions are favourable. Not recorded during the field survey.	**Potential for residual impact:** Unlikely.
Notomys fuscus Dusky Hopping-mouse	E	VU	50km: 14 100km: 77	2012	50km: Known 100km: Known	Dusky Hopping-mouse is a boom and bust species and consequently it is uncommon and difficult to locate in most years but abundant in years when populations are booming (Van Dyck and Strahan 2008). It primarily lives in sandy habitats such as sand dunes which are limited and isolated in the survey area; however, in good conditions when populations are booming it can be found temporarily in a range of other habitats (Van Dyck and Strahan 2008). Not recorded during the field survey.	**Likelihood of Occurrence:** Likely The habitat model for this species shows habitat and records within the PL 1125 area (Appendix 11). **Potential for residual impact:** Possible. **Area of potential impact:** 8.7 ha (RE 5.6.5 / RE 5.6.8 combined))

Pseudomys australis Plains Mouse	V	VU	50km: 1 100km: 2	1957	50km: May 100km: May	The Plains Rat was once widely distributed across central Australia however it now primarily occurs in central-northern and north-east South-Australia. There are scattered records in south-west Queensland and a re-established population in north-west NSW. It is a boom and bust species and can disperse widely following good rainfall. Historically, the plains rat was widely distributed across a broad range of habitats including river flats, grasslands, sand ridges and lowland shrubs. The current assumed distribution of the plains rat is limited to the gibber (stone-covered) plains characterised by cracking clay, productive depressions and minor drainage lines which support low open scrublands and ephemeral grass or herb lands. Similarly, during times of high rainfall, populations may move into surrounding habitat types. Habitat degradation due to grazing, introduced predators and drought have contributed to its decline. Not recorded during the field survey.	**Likelihood of Occurrence:** Possible The project area is not within the normal range for this species however there is one record within 50 km. It is possible that this species may occur in PL1125 however its preferred habitat of gibber plains is not present within the disturbance footprint. **Potential for residual impact:** Unlikely. Its preferred habitat of gibber plains is not present within PL 1125 disturbance area. **Area of potential impact:** 0 ha

Flora							
Frankenia plicata	-	EN	50km: 0 100km: 0	-	50km: Likely 100km: Likely	Frankenia plicata occurs in South Australia, from north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Maree (Barker et al., 2005; State Herbarium of South Australia, 2024). It is likely that the species has been under reported due to difficulty of identification of Frankenia spp. (Kutsche & Lay, 2003). Frankenia plicata grows in a range of habitats, including on small hillside channels, which take the first run-off after rain been found predominantly from swales of loamy sands to clay (Neagle, 2002). This species is found in a wide range of vegetation communities that have good drainage (Neagle, 2002). This species occurs within the South Australian Arid Lands Natural Resource Management Region. Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records within 100 km. **Potential for residual impact:** Unlikely.

Grevillea kennedyana Flame Spider-flower		VU	50km: 0 100km: 0	-	50km: No likelihood returned 100km: May	*Grevillea kennedyana* has a restricted distribution in the northwest corner of New South Wales and the southwest corner of Queensland (ALA 2024). As of 2000, the plant was found in six geographic locations. Ninety per cent of the populations are found in the Sturt National Park and are highly fragmented with a natural range of less than 100 km (ALA 2024). *Grevillea kennedyana* mostly grows in arid areas in clusters on rocky jump-ups and colluvial slopes of rocky mesas with weathered silcrete rocks and loamy soils but can sometimes be found in dry and rocky watercourses. It grows on slopes between 10˚ and 75˚ (ALA2024). The most dense populations of this species are found on the lower slopes that have high water retention. It is often found with species such as spiny fan-flower (*Scaevola spinescens*), whitewood (*Atalaya hemiglauca*), *Acacia* and *Eremophila* species, and occasionally black oak (*Casuarina pauper*) often with a low ground cover of chenopods (ALA 2024). Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records within 100 km. The habitat model map for this species does not show any habitat or records for the project area (Appendix 11). **Potential for residual impact:** Unlikely.

Sclerolaena walkeri		VU	50km: 0 100km: 0	-	50km: Not Returned 100km: Likely	Sclerolaena walkeri is known from central Queensland, including the Diamantina River–Mackunda Creek Channels, the Paroo River area and in the Norley Range area near the Bulloo River north of Thargomindah (DCCEEW). It occurs on saline river flats (Wilson, 1984), channels and flats with Soda Bush (*Neobassia proceriflora*) and on floodplains in Queensland Bluebush (*Chenopodium auricomum*) and Yapunyah (*Eucalyptus ochrophloia*). Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records within 100 km. **Potential for residual impact:** Unlikely.
Swainsona murrayana Slender Swainson-pea	V	VU	50km: 0 100km: 0	-	50km: May 100km: May	Slender Darling-pea is found on the western slopes and plains of New South Wales, in Northern and western Victoria and southern Queensland with an outlier in South Australia. It is uncommon and grows on heavy clay and clay loam soils in *Atriplex vesicaria* shrublands and grasslands and is also found in seasonally wet areas and near lakes. Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records within 100 km. **Potential for residual impact:** Unlikely.

Xerothamnella parvifolia	-	VU	50km: 0 100km: 0	-	50km: May 100km: Likely	The species is found in the Channel Country IBRA bioregion, in south-western Queensland, Mount Poole in north-western New South Wales and in South Australia (ALA 2024). It grows in low chenopod shrubland and low open woodland, in thin sandy clay soils, along the ridgetops and slopes of sandstone ranges (ALA 2024). Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There is no suitable habitat and no records within 100 km habitat. **Potential for residual impact:** Unlikely.
EPBC Act Migratory Bird Species							
Actitis hypoleucos Common Sandpiper	-	M	50km: 3 100km: 7	1999	50km: Known 100km: Known	Common Sandpiper is a migratory shorebird that has a widespread distribution across Australia. It is typically present between late July and March (Simpson and Day 2019). It occurs in a variety of habitats including a wide range of coastal and inland wetlands mostly around muddy margins or rocky shores and rarely on intertidal mudflats. The species also occurs on steep sided sewage ponds, dams, and other artificial wetland habitats. It is tolerant of a wide variety of salinities. Not recorded during the field survey.	**Likelihood of Occurrence**: Possible at ponds and sumps containing water and in ephemeral wetlands following large rainfall events. **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 ha (RE 5.3.22)

Apus pacificus Fork-tailed Swift	-	M	50km: 2 100km: 4	2007	50km: Likely 100km: Likely	Fork-tailed Swift has a widespread distribution across Australia. It is migratory and only occurs in Australia from October to March (ALA 2024). This species is highly mobile, almost entirely aerial, and rarely recorded on the ground. It feeds on aerial invertebrates which are caught while flying. Not recorded during the field survey.	**Likelihood of Occurrence:** Possible While it is possible that this species may occur over PL1125 including the disturbance footprint this species has no interaction with terrestrial habitats while in Australia as it feeds exclusively on airborne invertebrates. No impact to this species is therefore considered to be plausible from this project. **Potential for residual impact:** Unlikely. This species has no interaction with terrestrial habitats in Australia**.** **Area of potential impact:** 0 ha

Calidris melanotos Pectoral Sandpiper	-	M	50km: 1 100km: 1	1998	50km: May 100km: Known	Pectoral Sandpiper is widespread across southeast Australia (ALA 2024) but is only sporadically recorded in arid areas. (Geering et al. 2008; Menkhorst et al. 2017). It occurs in freshwater or brackish wetlands, grassy or lightly vegetated swamps (Geering et al. 2008). Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records within 50 km however this species could potentially be present following large rainfall events. **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 ha (RE 5.3.22)
Calidris ruficollis Red-necked Stint	-	M	50km: 0 100km: 2	2019	50km: No likelihood returned 100km: No likelihood returned	Red-necked Stint is widespread and common across southeast Australia (ALA 2024) but less commonly recorded in arid areas (Geering et al. 2008; Menkhorst et al. 2017). It occurs in freshwater or brackish wetlands, grassy or lightly vegetated swamps (Geering et al. 2008; Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence**: Possible There are no records within 50 km however this species could potentially be present following large rainfall events. **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 ha (RE 5.3.22)

Charadrius veredus Oriental Plover	-	M	50km: 0 100km: 1	1992	50km: No likelihood returned 100km: No likelihood returned	This species is a migratory wader which primarily occurs in Northern and Central Australia from the Kimberly's WA to the Gulf country and Central Queensland (Menkhorst et al. 2017). It was not included in the EPBC Protected Maters search results for 50km or 100 km buffer zones. There is one ALA record from 1992 within 100 km buffer zone but none within 50 km. It prefers open grasslands and thinly vegetated plains including recently burnt areas and heavily grazed paddocks (Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely This species was not included in either the 50 km or 100 km PMST search results. There is one record from 30+ years ago within 50 – 100 km from PL 1125. **Potential for residual impact:** Unlikely. .
Motacilla cinerea Grey Wagtail	-	M	50km: 0 100km: 0	-	50km: May 100km: May	This migratory species is a scarce but regular visitor to Australia with most records from the Kimberly, WA, Top End, NT and Wet Tropics, Qld (Menkhorst et al. 2017). There are no records from within 100 km for the survey area. It is usually found close to water including beaches and rock pools. It favours lowland watercourses, warterfalls and fast-flowing streams and rivers (Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely There are no records from within 100 km. **Potential for residual impact:** Unlikely.

Motacilla flava Yellow Wagtail	-	M	50km: 0 100km: 0	-	50km: Known 100km: Known	This migratory wagtail occurs in Australia between late September and April mostly in northern Australia from the Kimberly region, WA, to the Top End, NT and Wet Tropics, Qld (Menkhorst et al. 2017). It is identified as 'Known' to ocurr in the EPBC PMST desktop results however no records were returned from within 100 km for the survey area. Occurs in a variety of damp or wet habitats including marshes and bogs. Forages in damp grassland or on bare ground at the edge of rivers, lakes and other wetlands (Menkhorst et al. 2017). Not recorded during the field survey.	**Likelihood of Occurrence:** Unlikely There are no records from within 100 km. **Potential for residual impact:** Unlikely.

Tringa stagnatilis Marsh Sandpiper		MW	50km: 0 100km: 4	2001	50km: No likelihood returned 100km: No likelihood returned	This is a migratory shorebird which is widespread across Australia. It was not included in the EPBC PMST desktop results however there are four records in the BirdLife data within 100 km. It mainly occurs in fresh and brackish inland wetlands but also occurs along the coast on intertidal mudflats (Geering et al. 2008, Menkhorst et al. 2017). Also occupies artificial habitats. Not recorded during the field survey.	**Likelihood of Occurrence:** Possible There are no records within 50 km however this species could potentially be present following large rainfall events. **Potential for residual impact:** Possible. **Area of potential impact:** 8.6 ha (RE 5.3.22)

NC Act (Qld) Listed Species							
Flora							
Acacia peuce Waddy	V	-	50km: 0 100km: 0	-	50km: N/A 100km: N/A	*Acacia peuce* is restricted to two sites near Boulia and Birdsville in Queensland and a third site Mac Clark (*Acacia peuce*) Conservation Reserve in the Northern Territory (ALA 2024). The total population is approximately 76,000 individuals spread over a total area of 74,000 square kilometres but with a total area of occupancy of only 400 km2. The tree is found in open arid plains that usually receive less than 150 millimetres (5.9 in) of rain per annum. They grow on shallow sand aprons overlaying gibber or clay slopes and plains and between longitudinal dunes or on alluvial flats between ephemeral watercourses. The soils can be saline or contain high levels of gypsum (ALA 2024). Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely. This is a large characteristic species known from just three sites. **Potential for residual impact:** Unlikely.
Eremophila stenophylla -	V	-	50km: 0 100km: 0	-	50km: N/A 100km: N/A	This *Eremophila* occurs from central Queensland south to near Yowah and Thylungra, This species usually occurs in *Acacia* woodland on skeletal soil in rocky places or along watercourses. Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely There are no records from within 100 km. **Potential for residual impact:** Unlikely.

Birds							
Epthianura crocea crocea Yellow Chat (gulf)	V	-	50km: 1 100km: 4	2012	50km: N/A 100km: N/A	Yellow chat occurs from north-west WA across the NT to south-west and coastal Qld. In south-west Qld it is sparsely scattered to the north and east of Birdsville mostly in the Diamantina River and central Coppers creek drainage basins (Higgins et al. 2001). It occurs in low vegetation surrounding wetlands, occasionally grassland and other areas of low vegetation such as saltbush. Often found around the interface of grasslands and saltmarsh. Not recorded during the field survey.	**Likelihood of Occurrence**: Unlikely, There is no suitable habitat of permanent wetlands with adjacent saltmarsh area within PL 1125. **Potential for residual impact:** Unlikely.

5.2. Listed Species Summary

The outcomes of the listed species impact assessment resulted in 11 species which are EPBC listed and considered as having a potential residual impact from the development due to a 'likely' or 'possible' likelihood of occurrence within PL 1125 (Table 6). These species include threatened and or migratory species as follows:

- Australian Painted Snipe *Rostratula australis,* EPBC Endangered
- Curlew Sandpiper *Calidris ferruginea*, EPBC Critically Endangered and Migratory;
- Common Greenshank *Tringa nebularia* EPBC Endangered and Migratory;
- Sharp-tailed Sandpiper *Calidris acuminata,* EPBC Vulnerable and Migratory;
- Blue-winged Parrot *Neophema chrysostoma,* EPBC Vulnerable and Migratory (within Australia);
- Southern Whiteface *Aphelocephala leucopsis*, EPBC Vulnerable;
- Dusky Hopping-mouse *Notomys fuscus*, EPBC Vulnerable;
- Common Sandpiper *Actitis hypoleucos*, EPBC Migratory;
- Pectoral Sandpiper *Calidris melanotos*, EPBC Migratory;
- Marsh Sandpiper *Tringa stagnatilis*, EPBC Migratory; and
- Red-necked Stint *Calidris ruficollis*, EPBC Migratory.

Potential habitat for all of these species occurs within PL1125 and within the disturbance footprint for the project as follows:

- RE 5.3.22 provides potential habitat for the following species:
    - Australian Painted Snipe Rostratula australis, EPBC Endangered
    - Sharp-tailed Sandpiper Calidris acuminata, EPBC Vulnerable and Migratory;
    - Curlew Sandpiper Calidris ferruginea, EPBC Critically Endangered and Migratory;
    - Common Greenshank Tringa nebularia EPBC Endangered and Migratory;
    - Blue-winged Parrot Neophema chrysostoma, EPBC Vulnerable and Migratory (within Australia);
    - Common Sandpiper Actitis hypoleucos, EPBC Migratory;
    - Pectoral Sandpiper Calidris melanotos, EPBC Migratory;
    - Marsh Sandpiper Tringa stagnatilis, EPBC Migratory; and
    - Red-necked Stint Calidris ruficollis, EPBC Migratory
- RE 5.6.4 provides potential habitat for Southern Whiteface;
- RE 5.6.5 and RE 5.6.8 provides potential habitat for Dusky Hopping-mouse;

- RE 5.9.3 and RE 5.9.4 provides potential habitat for Blue-winged Parrot.

5.3. Disturbance Footprint

The total footprint for the Vali application is 41.99 hectares which represents 0.92% of PL1125. The disturbance footprint areas for each regional ecosystem are provided in Table 6. Regional ecosystem 5.6.5 and 5.6.8 are lumped due to difficulties in delineating these and therefore mapping these at the scale required. Regional ecosystems 5.9.3 and 5.9.4 are lumped due to similar difficulties. Regional ecosystem 5.3.22 is a groundwater dependant ecosystem and hence is a MSES regulated vegetation (defined watercourse) and is within the disturbance footprint at five locations, Vali 3, Vali 4, Vali 5 and two locations along the pipeline corridor (Figure 7). None of the other regional ecosystems are designated as regulated vegetation.

Table 6. Disturbance footprint areas for each Regional Ecosystems (REs).

Regional Ecosystem ID	**Regional Ecosystem (RE) Description**	**Disturbance Area ha (% of RE in PL1125)**	**RE Area in PL1125 ha (%)**
5.3.22	Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes.	8.69 (0.92%)	945.22 (20.81%)
5.6.4	*Atalaya hemiglauca +/- Acacia aneura +/- Acacia* spp. *+/- Corymbia terminalis* low open woodland on reticulate sand dunes.	11.41 (17.05%)	66.91 (1.47%)
5.6.5 or 5.6.8	Variable sparse to open-herbland or *Triodia basedowii* hummock grassland on dune flanks, crests and sandy interdunes; or *Zygochloa paradoxa* and/or *Crotalaria eremaea +/- Triodia basedowii* open tussock grassland and herbland on mobile crests and slopes of sand dunes.	8.80 (0.41%)	2151.54 (47.37%
5.9.3 or 5.9.4	*Astrebla* spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments; or *Aristida contorta* sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover.	13.09 (0.95%)	1378.75 (30.35%)
Total		**41.99 (0.92%)**	**4542.42**

5.4. Significant Residual Impact (SRI) Guideline Criteria Assessment

The Queensland Significant Residual Impact (SRI) Guideline (DEHP 2014) was used to determine whether or not the Vali Field project will, or is likely to have a significant residual impact on a matter of state environmental significance (MSES). Assessment frameworks for the activities to which this guideline applies have an 'avoid, mitigate, offset' obligation that requires in the first instance, avoiding impacts on prescribed environmental matters and if avoidance cannot be achieved, demonstrating that impacts have been carefully managed and minimised (mitigated). If there is still an impact on the MSES after all reasonable avoidance and on-site mitigation measures for the prescribed activity have been or will be undertaken, this guideline should be used to determine the 'significance' of the impact. If after avoidance and mitigation, there is still an impact on prescribed environmental matters, an offset may be required where the impact is, or is likely, to be significant (DEHP 2014).

The SRI Guideline does not use a likelihood and consequence framework to assess risk and instead uses 'significant residual impact criteria' to describe what level of impact is significant for each of the prescribed environmental matters. does not define the term significant.

The SRI guideline covers the following prescribed environmental matters:

- Regulated vegetation
- Connectivity areas
- Wetlands and watercourses
- Protected wildlife habitat
- Koala habitat in SE Queensland
- Protected areas
- Fish habitat areas and highly protected zones of marine parks
- Waterways providing for fish passage
- Marine plants
- Legally secured offset areas.

The desktop review and ground truthing during the field survey determined that there are none of the following prescribed environmental matters within PL1125 these are consequently not assessed any further:

- Koala habitat in SE Queensland
- Protected areas
- Fish habitat areas and highly protected zones of marine parks
- Waterways providing for fish passage
- Marine plants
- Legally secured offset areas.

The remaining prescribed environmental matters are assessed below using the SRI guideline.

Where appropriate a risk-based approach is also used to assess and describe risk based on categories used for threatened species national recovery plans. These are as follows:

Categories for likelihood are defined as follows (DCCEEW 2022):

- Almost certain – expected to occur every year,
- Likely – expected to occur at least once every five years,
- Possible – might occur at some time,
- Unlikely – such events are known to have occurred on a worldwide basis but only a few times,
- Rare or Unknown – may occur only in exceptional circumstances; OR it is currently unknown how often the incident will occur.

Categories for consequences are defined as follows (DCCEEW 2022):

- Not significant – no long-term effect on individuals or populations,
- Minor – individuals are adversely affected but no effect at population level,
- Moderate – population recovery stalls or reduces,
- Major – population decreases,
- Catastrophic – population extinction.

The risk matrix used by DCCEEW for their National Recovery Plans uses a qualitative assessment drawing on peer reviewed literature and expert opinion. Levels of risk are identified in Table 7 and the associated priority for action are defined as follows (DCCEEW 2022):

- Very High – immediate mitigation action required,
- High – mitigation action and an adaptive management plan required, the precautionary principle should be applied,
- Moderate – obtain additional information and develop mitigation action if required,
- Low – monitor the threat occurrence and reassess threat level if likelihood or consequences change.

Table 7 Risk matrix used by DCCEEW for their National Recovery Plans (DCCEEW 2022)

Likelihood of occurrence	Consequences				
	Not significant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	Low	Moderate	Very High	Very High	Very High
Likely	Low	Moderate	High	Very High	Very High
Possible	Low	Moderate	High	Very High	Very High
Unlikely	Low	Low	Moderate	High	Very High
Rare or Unknown	Low	Low	Moderate	High	Very High

5.4.1. Regulated Vegetation

Regulated vegetation includes vegetation that:

- is an endangered or of concern regional ecosystem, as defined under the Vegetation Management Act 1999; or
- intersects with an area shown on the vegetation management wetlands map, as defined under the Vegetation Management Act 1999, (ie. the component of a regional ecosystem that lies within a mapped wetland); or
- is located within the defined distance from the defining banks of a watercourse identified on the vegetation management watercourse map, as defined under the Vegetation Management Act 1999.

No endangered or of concern regional ecosystem, as defined under the Vegetation Management Act 1999 are present in PL 1125. Areas shown on the vegetation management wetlands map are present within PL1125 and the disturbance footprint intersects with some of these areas which are identified as RE 5.3.22 *Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes*. RE 5.3.22 is not endangered or of concern and no areas constitute a defined watercourse however as they are included within mapped wetlands (Category 8f) an assessment of the three criteria of section 2.1 of the SRI guideline is required.

Criteria 1: The flowline is consistent with 'linear infrastructure'. The flowline corridor is 40 meters in width which exceeds the 20 m wide threshold for a sparse (structural category) regional ecosystem (RE 5.3.22) that lies within a mapped wetland. Criteria 1 is therefore exceeded.

Criteria 2: Clearance of 5.3.22 is within 50 m of the defining bank (the high-water point of flooding) of a vegetation management wetland community that lies within a mapped wetland. All clearance of RE 5.3.22 within 50 m of the defining bank is also considered within Criteria 1.

Criteria 3: This is not applicable as there is no defined watercourse.

In accordance with the first note of the SRI guideline section 2.1 the project footprint therefore results in a significant residual impact on the regional ecosystem that lies within the mapped wetland (RE 5.3.22) as Criteria 1 and Criteria 2 are exceeded.

The disturbance footprint results in a total clearance area of 8.69 ha of RE 5.3.22. This disturbance area represents 0.92 % of RE 5.3.22 within PL 1125.

5.4.2. Connectivity areas

The DETSI Landscape Fragmentation and Connectivity (LFC) tool was used to assess whether significant impacts to connectivity would occur from the existing and proposed disturbance within PL1125. It consists of two analysis tools the *Connectivity Impact Assessment (CIA) Tool* and the *Standalone Landscape Fragmentation Analysis Tool*. The LFC tool determines the significance of a proposed impact on connectivity areas by testing:

1. Whether the change in the core ecosystem extent at the local scale (post impacts) is greater than a threshold determined by the level of fragmentation at the regional scale; or

2. If any core area (greater than or equal to one hectare) is lost or reduced to patch fragments (core to non-core).

The LFC Tool User Guide was used to interpret the results and determine whether constitutes a significant residual impact to the connectivity prescribed environmental matter. If either of the test results are *True,* then the project impact is considered to cause a significant residual impact on connectivity areas.

The results of the *LFC Assessment Tool* analysis are presented in Table 8 to Table 10. The core area is identified as greater than 500 ha and is 100 % covered by remnant vegetation.

For Test 1 the local change threshold for an impact is 50% (Table 10 LOCAL_CHANGE_THRESHOLD) and the change to the core area from the impact is 0.9601% (Table 10 PROP_ CORE_ CHANGE) which is well below the threshold for an impact.

For Test 2 the number of pre-clearance core areas is identified as 1 and the number of each post clearance core areas is also identified as 1 and therefore does not change and the core areas is not reduced to a patch fragment (Table 9).

Table 10 contains the Significance Assessment results which identify a FALSE results for both tests which confirms that the project does not result in a significant impact to connectivity.

The disturbance areas consist of linear disturbance such as the flowline and access tracks and blocks of disturbance such as wellpads, ponds and associated infrastructure. The flowline corridor is approximately 40 m wide which includes the buried pipeline and an access track. Bare ground makes up a small proportion of the flowline following rehabilitation and did not appear to be different from adjacent areas (Figure 8 and Figure 9). The width of the corridor that was disturbed for construction of the flowline appeared during ground-truthing conducted on 8

September 2024 to be much less than the 40 meters designated as the corridor, typically less than 20 meters in width (Figure 8). Regeneration of native vegetation was evident along the flowline following good rainfall in 2023 and 2024 (Figure 8 and Figure 9) and contains vegetation cover that is not substantially different from adjacent areas. It is considered that the flowline has a very low impact on connectivity of flora and fauna including listed species.



Figure 8 The flowline west of Vali 1 on 8 September 2024 within RE5.6.8 on a dune crest, following rehabilitation and good rainfall.



Figure 9 The flowline west of Vali 1 on 8 September 2024 following rehabilitation and good rainfall.

Other linear disturbance such as access tracks are approximately 3 to 5 meters wide and consist of bare ground. Wildlife often use these tracks for easy access and resting as observed during the field survey. The tracks are consistent with pastoral tracks which are prevalent throughout the area and are not considered to pose any greater barrier to connectivity for wildlife than any other tracks in the region. It is considered that the access tracks have a very low impact on connectivity for wildlife including listed species.

Remaining areas of disturbance consist of well fields, lined catchment ponds and associated infrastructure for the five Vali wells. They are roughly square to rectangular and located in separate areas (Figure 7). Disturbance areas for the five well pads and associated infrastructure range from 2.68 hectares for Vali-2 to 7.16 ha for Vali-1. Valia 1, Vali-2 and Vali-3 have already been built but Vali-4 and Vali-5 are yet to be constructed. They are all located in interdunal plains or swales with larger areas of habitat adjacent to them than is being disturbed. In all cases corridors of habitat is available surrounding the disturbance areas for movement of wildlife at a local scale. At a larger scale the disturbance represents a very small extent of existing habitats, less than 1% of PL1125.

It is therefore considered that the disturbance area for the Vali Field has a very low impact on connectivity for wildlife in general at the local scale and at the regional scale.

All of the listed species identified as potentially occurring within PL1125 and the project footprint are birds apart for one mammal, Dusky Hopping-mouse. Nine of the ten species of birds (the eight waders plus Blue-winged Parrot) are highly mobile, being either migratory or nomadic and regularly or periodically move long distances to take advantage of seasonal or environmental conditions. Disturbance on the scale of the Vali wellfield project would present no barrier to these birds which can move on the scale of tens to hundreds of kilometres within a day.

The remaining species of bird, Southern Whiteface, is considered to be sedentary with local movements undertaken by young and unpaired birds (Higgins & Peter 2002). This species is known to move outside of their normal home range during times of drought, and they have been recorded in foraging parties in winter (Higgins & Peter 2002) which typically consist of mixed species roaming over larger areas than their normal home range. The scale of disturbance from the Vali Field is not considered to be a significant barrier to the species given the dimensions of the disturbance areas are measured in hundreds of meters and suitable habitat remains in adjacent areas to the disturbance footprint.

Dusky Hopping-mouse lives in sandy dunes and RE 5.6.5 and RE 5.6.8 provide potential habitat for Dusky Hopping-mouse within PL 1125. These habitats are typically found in a linear arrangement along dune crests which may be narrow corridors or broader where dunes are lower and wider. The areas of dunes which are affected are along the flowline and access tracks as the wellfield infrastructure is located away from dunes. The disturbance to dune habitats from construction of the flowline has largely been rehabilitated and appears similar in cover to adjacent areas, as discussed above. Access tracks through dunes result in a bare ground at scale of about 3 m to 5 m which is consistent with pastoral tracks in the area and some areas of bare ground that naturally occur within the dunes. Such distances do not present a barrier to Dusky Hopping-mouse. Foraging distances for the species can reach up to 400 m per night, with individuals extending their foraging range to 1.5 km over three nights (ALA 2025).

It is considered that the disturbance area for the Vali Field has a very low impact on connectivity for listed species at the local scale and at the regional scale.

Table 8. Site scale results from the from the Connectivity Impact Assessment Tool analysis.

COREID	VALUE	LABEL	AREA_HA
1	0	non-rem	42.0
1	1	patch	1.93
1	2	edge	74.93
1	3	perforated	None
1	4	core (< 100 hectares)	None
1	5	core (100-500 hectares)	None
1	6	core (> 500 hectares)	12265.1
1	7	water	None

Table 9 Local scale summery from the Connectivity Impact Assessment Tool analysis.

VALUE	LABEL	PRE_ GRID_ AREA	PRE_ GRID_ COUNT	PRE_ PATCH_ COUNT	POST_ GRID_ AREA	POST_ GRID_ COUNT	POST_ PATCH_ COUNT	DIFF_ GRID_ AREA	DIFF_ GRID_ COUNT	DIFF _PATCH_ COUNT	PROP_ GRID_ AREA	PROP_ GRID_ COUNT	PROP_ PATCH_ COUNT
0	non-rem	0	0	0	42.04	4204	2	42.04	4204	2	NA	NA	NA
1	patch	0	0	0	1.93	193	0	1.93	193	0	NA	NA	NA
2	edge	0	0	0	74.93	7493	2	74.93	7493	2	NA	NA	NA
6	core (> 500 hectares)	12384	1238400	1	12265.1	1226510	1	-118.9	-11890	0	0.990399	0.990399	1

Table 10. Significance Assessment results from the Connectivity Impact Assessment Tool analysis.

TOTAL_ CORE_ REGIONAL	PROP_ CORE_ REGIONAL	LOCAL_ CHANGE_ THRESHOLD	TOTAL_ CORE_ LOCAL	PROP_ CORE_ LOCAL	POST_ PROP_ CORE_ LOCAL	PROP_ CORE_ CHANGE	SIGNIF_ LOCAL_ CORE_ CHANGE	SITE_ CORE_ NON CORE	SIGNIFICANT_ IMPACT
95491.66	99.9886	50	12384	100	99.0399	0.9601	FALSE	FALSE	FALSE

5.4.3. Wetlands and Watercourses

PL 1125 does not contain any of the following wetlands:

- wetland in a wetland protection area as shown on the Map of referrable wetlands under schedule 12, part 2 of the Environmental Protection Regulation 2008;
- wetlands of high ecological significance as shown on the Map of referrable wetlands under schedule 12, part 2 of the Environmental Protection Regulation 2008; and
- wetland or watercourse in a high ecological value waters as identified under the Environmental Protection (Water) Policy 2009, schedule 2.

The SRI assessment finds that the project does not have a significant residual impact on prescribed wetlands or watercourses.

5.4.4. Protected Wildlife Habitat: Environmentally Sensitive Area – Essential Habitat

Mapping layers within Queensland Globe do not identify any Category A or Category B environmentally sensitive areas (ESAs) within PL1125. If an area contains both protected wildlife habitat and is mapped as a category A, B or C RVM area then it is defined as a Category C ESA under the Vegetation Management Act 1999. Category C ESAs must be identified by ground truthing of potential habitat for protected wildlife including endangered and vulnerable wildlife species. The whole of PL1125 is identified as category B C RVM mapped area in the Queensland Globe vegetation layer consequently the whole of PL1125.

Areas of PL1125, including the disturbance area, that contain RE 5.3.22 are considered Category C Environmentally Sensitive Area – Essential Habitat for endangered wildlife as RE 5.3.22 provides suitable habitat for the EPBC endangered Curlew Sandpiper, Common Greenshank and Australian Painted Snipe. The area of RE 5.3.22 within the disturbance footprint is 8.7 hectares which is 0.92 % of RE 5.3.22 that is mapped within PL 1125 (945.22 ha). The desktop review identified records for Curlew Sandpiper, Common Greenshank and Australian Painted Snipe within 50 km. Australian Painted Snipe is a nomadic wetland species which could possibly be present during favourable conditions. The remaining two species are international migrants and only present in Australia between September and March. The preferred habitats for these species differ slightly but they would all potentially use ephemeral wetlands identified as RE 5.3.22 on a temporary basis when water is present.

All areas of PL1125 and the disturbance area are considered Category C Environmentally Sensitive Area – Essential Habitat for vulnerable wildlife as all of PL1125 is mapped as Category B RVM area and all regional ecosystems within PL1125 provide suitable habitat for vulnerable species as follows:

- RE 5.3.22 for Sharp-tailed Sandpiper and Blue-winged Parrot;

- RE 5.6.4 for Southern Whiteface;
- RE 5.6.5 and RE 5.6.8 for Dusky Hopping-mouse; and
- RE 5.9.3 and RE 5.9.4 for Blue-winged Parrot.

This disturbance area results in habitat loss for these species as follows:

- 8.69 ha of 5.3.22 which is equivalent to 0.92% of this community as mapped within PL 1125;
- 11.41 ha of RE 5.6.4 which is equivalent to 17.05% of this community as mapped for PL 1125;
- 8.8 ha of RE 5.6.5/RE 5.6.8 which is equivalent to 0.41% of this community as mapped for PL 1125;
- 13.09 ha of RE 5.93/RE 5.94 (combined) which is equivalent to 0.95% of this community as mapped for PL 1125.

As all areas of PL1125 and the disturbance footprint are categorised as Category C Environmentally Sensitive Area – Essential Habitat and therefore do not lie within a primary or secondary protection zones. The areas of the disturbance footprint that are categorised as Category C Environmentally Sensitive Area (ESA) – Essential Habitat and will therefore require authorisation for disturbance are presented according to the infrastructure category in Table 11.

Table 11 Category C Environmentally Sensitive Area (ESA) – Essential Habitat that will require Authorised disturbance to Environmental Authorisation to disturb

Tenure	**Description of Infrastructure**	**Max Disturbance footprint (ha)**	**ESA Protection Zone**	**Coordinates**
Constructed				
PL1125	Vali 1 Well and associated ponds and infrastructure	7.16	Category C ESA	-27.99192 141.06211
PL1125	Vali 2 Well and associated ponds and infrastructure	3.90	Category C ESA	-27.99477 141.07417
PL1125	Vali 3 Well and associated ponds and infrastructure	5.63	Category C ESA	-27.99665 141.05751
PL1125	Flowline and	13.34	Category C	-27.99242

	pipelines		ESA	141.05741 -27.99499 141.03456
PL1125	Access Tracks	3.00	Category C ESA	-27.99438 141.06936 -27.99412 141.05735
PL1125	Kudnari Bore	0.60	Category C ESA	-27.98032 141.05211
Proposed				
PL1125	Vali 4 Well and associated ponds and infrastructure	3.11	Category C ESA	-27.98331 141.06514
PL1125	Vali 5 Well and associated ponds and infrastructure	3.11	Category C ESA	-27.98102 141.05546
PL1125	Access Tracks	2.14	Category C ESA	-27.98785 141.06488

5.5. Impact assessment of proposed and existing activities on Environmentally Sensitive Areas (ESAs) – Essential Habitat

The outcomes of the listed species impact assessment identified seven EPBC Endangered and Vulnerable species with a 'likely' or 'possible' likelihood of occurrence within PL 1125 (Table 5). These species are further assessed below to determine if the potential impact is likely to be significant. This is based on the impact criteria provided in section 5.1 of the Significant Residual Impact (SRI) guideline for endangered and vulnerable wildlife habitat (including essential habitat) (DEHP 2014). The guideline states that 'An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:

- lead to a long-term decrease in the size of a local population; or
- reduce the extent of occurrence of the species; or
- fragment an existing population; or
- result in genetically distinct populations forming as a result of habitat isolation; or

- result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or
- introduce disease that may cause the population to decline, or
- interfere with the recovery of the species; or
- cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.

5.5.1. Potential Impacts and Mitigation Measures

In accordance with section 125 of the Environmental Protection Act 1994 (EP Act), an application for an environmental authority (EA) must include an assessment of the likely impact of each environmentally relevant activity on environmental values including Environmentally Sensitive Areas (ESAs) – Essential Habitat. This includes a requirement to provide details of:

- any emissions or releases likely to be generated by the activities;
- descriptions of the risk and likely magnitude of the impacts;
- details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and
- details of how the impacted land will be rehabilitated after the activities cease.

Details are provided of these requirements in the Vali Gas Field Project Supporting Documentation for Site-Specific Application and are not repeated here. The relevant sections of the application are:

- Section 3.2 for a description of the emissions from the project;
- Section 3.3 including Table 6 for a description of the risk and likely magnitude of impacts on the environmental;
- Section 3.4 for details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and
- Section 3.5 for details of how the impacted land will be rehabilitated after the activities cease.

This section uses information presented in Sections 3.2 to 3.5 of the application supporting documentation to undertake a significant residual impact assessment using the impact criteria provided in section 5.1 of the Significant Residual Impact (SRI) guideline (DEHP 2014).

The impact assessment for the project (Table 3.6 – Natural Environmental Impacts and Risk Assessment of the Supporting Documentation for Site-Specific Application Vali Gas Field Project) identified the following hazards and associated potential impacts to fauna and fauna habitats:

- Air Emissions (dust),

- Fire or explosion,
- Groundwater contamination,
- Hazardous materials – storage, handling, spills/leaks,
- Light emissions (during construction only),
- Long-term site instability,
- Loss of well integrity,
- Noise and vibration emissions,
- Surface water contamination,
- Vehicle movements,
- Waste – storage, handling and disposal,
- Introduction of invasive flora and fauna,
- Land clearing.

The impacts assessment provided pre-mitigation risk ratings, and residual risk ratings for each identified risk with pre-mitigation risks ranging from very low to medium and residual risk ratings from very low to low. The highest risk ratings were for the following risks which all had a pre-mitigation rating of *medium* and residual risk of *low*:

- Groundwater contamination,
- Hazardous materials – storage, handling, spills/leaks,
- Long-term site instability,
- Loss of well integrity,
- Waste – storage, handling and disposal, and
- Land clearing.

Mitigation and management measures that have been or will be implemented and are relevant to these potential impacts are given below.

Vegetation clearance:

- Undertake project activities to avoid watercourses.
- Locate access tracks to avoid surface water features such as wetland areas and to maintain pre-existing water flows.
- Mark the areas to be cleared before clearing.
- Clearing should be supervised to ensure no 'out of bounds' clearing takes place.
- Clearing should be conducted directionally in a manner that allows fauna species the best opportunity to relocate to native habitat.
- Placing topsoil in uncompacted stockpiles to minimise loss of seed viability and

soil biota.

- Use existing tracks, roads and/or seismic lines for access, where practicable, to prevent unnecessary dust emissions and habitat removal.

Vehicle collision with wildlife:

- Restrict traffic to established roads and tracks only.
- Maintain a 40-km/h speed limit on all access tracks, to reduce the risk of animal strike.

Introduction of weeds:

- Inspect and certify earth moving equipment as weed-free prior to accessing the project site.
- Vehicles and mobile equipment will be parked only in designated parking areas. Vegetated areas will not be used for parking.
- Monitor Project site for new or increased weed issues and manage accordingly.
- Undertake induction and training sessions for all site personnel prior to working on site.

Waste causing impacts to fauna or habitat:

- Mange waste in accordance with the waste and resource management hierarchy and the waste and resource management principles.
- Undertake an initial hazard assessment of waste streams and storages.
- Segregate waste streams to maximise reuse and recycling.
- No disposal or use of regulated waste.
- Restrict the availability of domestic waste by covering bins to prevent access by scavenging species.
- Manage sewage effluent and/or grey water in accordance with conditions of environmental authority
- Monitor sumps for overflow during periods of high rainfall Low hazard water storage ponds operated and maintained in accordance with accepted engineering standards appropriate for the purpose for which the pond is intended to be used.
- Design pond floor and sides with material that will contain the wetting front and any entrained contaminants within the bounds of the containment system during operation and decommissioning and rehabilitation.
- Monitor for early signs of loss of structural or hydraulic integrity as specified in the initial hazard assessment.
- When no longer required, low hazard water storage ponds to be decommissioned to no longer accept inflow from petroleum activities.

Surface water contamination - Spillage from loss of well integrity and hazardous

materials:

- Perform all activities in accordance with applicable industry and regulatory standards.
- Assess well bore integrity prior to commencing drilling and rectify any issues immediately.
- Develop an Emergency Response Plan, which includes procedures for response to well issues (e.g. blow out).
- Undertake induction and training sessions for all site personnel, to ensure an understanding of emergency response procedures.
- Store all dangerous goods and hazardous substances in accordance with manufacturers recommendations and workplace health and safety requirements.
- Volume of chemicals stored onsite will not exceed those listed under Schedule 2 (Part 2 Section 8) of the Environmental Protection Regulation 2008.
- Safety Data Sheets (SDS) to be available for all chemicals stored onsite.
- Minimise fuel transfer where possible, and use drip trays at all times.
- Store residual drilling material in sumps.
- Drilling fluids will not be oil-based or synthetic oil-based.
- Store spill response kits at all locations where hazardous materials are handled or stored.
- Undertake induction and training sessions for all site personnel, to ensure an understanding of SDS application and spill prevention/response.

Long-term site instability - Surface water contamination

- Implement sediment and erosion control measures to prevent soil loss and deposition beyond Project sites
- Rehabilitate the site promptly following decommissioning, include the following:
    - remove hardstand areas,
    - reshape disturbed areas to a stable landform,
    - re-profile contours to be re consistent with the surrounding landform,
    - re-establish surface draining lines,
    - reinstate topsoil.
- Monitor performance of rehabilitation activities until final acceptance criteria are met.
- Develop a rehabilitation report and submit to the administering authority.

Fire or Explosion:

- Maintain and appropriately sign all fire-fighting equipment

- Fire access tracks will be maintained to ensure ease of access to site
- Store all dangerous goods and hazardous substances in accordance with manufacturers recommendations and workplace health and safety requirements
- Design, construct and operate all equipment and infrastructure to reduce the potential for ignition
- Restrict smoking to areas clear of any vegetation and prohibit disposal of cigarette butts to land
- Monitor fire conditions, weather conditions, current fires in the area and high fire risk days
- Develop an Emergency Response Plan, which includes procedures for response to fire
- Undertake induction and training sessions for all site personnel, to ensure an understanding of fire prevention and response procedures.

5.5.2. Environmentally Sensitive Areas (ESAs) – Essential Habitat for Endangered Species

The listed species likelihood and residual impact assessment (Table 5) identified three EPBC Endangered species Curlew Sandpiper, Common Greenshank and Australian Painted Snipe as having records within 50 km of PL1125 and therefore as possibly occurring within the project footprint. All three of these species are waders which depend on wetlands and suitable habitat for these species has been identified within PL 1125 as RE 5.3.22. The disturbance area includes 8.80 hectares of RE 5.3.22 (Figure 10) which is identified as Category C Environmentally Sensitive Areas for Endangered Wildlife.

The most critical habitat waders and water birds including the three species identified above are designated as RAMSAR wetlands which are internationally recognised and Migratory Shorebird Habitat locations which are wetlands of national importance. Wetland habitat is considered to be internationally important if it regularly supports:

- 1 percent of the individuals in a population of one species or subspecies of waterbird; or,
- a total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds if it regularly supports:

- 0.1 percent of the flyway population of a single species of migratory shorebird; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

There are none of these wetlands within or near PL1125 with the nearest being the ephemeral Lake Yamma Yamma which is located approximately 170 kilometres to the north of PL1125.

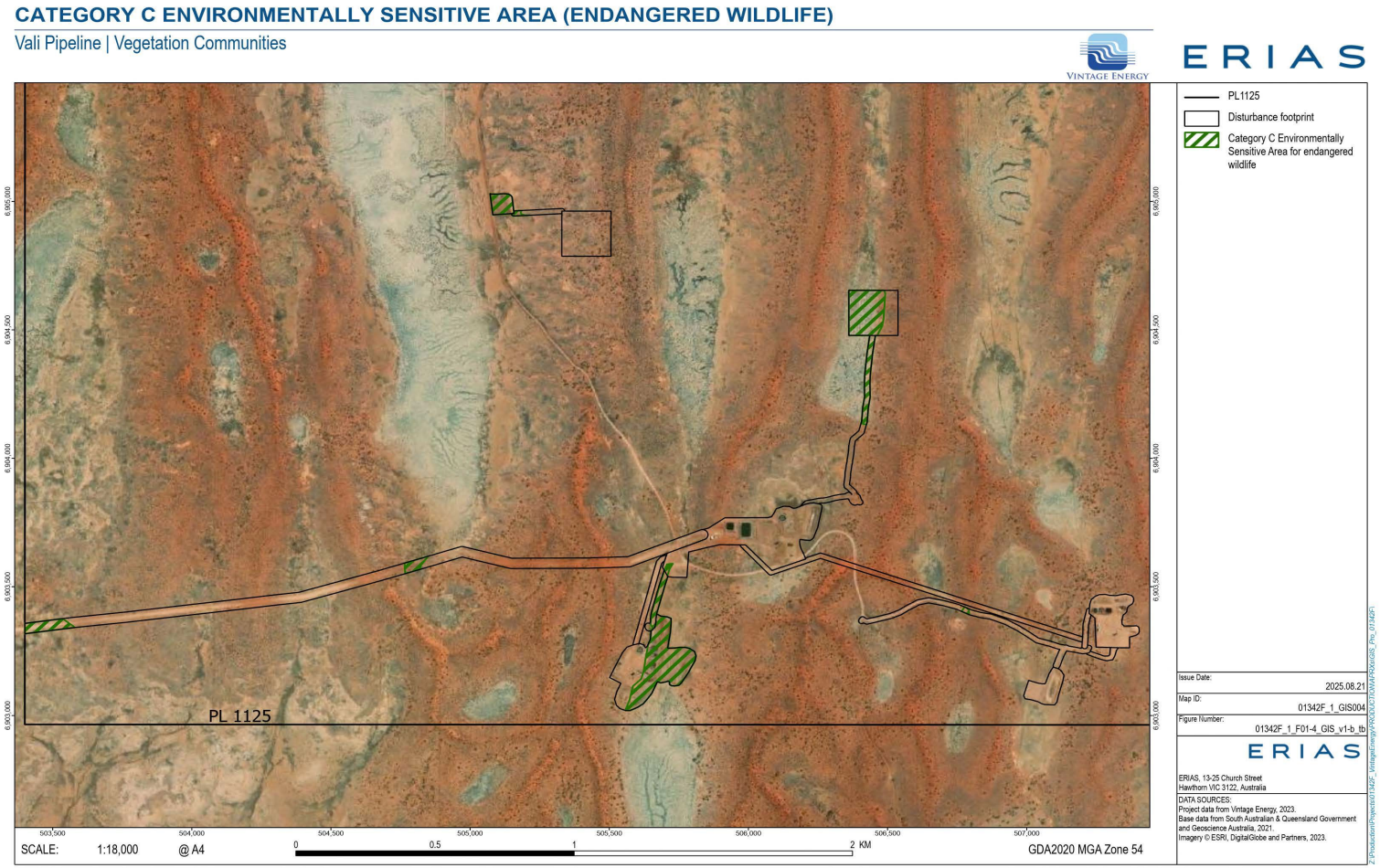


Figure 10 Areas of RE 5.3.22 within the disturbance footprint which are identified as Category C Environmentally Sensitive Areas for Endangered Wildlife.

Curlew Sandpiper *Calidris ferruginea*, EPBC Act: Critically Endangered and Migratory, NC Act: Critically Endangered

No. of Records within 50 km: 1 **No. of Records within 100 km:** 3

Not recorded during the survey.

Distribution

Curlew sandpipers breed across Arctic Siberia and migrate through south-east Asia to Australia and other countries in the southern hemisphere. Birds also move from their breeding grounds across Siberia to India, continuing down. They may also move overland to east Asia and via the coast of China to Australia (BirdLife International 2021).

Curlew sandpipers are most common in the far south-east and north-west of Australia. They are found in many Australian coastal sites and may also be seen inland in suitable wetland habitats (DCCEEW 2023a). In Queensland there are scattered records in the Gulf of Carpentaria. The species is widespread along the coast south of Cairns. Inland, the species is sparsely scattered, but there have been regular sightings around Mount Isa. (DCCEEW 2023a).

Population and declines

There are currently an estimated 40,100 (range 8,100–125,300) mature individuals in the wild with a continuing declining trend (Clemens et al. 2021). The extent of occurrence (EOO) is estimated at 10,900,000 km^2 (range 10,400,000–11,400,000 km^2) and area of occupancy (AOO) at 8,000 km^2 (8,000–12,000 km^2). Despite the loss and degradation of wetland habitats, Clemens et al. (2021) considers both the EOO and AOO to be stable (DCCEEW 2023a).

The most recent analysis by Rogers et al. (2023) estimated the mean change between 1993 and 2021 was -6.4% annually for an estimated total decline of -84.5% (95%CI: -90.9, -74.4). This is equivalent to a decline of -53% (95%CI: -72.3, -18.7) over three generations (DCCEEW 2023a).

Declines are thought to be due to the increasing frequency and length of droughts, particularly in south-eastern Australia, changes to coastal staging locations, particularly along the coast of the Yellow Sea where there is rapid development for aquaculture and industry; invasion by cordgrass (*Spartina alterniflora*); pollution from domestic, industrial and aquaculture discharges, oil and pesticides; and hunting and incidental drowning in fishing nets and traps (Clemens et al. 2021). Available habitat is also shrinking through a combination of restricted inflow of sediments from increasingly dammed rivers and sea level rise (DCCEEW 2023a).

Habitat and Ecology

Curlew sandpiper often feed in mixed flocks with other species of shorebirds, pecking at invertebrates on the surface of the mud or making shallow probes below its surface (BirdLife Australia 2021). They generally forage within mudflats and nearby shallow water. In non-tidal wetlands, they usually wade, mostly in water 15–30 mm,

but up to 60 mm deep. In intertidal areas, they forage at the edge of shallow pools and drains, and along sandy shores, often following the receding tide to forage near the water edge (DCCEEW 2023a). They also feed on part of the mudflats that have been exposed for a longer period, foraging in small groups (DCCEEW 2023a). Occasionally they forage on wet mats of algae or waterweed, or on banks of beachcast seagrass or seaweed. At high tide, the species tends to forage among low sparse emergent vegetation such as saltmarsh, and sometimes within flooded paddocks or inundated saltflats (Higgins & Davies 1996).

Roosting mainly occurs around 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. Roosting has been recorded on occasion near ponds in saltworks and sewage farms. Less often, individuals are recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand (DCCEEW 2023a).

Regional Ecosystem RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes provides potentially suitable habitat Curlew Sandpiper within PL 1125.

Critical Habitat

The National Directory of Important Migratory Shorebird Habitat identifies all known feeding and roosting sites of Curlew Sandpiper in Australia (Weller et al. 2020). These areas are identified as internationally or nationally important in accordance with the EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species.

An Internationally Important site is determined for Curlew Sandpiper if it regularly supports more than 1 percent of the species' total population (1 percent flyway of the population = 900 individuals, Weller et al. 2020).

A Nationally Important site is determined for Curlew Sandpiper if it regularly supports more than 0.1 percent of the bird's Flyway population (0.1 percent of the flyway population = 90 individuals, Weller et al. 2020).

Area of Disturbance

The area of RE 5.3.22 within the disturbance footprint is 8.69 hectares which is 0.92 % of RE 5.3.22 that is mapped within PL 1125 (945.22 ha). Areas of RE 5.3.22 that were disturbed along the flowline and pipeline corridors have revegetated following rehabilitation and now provide similar habitats to the original vegetation.

Identified Threats

The conservation advice for Curlew Sandpiper identifies the following threats:

- Major Threats, Very High Risk:
    - Habitat loss caused by residential and commercial development
    - Sea level rise
    - Climate change in Arctic breeding areas*

    - Downstream effects of large dams
- Moderate threats Very High Risk:
    - Habitat loss caused by industrial aquaculture*
    - Invasion of mudflats and coastal saltmarshes by mangroves and cordgrass*
    - Hunting*
    - Increased frequency and length of droughts
- Moderate threats, High Risk:
    - Disturbance at feeding and roosting sites
- Minor threats, moderate risk:
    - Chronic and acute pollution

* = threat occurs mostly outside Australia

SRI Assessment

Decrease in Population Size: Curlew Sandpiper does not breed in Australia and hence the project area does not constitute breeding or nesting area. The project area is not within the typical Australian range of the species in Queensland with only sparsely scattered records from the region and is not on the migration route for this species or provide typical roosting areas. There is one record from within 50 km and three records from within 100 km which represent transient birds. It is possible that the species may occur in the local region on an a very occasional basis however it is considered that there is no local population within PL1125 or the surrounding area. The Vali Field project is therefore assessed not to have a significant impact that will lead to a long-term decrease in the size of a local population of Curlew Sandpiper.

Reduction in Extent of Occurrence: The disturbance to potential habitat, RE 5.3.22, from the project represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout the PL1125 which is available hence the extent of occurrence would not be reduced.

Fragmentation of existing population: The disturbance from the project is on the scale of hundreds of meters and therefore does not present a barrier to Curlew Sandpiper which is highly migratory and is capable of flying hundreds of kilometres per day. No local population exists with only sparse scattered records of highly mobile birds. Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of fragmentation of an existing population.

Gene flow interruption due to habitat isolation: Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of gene flow interruption due to habitat isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented are described. Construction of the flowline, Vali 1, 2 and 3 well pads

and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds were recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. There is no impact of harmful invasive weeds arising from the project to Curlew Sandpiper.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste streams are of an industrial nature, and these are managed in dedicated sumps or storages and disposed of appropriately using industry standard methods. The project is not considered to result in the potential for introduction of diseases to Curlew Sandpiper or other wildlife species.

Interefrence with recovery: The conservation advice for Curlew Sandpiper identifies two primary conservation objectives:

- Minimise further loss of habitat critical to the survival of curlew sandpiper throughout Australia (including habitat predicted to become habitat critical in the future because of climate change).
- Prevent further declines in curlew sandpiper populations by working with relevant Range States to address threats in the East Asian-Australasian Flyway.

The second objective is not relevant as it applies to areas outside of Australia. The first objective relates to identification, preservation and management of critical habitats for Curlew Sandpiper. There are only sparse and scattered recording of the species within 100 km of the project. The project area, including RE5.3.22, and surrounding regions do not provide critical habitats for this species. The nearest identified Migratory Shorebird Habitat location is 170 km to the North. The project does not impact any recovery efforts for Curlew Sandpiper.

Disruption to ecologically significant locations:

As above, the project area does not provide ecologically significant locations including for breeding, feeding, nesting, migration or resting sites as the species only occurs very infrequently, if at all in the project area. Should Curlew Sandpipers seek to use habitats within PL 1125 during times when wetlands contain water it is likely that they would be able to find suitable locations for feeding and resting and disruption from the project would be either minimal or negligible.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Curlew Sandpiper is considered to be 'Rare or Unknown' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low' with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

Finding

There is one record of Curlew Sandpiper from within 50 km and three records from within 100 km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. The risk to this species from the project is considered to be Low with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

Common Greenshank *Tringa nebularia* EPBC Act: Endangered and Migratory, NC Act: Not Listed

No. of Records within 50 km: 0 **No. of Records within 100 km:** 5

Not recorded during the survey.

Distribution

Common Greenshank is a migratory shorebird that has a widespread distribution throughout Australia, in summer (Geering et al. 2008, ALA 2024). The common greenshank is widespread in coastal regions, occurs in all types of wetlands, and has one of the widest distribution of any shorebird in Australia (Higgins & Davies 1996). In Queensland, the species is widespread in the Gulf country and eastern Gulf of Carpentaria. Inland, there have been a few records south of a line from near Dalby to Mt Guide, and sparsely scattered records elsewhere (Higgins & Davies 1996). Inland, the species is known mostly in the west and in the Murray River Valley (Higgins & Davies 1996).

The species arrives in Australia from August, passing mainly through West Australia (Lane 1987), and also passing through the Torres Strait with individuals found as far south as south-east Tasmania (Higgins & Davies 1996). The Common Greenshank starts moving southwards in Western Australia from November onwards (Lane 1987), with numbers increasing slowly at most inland and coastal sites during August and September. The largest increases at some scattered sites are reported in October and November (Alcorn 1988). The Common Greenshank overwinters at a few selected sites, which reach the expected wintering numbers in late April and early May (Alcorn 1988). The proportion of the population that overwinters in Australia varies between years (Thomas 1970). During non-breeding season, most birds do not seem to move long distances within Australia, although dispersive movements may occur (Higgins & Davies 1996).

Population and declines

There are currently estimated to be 23,700 (range 16,300–33,400) mature individuals in the wild with a continuing declining trend (Clemens et al. 2021).

The main factor that makes the species eligible for listing is based on recent changes in the estimated rate of population decline. Several studies have recorded declines of common greenshank with the following change over three generations of between -22 percent (Clemens et al. 2016), and -50 percent (Clemens et al. 2019). These declines are thought to be due to changes to coastal stopover locations, particularly along the coast of the Yellow Sea where there is rapid development for aquaculture and industry; invasion by cordgrass (*Spartina alterniflora*); pollution from domestic, industrial and aquaculture discharges, oil and pesticides; hunting; and incidental drowning in fishing nets and traps. The species' habitat area is also shrinking due to a combination of restricted inflow of sediments from increasingly dammed rivers and sea level rise (Murray et al. 2014; Melville et al. 2016).

Habitat and Ecology

The Common Greenshank occurs in intertidal marine mudflats, fresh and saltwater wetlands along the coast or inland (Geering et al. 2008) and also uses artificial habitats such as ponds and dams. The species has been recorded within swamps, open muddy or rocky shores of lakes and large rivers, sewage farms, saltworks, inundated rice-fields (del Hoyo et al. 1996), ponds, reservoirs (Snow and Perrins 1998), flooded grasslands, saltmarshes, sandy or muddy coastal flats, mangroves, estuaries, lagoons, pools on tidal reefs, or in areas of exposed coral (del Hoyo et al. 1996, Menkhorst et al 2017, BirdLife International 2025b). It forages at the in soft mud on mudflats, in shallow water at the edge of wetlands and in channels.

Regional Ecosystem RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes provides potentially suitable habitat Common Greenshank within PL 1125.

Critical Habitat

The National Directory of Important Migratory Shorebird Habitat identifies all known feeding and roosting sites of Common Greenshank in Australia (Weller et al. 2020). These areas are identified as internationally or nationally important in accordance with the EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species.

An Internationally Important site is determined for Common Greenshank if it regularly supports more than 1,100 individuals which represents 1 percent of the species' total East Asian–Australasian Flyway population (Weller et al. 2020).

A Nationally Important site is determined for Common Greenshank if it regularly supports more than 110 individuals which represents 0.1 percent of the bird's East Asian–Australasian Flyway population (Weller et al. 2020).

Area of Disturbance

The area of RE 5.3.22 within the disturbance footprint is 8.69 hectares which is 0.92 % of RE 5.3.22 that is mapped within PL 1125 (945.22 ha). Areas of RE 5.3.22 that were disturbed along the flowline and pipeline corridors have revegetated following rehabilitation and now provide similar habitats to the original vegetation.

Identified Threats

The conservation advice for Common Greenshank identifies the following threats:

- Major Threats, Very High Risk:
    - Habitat loss caused by residential and commercial development
    - Habitat loss caused by industrial aquaculture*
    - Sea level rise
- Moderate threats Very High Risk:
    - Downstream effects of large dams
    - Invasion of mudflats and coastal saltmarshes by mangroves and cordgrass*
    - Hunting*
    - Increased frequency and length of droughts
- Moderate threats, High Risk:
    - Disturbance at feeding and roosting sites
- Minor threats, moderate risk:
    - Chronic and acute pollution
    - Fishing bycatch

* = threat occurs mostly outside Australia

SRI Assessment

Decrease in Population Size: Common Greenshank does not breed in Australia and hence the project area does not constitute breeding or nesting area. The project area is not within the typical Australian range of the species in Queensland with only sparsely scattered records from the region and is not on the migration route for this species or provide typical roosting areas. There are no records from within 50 km but five records from within 100 km which represent transient birds. It is possible that the species may occur in the local region on an a very occasional basis however it is considered that there is no local population within PL1125 or the surrounding area. The Vali Field project is therefore assessed not to have a significant impact that will lead to a long-term decrease in the size of a local population of Common Greenshank.

Reduction in Extent of Occurrence: The disturbance to potential habitat, RE 5.3.22, from the project represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout the PL1125 which is available hence the extent of occurrence would not be reduced.

Fragmentation of existing population: The disturbance from the project is on the scale of hundreds of meters and therefore does not present a barrier to Common Greenshank which is highly migratory and is capable of flying hundreds of kilometres per day. No local population exists with only sparse scattered records of highly mobile birds. Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of fragmentation of an

existing population.

Gene flow interruption due to habitat isolation: Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of gene flow interruption due to habitat isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented were described. Construction of the flowline, Vali 1, 2 and 3 well pads and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds are recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. There is no impact of harmful invasive weeds arising from the project to Common Greenshank.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste stream are of an industrial nature and these are managed in dedicated sumps or storages and disposed of appropriately. The project is not considered to result in the potential for introduction of diseases to Common Greenshank or other wildlife species.

Interefrence with recovery: The conservation advice for Common Greenshank identifies two primary conservation objectives:

- Minimise further loss of habitat critical to the survival of Common Greenshank throughout Australia (including habitat predicted to become habitat critical in the future because of climate change).
- Prevent further declines in Common Greenshank populations by working with relevant Range States to address threats in the East Asian-Australasian Flyway.

The second objective is not relevant as it applies to areas outside of Australia. The first objective relates to identification, preservation and management of critical habitats for Common Greenshank. There are only sparse and scattered recording of the species within 100 km of the project. The project area, including RE5.3.22, and surrounding regions do not provide critical habitats for this species. The nearest identified Migratory Shorebird Habitat location is 170 km to the North. The project does not impact any recovery efforts for Common Greenshank.

Disruption to ecologically significant locations:

As above, the project area does not provide ecologically significant locations including for breeding, feeding, nesting, migration or resting sites as the species only occurs very infrequently, if at all in the project area. Should Common Greenshank seek to use habitats within PL 1125 during times when wetlands contain water it is likely that they would be able to find suitable locations for feeding and resting and disruption from the project would be either minimal or negligible.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Common Greenshank is considered to be 'Rare or Unknown' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low' with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

Finding

There are no records of Common Greenshank from within 50 km but five records from within 100 km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. The risk to this species from the project is considered to be 'Low' with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

Australian Painted Snipe *Rostratula australis*, EPBC Act: Endangered, NC Act: Endangered

No. of Records within 50 km: 1 **No. of Records within 100 km:** 1

Not recorded during the survey.

Distribution

The Australian Painted Snipe is endemic to Australia. The species has a historical distribution through most of continent including some desert regions, but the Murray–Darling Basin, particularly the Riverina region of Victoria and New South Wales, appears to have been a stronghold for the species (DCCEEW 2022). The recovery plan for Australian Painted-snipe shows that south-west Queensland is mapped as 'species may occur' rather than 'species known or likely to occur' (DCCEEW 2022).

This species has mainly been recorded breeding in the Murray–Darling region but has also been recorded in coastal central Queensland (Black et al. 2010), south-east Queensland, eastern NSW, the Channel Country, south-east South Australia and the Mt Lofty Ranges—with a few records from Australia's savannah bioregions. It has not been recorded breeding in south-west Queensland (DCCEEW 2022).

Australian Painted Snipe is a nomadic wetland species which could possibly be present during favourable conditions when ephemeral wetlands (RE 5.3.22) temporarily contain water.

Population and declines

In 2020, the population was estimated to be 340 (range 270–410) mature individuals following declines in the last five years (2015–2020), although with very low certainty given the biology of the species (Rogers et al. 2021). Population estimates for the Australian Painted Snipe are considered to be unreliable due to the cryptic nature of the bird. Previous population estimates 1,500, 5,000 (Garnett and Crowley 2000) and <2,500 (Garnett et al. 2011).

Habitat and Ecology: The Australian painted snipe occurs in shallow freshwater (occasionally brackish) wetlands, both ephemeral and permanent, such as lakes, swamps, claypans, inundated or waterlogged grassland/saltmarsh, dams, rice crops, sewage farms and bore drains, generally with a good cover of grasses, rushes and reeds, low scrub, *Muehlenbeckia* spp. (lignum), open timber or samphire (Marchant and Higgins, 2003).

The species is strongly affected by seasonal conditions. It nests only in temporary wetlands and appears to depend on the Murray-Darling Basin for breeding.

Regional Ecosystem RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes provides potentially suitable habitat Australian Painted Snipe within PL 1125.

Identified Threats

The Australian Painted Snipe is affected by habitat destruction such as clearing of riparian vegetation for agriculture; drainage, salinisation and pollution of wetlands and waterbodies; and alteration of flooding regimes due to the regulation of inland waterways. This species is also threatened by grazing and the associated trampling of wetland vegetation/nests, nutrient enrichment and disturbance to substrate by livestock in certain regions, particularly where grazing is concentrated around wetlands during dry seasons (DCCEEW 2022). Australian Painted Snipe may also be preyed upon by introduced feral animals such as cats and foxes (Birdlife Australia 2025b). Reduced rainfall and runoff in the Murray-Darling Basin associated with climate change (CSIRO 2008, 2011) may threaten the Australian painted snipe in the future. Additional potential threats include coastal port and infrastructure development. The replacement of native wetland vegetation by invasive weeds such as Parkinsonia (Parkinsonia aculeata) is a potential threat to this species (DCCEEW 2022).

Critical Habitat

As a guide, habitat critical to the survival of the Australian Painted Snipe can be considered to include:

- Any natural wetland habitat where the species is known or likely to occur (especially with suitable breeding habitat) within the indicative distribution map.
- Any location outside the above area that may be periodically occupied by Australian (DCCEEW 2022).

Area of Disturbance

The area of RE 5.3.22 within the disturbance footprint is 8.69 hectares which is 0.92 % of RE 5.3.22 that is mapped within PL 1125 (945.22 ha). Areas of RE 5.3.22 that were disturbed along the flowline and pipeline corridors have revegetated following rehabilitation and now provide similar habitats to the original vegetation.

SRI Assessment

Decrease in Population Size: There is only one record within 50 km and one record from within 100km of the project area. It is possible that the species may temporarily occur in the local region on an occasional basis. Australian Painted Snipe and is not known to breed in south-west Queensland. As such the project area is unlikely to constitute breeding or nesting area and it is unlikely that a population of this species occurs in the project area or adjacent areas. The Vali Field project is considered not to have a significant impact that will lead to a long-term decrease in the size of a local population of Australian Painted Snipe.

Reduction in Extent of Occurrence: The disturbance to potential habitat, RE 5.3.22, from the project represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout the PL1125 which is available as potential habitat, hence the extent of occurrence would not be reduced.

Fragmentation of existing population: The disturbance from the project is on the scale of hundreds of meters and therefore does not present a barrier to Australian Painted Snipe which is capable of flying hundreds of kilometres per day during nomadic movements. No local population exists with only sparse scattered records of within the broader region. Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of fragmentation of an existing population.

Gene flow interruption due to habitat isolation: Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of gene flow interruption due to habitat isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented are described. Construction of the flowline, Vali 1, 2 and 3 well pads and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds were recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. There is no impact of harmful invasive weeds arising from the project to Australian Painted Snipe. The primary species known to impact habitat for Australian Painted Snipe is Parkinsonia (Parkinsonia aculeata) which was not recorded during the site visit.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste stream are of an industrial nature and these are managed in dedicated sumps

or storages and disposed of appropriately. The project is not considered to result in the potential for introduction of diseases to Australian Painted Snipe or other wildlife species.

Interefrence with recovery: The conservation advice for Australian Painted Snipe identifies the following primary conservation strategies:

- Manage and protect known Australian Painted Snipe habitat at the landscape scale.
- Develop and apply techniques to measure changes in population trajectory in order to measure the success of recovery actions.
- Reduce, or eliminate threats at breeding and non-breeding habitats
- Undertake research to improve knowledge of the habitat requirements, biology and behaviour of Australian Painted Snipe.
- Engage community stakeholders to improve awareness of the conservation of Australian Painted Snipe.
- Coordinate, review and report on recovery process.

The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Habitat that is potentially suitable remains throughout PL1125 and adjacent areas that would be available should individuals arrive at the site when the wetlands contain water. Cattle are excluded from operational areas of PL1125 which may provide a potential benefit to the species should it occur as it reduces grazing pressure from cattle which is recognised as a primary threat to the species. There are no recovery actions for Australian Painted Snipe being implemented within or adjacent to the Vali Field project. The project is not considered to have an impact on any recovery efforts for Australian Painted Snipe.

Disruption to ecologically significant locations:

As above, the project area does not provide ecologically significant locations including for breeding, feeding, nesting, migration or resting sites as the species only occurs very infrequently, if at all in the project area. Should Australian Painted Snipe seek to use habitats within PL 1125 during times when wetlands contain water it is likely that they would be able to find suitable locations for feeding and resting if suitable habitats exist in the area and disruption from the project would be either minimal or negligible.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Australian Painted Snipe is considered to be 'Rare or Unknown' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low' with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

Finding

There is only one record of Australian Painted Snipe within 50 km and one record from within 100km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is not considered to be significant with no long-term effect on individuals or populations. The risk to this species from the project is considered to be 'Low' with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

5.5.3. Environmentally Sensitive Areas (ESAs) – Essential Habitat for Vulnerable Species

The listed species likelihood and residual impact assessment (Table 5) identified four EPBC Vulnerable species one migratory wader Sharp-tailed Sandpiper, Blue-winged Parrot, Southern Whiteface and one mammal Dusky Hopping-mouse as having records within 50 km of PL1125 and therefore as possibly occurring within the project footprint. All habitats within PL 1125 are used by one or more of these species hence the whole of the disturbance area is identified as Category C Environmentally Sensitive Areas for Vulnerable Wildlife (Figure 11).

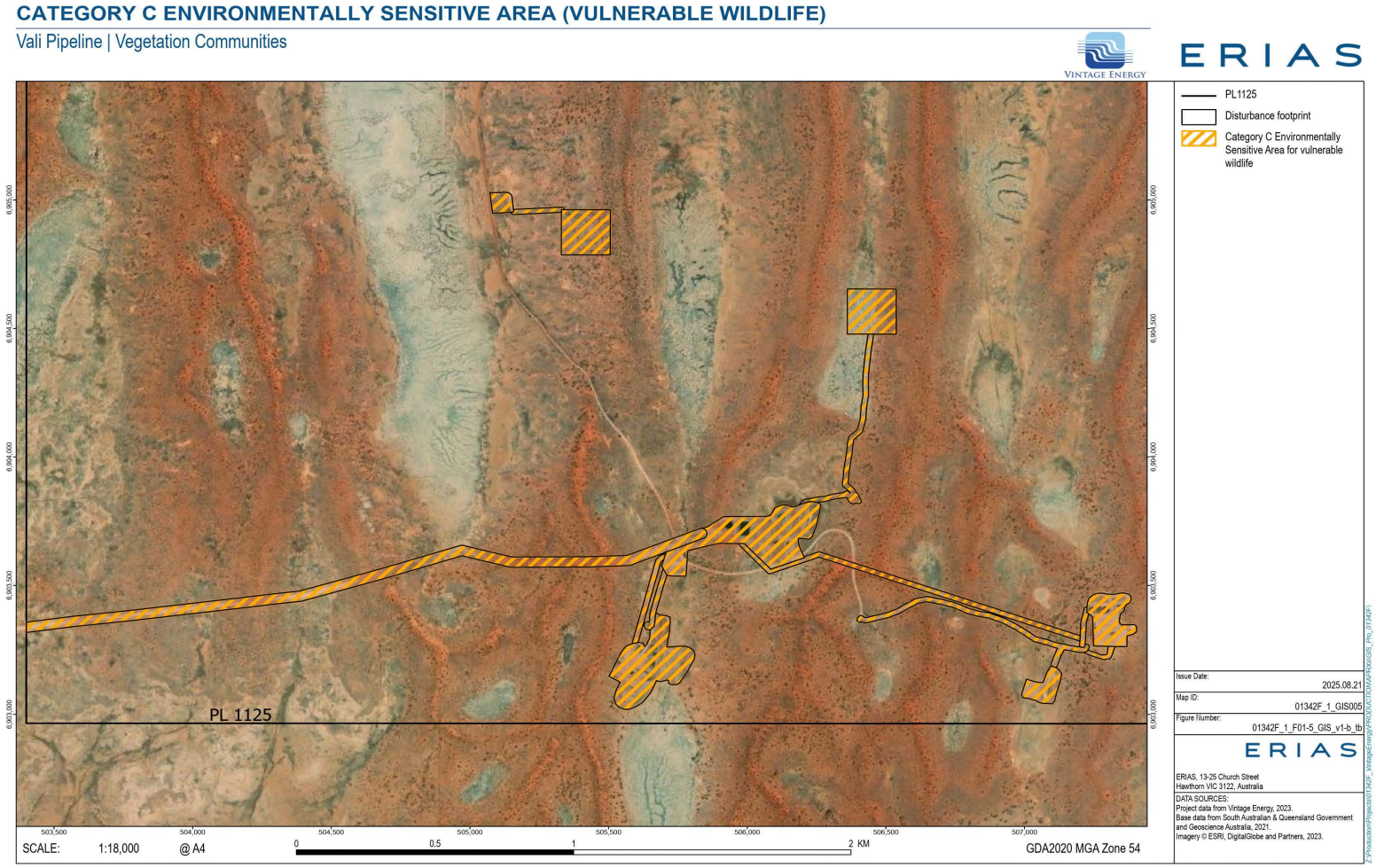


Figure 11 Areas within the disturbance footprint which are identified as Category C Environmentally Sensitive Areas for Vulnerable Wildlife.

Sharp-tailed Sandpiper *Calidris acuminata* EPBC Act: Vulnerable and Migratory, NC Act: Not Listed

No. of Records within 50 km: 2 **No. of Records within 100 km**: 13

Not recorded during the survey.

Distribution

The sharp-tailed sandpiper breeds in northern Siberia from the Lena River delta, east to the Chaun Gulf and the Kolyma River delta. The species is a passage migrant through eastern Mongolia, China, Korea, Japan, Micronesia, the Philippines, and southeast Asia. It also occurs less frequently as a passage migrant in the Malay Peninsula, Borneo, and Melanesia (Higgins & Davies 1996, DCCEEW 2024).

Small numbers arrive in north-west Australia during mid-August, with larger numbers arriving in early September. Small numbers pass through the Torres Strait, arriving on the coast of the Gulf of Carpentaria during September and December, and on the coast of north-east Queensland from late August. After arriving in Australia, most birds move slowly south across the continent to southeast Australia (Higgins & Davies 1996, DCCEEW 2024).

During the non-breeding season, approximately 91 percent of the East Asian - Australasian population occurs in Australia and New Zealand (Bamford et al. 2008). Sharp-tailed sandpipers occur within all states of Australia. They are found mostly in the south-east and are widespread in both inland and coastal locations. The species also occurs in both freshwater and saline habitats (Higgins & Davies 1996). In Queensland, the species is widespread along the coast and is sparsely scattered inland, particularly in central and south-western regions (Higgins & Davies 1996).

Population and declines

There are currently an estimated 71,000 (range 8,100–125,300) mature individuals in the wild with a continuing declining trend (Clemens et al. 2021). The extent of occurrence (EOO) is estimated at 10,900,000 km2 (range 10,400,000–11,400,000 km2) and area of occupancy (AOO) at 13,000 km^2 (13,000–20,000 km^2). Despite the loss and degradation of wetland habitats, Clemens et al. (2021) considers both the EOO and AOO to be stable (DCCEEW 2024).

The main factor that makes the species eligible for listing is based on recent changes in the estimated rate of population decline. Several studies have recorded declines of Sharp-tailed Sandpiper with the following change over three generations: −60 percent (Clemens et al. 2016), −24 percent (Clemens 2017), −47 percent (Clemens et al. 2019), and −52 percent (Clemens et al. 2019).

The most recent analysis by Rogers et al. (2023) estimated the mean change in population was +0.1% annually (1993-2021) for an estimated total increase of +19.8% (95%CI: -51.8, 235.2) over three generations. The mean annual change in the last 10 years (2012-2021) was +1.9% (95%CI: -9.1, 16.7), suggesting the decline may have stabilised (Rogers et al. 2023). These data are clearly markedly at odds with previous studies. This may indicate that the decline of this species has slowed and may even have reversed in the past decade. However, given the substantial reduction in

population size estimated by four earlier studies, a listing of Vulnerable is appropriate until population stabilisation can be confirmed over coming years (DCCEEW 2024).

Declines are thought to be due to the increasing frequency and length of droughts, particularly in south-eastern Australia, changes to coastal staging locations, particularly along the coast of the Yellow Sea where there is rapid development for aquaculture and industry; invasion by cordgrass (*Spartina alterniflora*); pollution from domestic, industrial and aquaculture discharges, oil and pesticides; and hunting and incidental drowning in fishing nets and traps (Clemens et al. 2021). Available habitat is also shrinking through a combination of restricted inflow of sediments from increasingly dammed rivers (Murray et al. 2014; Melville et al. 2016) and sea level rise and construction of sea walls at many sites (DCCEEW 2024).

Habitat and Ecology

The species utilises fresh and hypersaline environments, feeding along the edge of water on mudflats, coastal and inland wetlands, and sewage ponds. After rainfall events, the species may also feed on areas of agricultural pasture (Higgins and Davies 1996; Weller et al. 2020). Sharp-tailed sandpipers are omnivorous. Their diet comprises mostly of seeds, worms, molluscs, crustaceans, and insects, which they prey on by pecking and jabbing their beak into muddy substrate (Higgins and Davies 1996).

The species forages and roosts on rocky and sandy beaches, freshwater habitats, and inland saltwater habitats (Higgins & Davies 1996).

Regional Ecosystem RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes provides potentially suitable habitat Sharp-tailed Sandpiper within PL 1125.

Critical Habitat

The National Directory of Important Migratory Shorebird Habitat identifies all known feeding and roosting sites of Sharp-tailed Sandpiper in Australia (Weller et al. 2020). These areas are identified as internationally or nationally important in accordance with the EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species.

An Internationally Important site is determined for Sharp-tailed Sandpiper if it regularly supports more than 1 percent of the species' total population (1 percent flyway of the population = 850 individuals, Weller et al. 2020).

A Nationally Important site is determined for Sharp-tailed Sandpiper if it regularly supports more than 0.1 percent of the bird's Flyway population (0.1 percent of the flyway population = 85 individuals, Weller et al. 2020).

Area of Disturbance

The area of RE 5.3.22 within the disturbance footprint is 8.69 hectares which is 0.92 % of RE 5.3.22 that is mapped within PL 1125 (945.22 ha). Areas of RE 5.3.22 that were disturbed along the flowline and pipeline corridors have revegetated following rehabilitation and now provide similar habitats to the original vegetation.

Identified Threats

The conservation advice for Sharp-tailed Sandpiper identifies the following threats:

- Major Threats, Very High Risk:
    - Habitat loss caused by residential and commercial development
    - Sea level rise
    - Downstream effects of large dams
- Moderate threats Very High Risk:
    - Habitat loss caused by industrial aquaculture*
    - Habitat loss caused by clearing for large-scale agriculture
    - Invasion of mudflats and coastal saltmarshes by mangroves and cordgrass*
    - Hunting*
    - Increased frequency and length of droughts
- Minor threats, moderate risk:
    - Chronic and acute pollution
    - Fishing bycatch*

* = threat occurs mostly outside Australia

SRI Assessment

Decrease in Population Size: Sharp-tailed Sandpiper does not breed in Australia and hence the project area does not constitute breeding or nesting area. There are two records from within 50 km and 13 records from within 100 km. It is possible that the species may occur in the local area on an infrequent basis however it is considered unlikely that there is a local population within PL1125 or the surrounding area. The Vali Field project is considered not to have a significant impact that will lead to a long-term decrease in the size of a local population of Sharp-tailed Sandpiper.

Reduction in Extent of Occurrence: The disturbance to potential habitat, RE 5.3.22, from the project represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout the PL1125 which is available hence the extent of occurrence would not be reduced.

Fragmentation of existing population: The disturbance from the project is on the scale of hundreds of meters and therefore does not present a barrier to Sharp-tailed Sandpiper which is highly migratory and is capable of flying hundreds of kilometres per day. Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of fragmentation of an existing population.

Gene flow interruption due to habitat isolation: Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of gene flow interruption due to habitat isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented were described. Construction of the flowline, Vali 1, 2 and 3 well pads and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds were recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. There is no impact of harmful invasive weeds arising from the project to Sharp-tailed Sandpiper.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste stream are of an industrial nature and these are managed in dedicated sumps or storages and disposed of appropriately. The project is not considered to result in the potential for introduction of diseases to Sharp-tailed Sandpiper or other wildlife species.

Interefrence with recovery: The conservation advice for Sharp-tailed Sandpiper identifies two primary conservation objectives:

- Minimise further loss of habitat critical to the survival of curlew sandpiper throughout Australia (including habitat predicted to become habitat critical in the future because of climate change).
- Prevent further declines in curlew sandpiper populations by working with relevant Range States to address threats in the East Asian-Australasian Flyway.

The second objective is not relevant as it applies to areas outside of Australia. The first objective relates to identification, preservation and management of critical habitats for Sharp-tailed Sandpiper. There are only sparse and scattered recording of the species within 100 km of the project. The project area, including RE5.3.22, and surrounding regions do not provide critical habitats for this species. The nearest identified Migratory Shorebird Habitat location is 170 km to the North. The project does not impact any recovery efforts for Sharp-tailed Sandpiper.

Disruption to ecologically significant locations:

As above, the project area does not provide ecologically significant locations including for breeding, feeding, nesting, migration or resting sites as the species only occurs very infrequently, if at all in the project area. Should Sharp-tailed Sandpiper seek to use habitats within PL 1125 during times when wetlands contain water it is likely that they would be able to find suitable locations for feeding and resting and disruption from the project would be either minimal or negligible.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Sharp-tailed Sandpiper is considered to be 'Possible' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low'

with an associated priority for action of 'monitor the threat occurrence and reassess threat level if likelihood or consequences change'.

Finding

There are two records of Sharp-tailed Sandpiper from within 50 km and 13 records from within 100 km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. The risk to this species from the project is considered to be 'Low' with an associated priority for action of '*monitor the threat occurrence and reassess threat level if likelihood or consequences change*'.

Blue-winged Parrot *Neophema chrysostoma*, EPBC Act: Vulnerable, NC Act: Vulnerable

No. of Records within 50 km: 10 **No. of Records within 100 km:** 19

No records within PL1125 and not recorded during the survey.

Distribution

Blue-winged Parrot is endemic to Australia. They breed on mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and sometimes in the far south-east of South Australia, and the north-western, central and eastern parts of Tasmania (Higgins 1999). It is a partial migrant, with some birds crossing Bass Strait to mainland Australia in winter and some birds migrating to arid and semi-arid arid areas of southeastern Australia including south-western Queensland during the non-breeding period, from autumn to early spring (Higgins 1999). South-west Queensland is shown as 'species or species known or likely to occur' in the Blue-winged Parrot conservation advice (DCCEEW 2023c).

Population and declines

The main factors that make the species eligible for listing in the Vulnerable category are that the population appears to have declined by 30–50% in three generations (11 years) (Holdsworth et al. 2021). There are currently an estimated 10,000 (range 7,500–15,000) mature blue-winged parrots in the wild with a declining trend (Holdsworth et al. 2021). The extent of occurrence (EOO) for the species is estimated to be 170,000 km^2 (range 155,000–190,000 km2, stable trend), however the area of occupancy (AOO) is contracting and is estimated to be 11,000 km2 (range 9,000–19,000 km2) (Holdsworth et al. 2021). Significant declines in reporting rates in the core range in Tasmania and Victoria are considered indicative of a population wide decline. This is likely due to changes in habitat quality (Holdsworth et al. 2021).

Habitat and Ecology

Blue-winged parrots inhabit a range of grasslands, shrublands and grassy woodlands often found near wetlands where they forage near or on the ground for seeds of a wide range of native and introduced grasses, herbs and shrubs (DCCEEW 2023c, Higgins 1999).

Blue-winged Parrots occur in eucalypt forests and woodland in spring and summer where they breed in tree hollows, laying 4–6 eggs. In Victoria, they breed mainly in heathy forests and woodlands and in wetter forests soon after fire or logging (Emison et al. 1987). In Tasmania, in autumn many birds congregate on saltmarshes and agricultural land before migration, on the mainland mobile flocks feed in saltmarsh and rough pasture in coastal Victoria. Other birds move >100 km inland to feed in semi-arid chenopod shrubland and sparse grassland. They feed on or near the ground on the seeds of a wide range of native and introduced grasses, herbs and shrubs (Higgins 1999).

They may potentially use RE 5.3.22, RE 5.9.3 and RE 5.9.4 habitats which contain a variety of grasses and forbs.

Critical Habitat

The Blue-winged Parrot recovery plan identifies the following as habitat critical to the survival of the species:

- Foraging and staging habitats found from coastal, sub-coastal and inland areas, right through to semi-arid zones including: grasslands, grassy woodlands and semi-arid chenopod shrubland with native and introduced grasses, herbs and shrubs.
- Wetlands both near the coast and in semi-arid zones used for foraging and staging.
- Eucalypt forests and woodlands within the breeding range in Tasmania, coastal south-eastern South Australia and southern Victoria.
- Live and dead trees and stumps with suitable hollows within the breeding range.

Area of Disturbance

The area of RE 5.3.22 within the disturbance footprint is approximately 8.69 ha (0.92 % of 5.3.22 within PL1125). The area of RE 5.9.3 and RE 5.9.4 combined which is within the disturbance footprint is 13.09 ha (0.95% of RE 5.9.3 / RE 5.9.4 within PL 1125). The majority of areas disturbed along the flowline have revegetated following rehabilitation and now provide similar habitats to the original vegetation communities.

Identified Threats

There is no obvious single explanation for the population decline of Blue-winged Parrot. The conservation advice for Blue-winged Parrot does however identify the following threats:

- Major Threats, Very High Risk:
    - Habitat loss caused by land clearing
    - Inappropriate fire regimes
    - Habitat degradation caused by domestic livestock grazing
    - Increased likelihood of extreme events (i.e., wildfire, heatwave and drought)
- Moderate threats moderate risk:
    - Sea level rise
- Minor threats, moderate risk:
    - Predation by introduced sugar gliders
    - Predation by cats and foxes
    - Competition for tree hollows
    - Invasive weeds
    - Psittacine Beak and Feather Disease (PBFD).

SRI Assessment

Decrease in Population Size: Blue-winged does not breed in south-west Queensland and hence the project area does not constitute a breeding or nesting area. There are 10 records from within 50 km and 19 records from within 100 km. It is possible that Blue-winged Parrot may occur within PL1125 or the surrounding area temporarily on an infrequent or regular basis between autumn and early spring. The species was not recorded during the survey however the survey was conducted in September, and it is possible that they may have already left the region if they were present. They may potentially use RE 5.3.22, RE 5.9.3 and RE 5.9.4 habitats which contain a variety of grasses and forbs. The area of RE 5.3.22 within the disturbance footprint is 8.69 ha (0.92 %). The area of RE 5.9.3 and RE 5.9.4 combined which is within the disturbance footprint is 13.09 ha (0.95%). The remaining habitat following disturbance will be 936.55 ha of RE 5.3.22 and 1365.66 ha of RE 5.9.3 / RE 5.9.4 combined for a total of 2302 ha of potential habitat for Blue-winged Parrot. The majority of areas disturbed along the flowline have revegetated following rehabilitation and now provide habitat that is likely to be suitable for Blue-winged Parrot. Considering the proportion of habitat that would be disturbed by the Vali Field project it is not considered to have a significant impact that will lead to a long-term decrease in the size of a local population of Blue-winged Parrot.

Reduction in Extent of Occurrence: The disturbance to potential habitat, RE 5.3.22 and RE 5.9.3 / RE 5.9.4 from the project represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout the PL1125 which is available hence the extent of occurrence would not be reduced. As above the area of RE 5.3.22 within the disturbance footprint is approximately 8.69 (0.92 %). The area of RE 5.9.3 and RE 5.9.4 combined which is within the disturbance footprint is 13.09 ha (0.95%). The small scale of the impact is very localised and compared to the extensive

amount of habitat available to this species is considered unlikely to have an impact on any local population or the extent of occurrence of this species in PL1125.

Fragmentation of existing population: The disturbance from the project is on the scale of hundreds of meters and therefore does not present a barrier to Blue-winged Parrot which is a migratory species and is capable of flying tens or hundreds of kilometres within a day. Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of fragmentation of an existing population.

Gene flow interruption due to habitat isolation: Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of gene flow interruption due to habitat isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented were described. Construction of the flowline, Vali 1, 2 and 3 well pads and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds were recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. There is no impact of harmful invasive weeds arising from the project to Blue-winged Parrot.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste stream are of an industrial nature and these are managed in dedicated sumps or storages and disposed of appropriately. The project is not considered to result in the potential for introduction of diseases to Blue-winged Parrot or other wildlife species.

Interefrence with recovery: The conservation advice for Blue-winged Parrot includes the following conservation objectives:

- Cease all land clearing of habitat critical for the survival of Blue-winged Parrot.
- Establish new habitat patches in areas where native vegetation cover is lacking.
- Promote ecological management of woodland remnants on private and public land.
- Protect and enhance feeding and breeding habitat, including preparation of management plans for key habitat across the winter range.
- Develop a site-based fire management strategies with local authorities which considers the ecological needs of the species.
- Restore degraded grasslands and grassy woodlands habitat to support the recovery of blue-winged parrot.

- Prevent intensive grazing in high value grasslands and grassy woodland habitats.
- Modify grazing management practices that will maintain or improve habitat values and still allow some grazing to occur at strategic times of the year.
- Stakeholder engagement/community engagement
- Determine population trends across its range.

Less than 1 % of the available habitat for Blue-winged Parrot within PL1125 is within the disturbance footprint. Large areas of habitat that is potentially suitable remains throughout PL1125 and adjacent areas that would be available should individuals arrive at the site. Cattle are excluded from operational areas of PL1125 which may provide a potential benefit to the species should it occur as it reduces grazing pressure from cattle which is recognised as a primary threat to the species. There are no on-ground recovery actions for Blue-winged Parrot being implemented within or adjacent to the Vali Field project which would be or have been disturbed by the project. The project is not considered to have an impact on any recovery efforts for Blue-winged Parrot.

Disruption to ecologically significant locations:

It is unclear whether the project area provides ecologically significant locations for Blue-winged Parrot including for breeding, feeding, nesting, migration or resting sites. Should Blue-winged Parrot seek to use habitats within PL 1125 it is likely that they would be able to find suitable locations for feeding and resting and disruption from the project would be either minimal or negligible.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Blue-winged Parrot is considered to be 'Possible' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low' with an associated priority for action of 'monitor the threat occurrence and reassess threat level if likelihood or consequences change'.

Finding

There are 10 records of Blue-winged Parrot from within 50 km and 19 records from within 100 km of the project area but has not been recorded from within PL 1125 or adjacent areas. It is not a core area for the species and south-west Queensland is at the edge of its range however it is possible that it may occur within PL1125 or the surrounding area on a temporary and infrequent basis. The disturbance to potential habitat, RE 5.3.22 and RE 5.9.3 / 5.9.4 from the project is 21.78 hectares which represents less than 1 % of the available habitat within PL1125. An estimated 2302 ha of suitable habitat remains throughout PL1125 and any Blue-winged Parrot individuals that arrive in the area would still be able to find suitable habitat. The project would lead to a residual loss of potential habitat from the project at a localised scale. The area to be cleared is however unlikely to be critical to the survival

of Blue-winged Parrot at the local or regional scale. Considering the extent of remaining habitat the risk of an impact from disturbance of the project is considered to be low with no long-term effect on individuals or populations. The residual impact of the Vali Field project is not considered to be ecologically significant. The risk to this species from the project is considered to be 'Low' with an associated priority for action of 'monitor the threat occurrence and reassess threat level if likelihood or consequences change'.

Southern Whiteface *Aphelocephala leucopsis* EPBC Act: Vulnerable, NC Act: Vulnerable

No. of Records within 50 km: 45 **No. of Records within 100 km:** 115

No records within PL1125 and not recorded during the survey.

Distribution

Southern whiteface occur across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range (Schodde & Mason 1999). There is a broad hybrid zone between the two subspecies extending north from the western edge of the Nullarbor Plain. The northern boundary extends to about Carnarvon in the west, to the southern Northern Territory in central Australia, but is slightly further south in Queensland where the species is largely confined to the south-west of the Mitchell Grass Downs and along the southern state border (Schodde & Mason 1999). South-west Queensland is shown as 'species or species habitat may occur' in the Southern Whiteface conservation advice (DCCEEW 2023d) however there are a number of records on the Atlas of Living Australia for the species in south-west Queensland (ALA 2025).

Population and declines

There are currently estimated to be 477,000 (range 236,000–954,000) mature individuals in the wild (DCCEEW 2023d). This estimate includes 67,000 (range 36,000–134,000) *A. l. castaneiventris* individuals and 410,000 (range 200,000–820,000) *A. l. leucopsis* individuals (DCCEEW 2023d).

The main factors that make the species eligible for listing in the Vulnerable category is that the population has declined substantially by an estimated 30 to 50% every ten years (one generation 2.9 years) since 1999, with no indication that the declines are slowing (Ehmke et al. 2021). Evidence for loss is now strong and is based largely on reporting rate data (Ehmke et al. 2021).

The extent of occurrence (EOO) for the species is estimated to be 4,910,000 km2 (Australian Government 2021) with a stable trend (Ehmke et al. 2021), however the area of occupancy (AOO) is contracting and is estimated to be 70,000 km^2 (range 34,400–140,000 km^2) (Ehmke et al. 2021). Habitat loss and fragmentation is likely the cause of the species decline, especially in the parts of the species' range where there has been complete removal of habitat for intensive agriculture (Ehmke et al. 2021).

Habitat and Ecology

Southern Whiteface lives in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both (DCCEEW 2023d). These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains (Higgins & Peter 2002). Southern Whiteface forages almost exclusively on the ground for insects, spiders, and seeds favouring habitat with low tree densities and an herbaceous understorey litter cover. It is sedentary or resident with local movements undertaken by young and unpaired birds (Higgins & Peter 2002).

The only habitat for this species within PL 1125 is RE 5.6.4 which has trees with an open understorey of shrubs, grasses and herbs. Atalaya woodlands were surveyed at a number of locations on PL 1125 on the flanks of dunes and on sandy plains, especially in the southern section and northern sections of PL 1125. There appeared to be more extensive areas of habitat in within PL1125 than mapped given that it is present on the flanks of many or most dunes and along drainage lines surveyed in the south-western section of PL 1125. It was noted that there was little leaf litter

Critical Habitat

Habitat critical to the survival of the Southern Whiteface includes areas of:

- relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
- habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat;
- living and dead trees with hollows and crevices which are essential for roosting and nesting.

Area of Disturbance

The project results in the loss of some habitat for Southern Whiteface as the disturbance footprint includes 11.41 ha of RE 5.6.4. This represents 17.05 % of the mapped available habitat for Southern Whiteface within PL1125. It was however evident during the site survey and is evident in the aerial imagery within Queensland Globe that the mapping of RE 5.6.4 is not accurate for PL 1125 and there is suitable habitat for Southern Whiteface scattered throughout PL1125 especially along dune flanks and drainage lines. The available habitat for Southern Whiteface is therefore substantially higher than mapped and the area disturbed is likely to be less than 17.05% of this vegetation community within Pl 1125.

Identified Threats

The conservation advice for Southern Whiteface (DCCEEW 2023d) identifies the following threats:

- Major Threats, Very High Risk:
    - Habitat loss caused by clearing agriculture
- Moderate threats very high risk:

  - Habitat degradation caused by domestic livestock grazing
  - Increased likelihood of extreme events (i.e., wildfire, heatwave and drought)
- Minor threats, moderate risk:
  - Inappropriate fire regimes.

SRI Assessment

Decrease in Population Size: There are 45 records of Southern Whiteface from within 50 km and 115 records from within 100 km. The species was not recorded during the survey despite it being one of the target species and environmental conditions being good at the time of survey. Atalaya woodlands were surveyed at a number of locations on PL1125 and adjacent PL1126, on the flanks of dunes, on sandy plains, especially in the southern section and northern sections of PL1125. There appeared to be more extensive areas of habitat in the area of mapped drainage lines adjacent the south-western section of PL1125. It is possible that Southern Whiteface may occur within PL1125 or the surrounding area. Given that this species is generally sedentary or resident it is likely that it is in low abundance if it is present. Clearance of 11.41 hectares of 5.6.4 could possibly have an impact on the size of a local population in the immediate area of the disturbance if the species is present.

Reduction in Extent of Occurrence: The area of habitat for Southern Whiteface (RE 5.6.4) within the disturbance footprint is 11.41 ha which constitutes 17.05 % of the mapped area of RE 5.6.4 within PL 1125. It was clear during the site visit that this RE is much more widespread throughout PL1125 than mapped especially along dune flanks and drainage lines, hence the area disturbed is likely to be less than 17.05% RE 5.6.4 within Pl 1125. The species has not been recorded within PL 1125 however it is possible that the project could reduce the area of extent at a local scale if the species is present. It is not considered to have a significant impact at a population or regional scale as suitable habitat remains adjacent to the impact areas and some extensive areas of habitat were observed within and outside of PL1125.

Fragmentation of existing population: The distribution of RE 5.6.4 within PL 1125 is mostly on dune flanks and is consequently linear and fragmented. The disturbance from the project is on the scale of hundreds of meters which is consistent with or smaller than the natural gaps between patches of RE 5.6.4. Suitable habitat adjacent to the disturbance area is retained in adjacent areas. The gaps between habitat patches created by the disturbance footprint are unlikely to present a barrier to Southern Whiteface. Young and unpaired birds are known to undertake local movements (Higgins and Peter 2002). If a local population of the species exists it would be likely that the birds would cross such gaps regularly. Disturbance on the scale of the Vali wellfield project is not considered to present a risk to this species of fragmentation of an existing population.

Gene flow interruption due to habitat isolation: The project is not considered to present a risk of increasing habitat isolation and therefore would be unlikely to interrupt gene flow or result in genetic isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented were described. Construction of the flowline, Vali 1, 2 and 3 well pads and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds were recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. The impact of harmful weeds is not identified as a threat to Southern Whiteface and the project is not considered to present a risk to the species from harmful invasive weeds.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste stream are of an industrial nature and these are managed in dedicated sumps or storages and disposed of appropriately. The project is not considered to result in the potential for introduction of diseases to Southern Whiteface or other wildlife species.

Interefrence with recovery: The conservation advice for Southern Whiteface includes the following conservation and management priorities:

- Cease all land clearing of habitat critical for the survival of Southern Whiteface.
- Secure occupied habitat patches in areas where the birds have a patchy distribution from further degradation and loss.
- Promote ecological management of woodland remnants on private and public land.
- Promote the uptake of agriculture and biodiversity stewardship programs to retain southern whiteface habitat.
- Prevent intensive grazing in high value habitats.
- Modify grazing management practices that will maintain or improve habitat values and still allow some grazing to occur at strategic times of the year.
- Stakeholder engagement/community engagement
- Determine population trends across its range.

The area to be cleared is unlikely to be critical to the survival of Southern Whiteface at the local or regional scale and is considered unlikely to lead to the loss of a population. It is possible that individuals may be affected however it is considered that sufficient habitat remains adjacent to the disturbance area and throughout PL 1125 to sustain a population should it be present. Cattle are excluded from operational areas of PL1125 which may provide a potential benefit to the species should it occur as it reduces grazing pressure from cattle which is recognised as a threat to the species. There are no on-ground recovery actions for Southern Whiteface being implemented within or adjacent to the Vali Field project which would be or have been disturbed by the project. The project is not considered to

have an impact on any recovery efforts for Southern Whiteface.

Disruption to ecologically significant locations:

It is unclear whether the project area provides ecologically significant locations for Southern Whiteface including for breeding, feeding, nesting, migration or resting sites. Should Southern Whiteface be present within PL 1125 it is likely that they would be able to find suitable locations for feeding, nesting and resting. Given the scale of the project, the potential disruption to the species is considered to be minor.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Southern Whiteface is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. Consequently, the Risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

Finding

There are 45 records of Southern Whiteface from within 50 km and 115 records from within 100 km. The species was not recorded during the survey despite it being one of the target species and environmental conditions being good at the time of survey, however it is possible that it may occur within PL1125 or the surrounding area. Given that this species is generally sedentary or resident it is likely that it is either in low abundance or not present. Clearance of 11.41 hectares of 5.6.4 could possibly have an impact on the size of a local population in the immediate area of the disturbance if the species is present. The area to be cleared is unlikely to be critical to the survival of Southern Whiteface at the local or regional scale and is considered unlikely to lead to the loss of a population. It is possible that individuals may be affected however it is considered that sufficient habitat remains adjacent to the disturbance area and throughout PL 1125 to sustain a population should it be present. A residual loss of habitat from the project for Southern Whiteface could result in a localised impact to the species however the impact is not considered to be significant. The risk to this species from the project is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

Dusky Hopping-mouse *Notomys fuscus* EPBC Act: Vulnerable, NC Act: Endangered

No. of Records within 50 km: 14 **No. of Records within 100 km:** 77

All records within 50 and 100 km of the survey area are within South Australia and New South Wales with no records within south-west Queensland (ALA 2025).

Not recorded during the survey.

Distribution

The Dusky Hopping-mouse has large fluctuations in abundance and distribution depending on environmental conditions (ALA 20205). It occurs in north-eastern South Australia, in the southern Strzelecki and the Cobblers Deserts (DEC 2008), north-western NSW and southwestern Queensland. It is possible the species distribution may extend as far south as Mutawintji, in central-western NSW (Moseby et al., 1999). None of the records from within 100 km are from within south-west Queensland however it is not clear whether this is due to a lack of survey effort or differences in habitats present. The Dusky Hopping-mouse formerly occurred far more widely across arid and semi-arid Australia (DEC 2008).

Population and declines

No population data for this species is contained in reference materials reviewed. This is likely to be due to its boom and bust nature resulting in large natural fluctuations in its population.

Habitat and Ecology

This species inhabits a variety of soft sandy habitats, preferring sand dunes, hills and ridges with Sandhill Canegrass (*Zygochloa paradoxa*), Sandhill Wattle (*Acacia ligulata*), Nitrebush (*Nitraria billardiera*), Sticky Hopbush (Dodonea viscosa) and other annual and perennial shrubs (Watts, 1995; DEC, 2005; EPA, 2006; Ehmann & Watson, undated, ALA 2025).Dusky Hopping-mouse is a boom and bust species and consequently it is uncommon and difficult to locate in most years but abundant in years when populations are booming. It primarily lives in sandy habitats such as dunes; however, in good conditions when populations are booming it can be found temporarily in a range of other habitats (Van Dyck and Strahan 2008).

Dunes with RE 5.6.5 and RE 5.6.8 provide potential habitat for Dusky Hopping-mouse within PL 1125. The area of RE 5.6.5 and RE 5.6.8 which is within the disturbance footprint is 8.8 ha (combined) which is 0.41% of the area mapped within PL 1125 (2151 ha).

With the good rainfalls since 2008, it has been found hundreds of kilometres and in different habitats from where it was recorded in drought conditions. The burrow system it constructs is inhabited by about five individuals and there are vertical escape holes to the surface. The Dusky Hopping-mouse does not need to drink free water; it gets its moisture from a diet of seeds, leaves and flowers, and occasional insects. This species can breed at any time of the year and has an average of three young in each litter.

The Dusky Hopping mouse is a social species, living in colonies of up to five individuals (ALA 2025). They live in burrows consisting of vertical shafts with a series of entrances leading to a network of horizontal tunnels and chambers extending up to 2m deep. This species prefers to forage at night in sheltered microhabitats, rather than open areas, to avoid the risk of predation. It is an opportunistic, omnivorous feeder, however it is considered to be primarily a granivore (ALA 2025). Green plant material, insects, and fruits are also eaten and it does not need to drink water.

Threats

The conservation advice for Dusky Hopping-mouse (DCCEEW 2008) identifies the following threats:

- predation by feral cats (*Felis catus*) and foxes (*Vulpes vulpes*);
- grazing pressure from stock; and
- competition for food and habitat from the introduced house mice (*Mus musculus*) and rabbits (Oryctolagus cuniculus).

Area of Disturbance

The areas of RE 5.6.5 and RE 5.6.8 which have been impacted are primarily along the flowline and access tracks. Disturbance along the flowline has largely been rehabilitated with substantial vegetation regrowth as observed during the field work (Figure 8). Rehabilitated vegetation communities are likely to provide habitat for the species as they contain the same flora species as adjacent areas.

SRI Assessment:

Decrease in Population Size: The presence of a local population of Dusky Hopping-mouse has not been confirmed within PL1125 although it is known to occur regionally. The habitat model map for this species shows potential habitat in the project area at a large scale (Appendix 11) but PL 1125 is not identified as important habitat for this species in the MSES report. There are 14 records from within 50 km and 77 records from within 100 km but none of these are from within south-west Queensland. It was not recorded during the field survey and no tracks of this species were observed in sand dunes however this species is nocturnal and difficult to detect. Given that this species is a boom and bust species and is highly nomadic it is possible that it will occur within PL 1125 at times. The area of RE 5.6.5 and RE 5.6.8 combined which is within the disturbance footprint is 8.8 ha (0.41% of this habitat within PL1125). Clearance of 8.8 hectares of 5.6.5 / 5.6.8 combined could possibly have a temporary impact on the size of a local population should it exist however approximately 2142 ha of habitat would remain in PL1125. The majority of areas disturbed along the flowline have revegetated following rehabilitation and now provide habitat that is likely to be suitable for Dusky Hopping-mouse. The impact is likely to be temporary and minor considering the boom and bust nature of the species, the remaining available habitat and the limited extent of the impact.

Reduction in Extent of Occurrence: The disturbance to potential habitat, RE 5.6.5 / RE 5.6.8 from the project represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout the PL1125 which is available hence the extent of occurrence would not be reduced. The impact of the project to Dusky Hopping-mouse habitat is very localised and if a population of Dusky Hopping-mouse is present within PL1125 it is very likely to persist despite the disturbance. It is possible that the project may have an impact on individuals however it is considered unlikely that the project would to have an impact on a local population or the extent of occurrence of this species in PL1125.

Fragmentation of existing population: Dusky Hopping-mouse lives in sandy dunes and RE 5.6.5 and RE 5.6.8 provide potential habitat for Dusky Hopping-mouse within PL 1125. These habitats are typically found in a linear arrangement along dune crests

which may be narrow corridors or broader where dunes are lower and wider. The areas of dunes which are affected along the buried flowline and other pipelines and access tracks. Most of the wellfield infrastructure is located away from dunes. The flowline and pipelines are buried and do not present a barrier to movement as this species is known to move up to 400 m per night in search of food and is able to cross unsuitable habitats (ALA 2025). The disturbance to dune habitats from construction of the flowline has largely been rehabilitated and appears similar in cover to adjacent areas, as discussed above. Access tracks through dunes result in a bare ground at a scale of about 3 m to 5 m which is consistent with existing pastoral tracks in the area and some areas of bare ground that naturally occur within the dunes. Such distances do not present a barrier to Dusky Hopping-mouse and suitable habitat adjacent to the disturbance area is retained. Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the connectivity of habitat retained is consistent with the area as a whole. The assessment concludes that the project does not present a risk of fragmentation of an existing population of Dusky Hopping-mouse.

Gene flow interruption due to habitat isolation: Disturbance on the scale of the Vali wellfield project would present no barrier to this species and the project does not present a risk of gene flow interruption due to habitat isolation.

Introduction of harmful invasive species: The potential impact of invasive weeds was identified in the project impact assessment and weed management practices to be implemented were described. Construction of the flowline, Vali 1, 2 and 3 well pads and associated infrastructure has occurred and has not led to weed outbreaks. Few weeds were recorded during the field survey with Paddy Melon being the most widespread in dune habitats which is a common species throughout arid regions of Australia. Project activities include weed management practices and are not resulting in the introduction of harmful invasive species. There is no impact of harmful invasive weeds arising from the project to Dusky Hopping-mouse.

Introduction of disease: As identified in the impact assessment, waste is managed in accordance with the waste and resource management hierarchy and principles. Waste bins are covered to prevent access to fauna. Sewage effluent and/or grey water is managed in accordance with conditions of environmental authority. Other waste stream are of an industrial nature and these are managed in dedicated sumps or storages and disposed of appropriately. The project is not considered to result in the potential for introduction of diseases to Dusky Hopping-mouse or other wildlife species.

Interefrence with recovery: The conservation advice for Dusky Hopping-mouse includes the following threat abatement actions:

- Habitat Loss, Disturbance and Modification
    - Identify sites of high conservation priority.
    - Manage threats to areas of native vegetation containing populations of the Dusky Hopping-mouse.
    - Monitor known populations to identify key threats.

    - Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
    - Undertake survey work in suitable habitat and potential habitat to locate any additional populations/occurrences.
- Trampling, Browsing or Grazing
    - Develop and implement a stock management plan to reduce stock intensity in, or exclude grazing from some areas to allow regeneration of vegetation providing habitat for nest sites and food sources.
    - Prevent grazing pressure at known sites on leased crown land through exclusion fencing or other barriers.
- Animal Predation and Competition
    - Implement appropriate management recommendations outlined in the threat abatement plans for the control and eradication of feral cats, foxes and rabbits in the local region.
    - Develop and implement a management plan for the control and eradication of house mice in the local region.
- Conservation Information
    - Raise awareness of the Dusky Hopping-mouse within the local community.
- Enable recovery of Additional Sites and/or Populations
    - Investigate options for linking, enhancing or establishing additional populations.

Approximately 0.41 % of the available habitat for Dusky Hopping-mouse within PL1125 is within the disturbance footprint. Habitat that is potentially suitable remains throughout PL1125 and adjacent areas that would be available should Dusky Hopping-mouse be present. The area to be cleared is unlikely to be critical to the survival of the species at the local or regional scale and is considered unlikely to lead to the loss of a population. It is possible that individuals may be affected however it is considered that sufficient habitat remains adjacent to the disturbance area and throughout PL 1125 to sustain a population should it be present. Cattle are excluded from operational areas of PL1125 which may provide a potential benefit to the species should it occur as it reduces grazing pressure from cattle which is recognised as a primary threat to the species. There are no on-ground recovery actions for Dusky Hopping-mouse being implemented within or adjacent to the Vali Field project which would be or have been disturbed by the project. The project is not considered to have an impact on any recovery efforts for Dusky Hopping-mouse.

Disruption to ecologically significant locations:

It is unclear whether the PL1125 provides ecologically significant locations for Dusky Hopping-mouse including for breeding, feeding, nesting, migration or resting sites. The extent of potential habitat for the species within PL1125 is more than 2100 ha. Should Southern Whiteface be present within PL 1125 it is likely that they would be

able to find suitable locations for feeding, nesting and resting. Given the scale of the project, the potential disruption to the species is considered to be minor.

Risk Assessment

Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Dusky Hopping-mouse is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. Consequently, the Risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

Finding:

There are 14 records of Dusky Hopping-mouse from within 50 km and 77 records from within 100 km of the project area and the project area is modelled as habitat for this species. It is possible that this species may use dune habitats (RE 5.6.5 / 5.6.8) within the project area. It is likely to occur on a temporary and infrequent basis during boom times but it is possible that PL1125 contains refugial populations that persist in times of drought. The disturbance to potential habitat, RE 5.3.22 and from the project is 8.80 hectares which represents 0.41 % of the available habitat within PL1125. Disturbance from construction of the flowline and other pipelines is temporary with rehabilitation resulting in habitat being restored as observed during the field survey. Areas of suitable habitat cleared for tracks and other infrastructure represent a loss of potential habitat but are unlikely to act as a barrier to the movement of Dusky Hopping-mouse. An estimated 2142 ha of suitable habitat remains throughout PL1125. A residual loss of potential habitat from the project for Dusky Hopping-mouse could result in a localised impact to some Dusky Hopping-mouse individuals. Considering the small scale of the project and extent of remaining habitat the risk of an impact from the project is not considered to be significant with no long-term effect on a population. The risk to this species from the project is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

5.6. Prescribed Environmental Matters and Matters of State Environmental Significance (MSES) Impact Assessment

An assessment of potential impacts was conducted against all Prescribed environmental matter (PEMs) identified in the Biodiversity 10 condition of the *Guideline Environmental Protection Act 1994, Streamlined model conditions for petroleum activities*. These are the same Matters of Environmental Significance identified in the MSES report generated for PL 1125 (DESI 2024a). Each matter is assessed to determine if a potential impact may occur along with the associated disturbance area (ha) and location. The Significant Residual Impact Guideline (DEHP 2014) has been used as a guide where appropriate. This assessment is provided in Table 12.

Table 12: Significant residual impacts to prescribed environmental matters (as per Streamlined model conditions for petroleum activities - Biodiversity 10 condition).

Prescribed environmental matter	Assessment	Maximum extent of impact	SRI Assessment finding
Regulated Vegetation			
Endangered regional ecosystem	No endangered regional ecosystems are present in PL 1125, see Appendix 12 Figure 1- PL 1125 – MSES – Regulated Vegetation (from MSES Report for PL 1125 – Table 2, Map 4 (Appendix 1)).	0 ha	No residual impact
Of concern regional ecosystem (not within an urban area)	No 'of concern' regional ecosystems (including categories B and C) are present in PL 1125, see Appendix 12 Figure 1- PL 1125 – MSES – Regulated Vegetation (from MSES Report for PL 1125 – Table 2, (Appendix 1)).	0 ha	No residual impact
Regional ecosystems (not within an urban area) that intersect a wetland on the vegetation management wetlands map: • RE 5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes Broad Vegetation Groups: • 34a Lacustrine wetlands. Lakes, ephemeral to permanent. Includes fringing woodlands and sedgelands. This impact is assessed in	**Summary of Assessment in Section 5.4.1:** RE 5.3.22 is not endangered or of concern and no areas constitute a defined watercourse however areas of RE 5.3.22 within PL1125 lie within mapped wetlands (Category 8f) and therefore an assessment of the three criteria of section 2.1 of the SRI guideline is required. In accordance with the first note of the SRI guideline section 2.1 Criteria 1 and Criteria 2 are exceeded and a significant residual impact occurs from the project disturbance on the regional ecosystem that lies within the mapped wetland (RE 5.3.22).	8.69 ha of RE 5.3.22	The disturbance footprint results in a residual impact to 8.69 ha of RE 5.3.22. This is identified as a significant residual impact to RE 5.3.22 due to Criteria 1 and Criteria 2 being exceeded.

accordance with Section 2 of the SRI guideline.	The disturbance footprint results in a total clearance area of 8.69 ha of RE 5.3.22. This disturbance area represents 0.92 % of RE 5.3.22 within PL 1125.		
Essential habitat (not in an urban area) for endangered wildlife as follows: • Curlew Sandpiper *Calidris ferruginea*, EPBC Critically Endangered; • Common Greenshank *Tringa nebularia* EPBC Endangered and Migratory; • Australian Painted Snipe *Rostratula australis*, EPBC Endangered.	**Summary of Assessment in Section 5.5.2:** Queensland Globe mapping does not identify any Category A or Category B Environmentally Sensitive Area (ESA) – Essential Habitat within PL1125, see Appendix 12 Figure 2- PL 1125 – MSES – Species Threatened (Endangered or Vulnerable) wildlife and species least concern animals (from MSES Report for PL 1125 – Table 2, Map 3a (Appendix 1)). Areas of PL1125 and the disturbance area that contain RE 5.3.22 are considered Category C Environmentally Sensitive Area for endangered wildlife as all of PL1125 is mapped as Category B RVM area and RE 5.3.22 provides suitable habitat for the EPBC endangered Curlew Sandpiper, Common Greenshank and Australian Painted Snipe. The area of RE 5.3.22 within the disturbance footprint is 8.69 hectares which is 0.92 % of RE 5.3.22 that is mapped within PL 1125 (945.22 ha). **Finding: Curlew Sandpiper** There is one record of Curlew Sandpiper from within 50 km and three records from within 100 km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the	8.69 ha of RE 5.3.22	A residual loss of 8.69 ha of habitat (RE 5.3.22) for these species is identified. The residual loss of habitat is assessed to be not significant with no long-term effect on individuals or populations for: Curlew Sandpiper, Common Greenshank and Australian Painted Snipe.

	project is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. **Finding: Common Greenshank** There are no records of Common Greenshank from within 50 km but five records from within 100 km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. **Finding: Australian Painted Snipe** There is only one record of Australian Painted Snipe within 50 km and one record from within 100km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is not considered to be significant with no long-term effect on individuals or populations.		

	Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to these three species is considered to be 'Rare or Unknown' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk to these species is considered to be 'Low' with an associated priority for action of 'monitor the threat occurrence and reassess threat level if likelihood or consequences change'.		
Essential habitat (not in an urban area) for the following vulnerable wildlife: • Sharp-tailed Sandpiper *Calidris acuminata*; EPBC Vulnerable; • Blue-winged Parrot *Neophema chrysostoma,* EPBC Vulnerable; • Southern Whiteface *Aphelocephala leucopsis*, EPBC Vulnerable; • Dusky Hopping-mouse *Notomys fuscus*, EPBC Vulnerable;	**Summary of Assessment in Section 5.5.3:** Queensland Globe mapping does not identify any Category A or Category B Environmentally Sensitive Area (ESA) – Essential Habitat within PL1125, see Appendix 12 Figure 2- PL 1125 – MSES – Species Threatened (Endangered or Vulnerable) wildlife and species least concern animals (from MSES Report for PL 1125 – Table 2, Map 3a (Appendix 1)). All areas of PL1125 and the disturbance area are considered Category C Environmentally Sensitive Area for vulnerable wildlife as all of PL1125 is mapped as Category B RVM area and all regional ecosystems within PL1125 provide suitable habitat for vulnerable species as follows: • RE 5.3.22 for Sharp-tailed Sandpiper and Blue-winged Parrot; • RE 5.6.4 for Southern Whiteface; • RE 5.6.5 and RE 5.6.8 for Dusky Hopping-mouse; and • RE 5.9.3 and RE 5.9.4 for Blue-winged Parrot.	8.69 ha of RE 5.3.22 11.41 ha of RE 5.6.4 8.80 ha of RE 5.6.5 / RE 5.6.8 (combined) 13.09 ha of RE 5.93 / RE 5.94 (combined)	A residual loss of 8.69 ha of habitat (RE 5.3.22) for Sharp-tailed Sandpiper is identified. The risk of the impact to Sharp-tailed Sandpiper is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. The risk of an impact to Blue-winged Parrot from the residual loss of potential habitat is considered to be low and the potential impact is considered to be not significant

	This disturbance area results in habitat loss for these species as follows: • 8.69 ha of 5.3.22 which is equivalent to 0.92% of this community as mapped within PL 1125; • 11.41 ha of RE 5.6.4 which is equivalent to 17.05% of this community as mapped for PL 1125; • 8.8 ha of RE 5.6.5/RE 5.6.8 which is equivalent to 0.41% of this community as mapped for PL 1125; • 13.09 ha of RE 5.93/RE 5.94 (combined) which is equivalent to 0.95% of this community as mapped for PL 1125. **Finding: Sharp-tailed Sandpiper** There are two records of Sharp-tailed Sandpiper from within 50 km and 13 records from within 100 km of the project area. It is likely to occur only very infrequently, if at all in the project area. The project area does not provide critical habitat and is not ecologically significant for the species. The disturbance to potential habitat, RE 5.3.22, from the project is 8.69 hectares which represents less than 1 % of the available habitat within PL1125. Suitable habitat remains throughout PL1125 and adjacent areas. The risk of an impact from disturbance of the project is considered to be low and the potential impact is considered to be not significant with no long-term effect on individuals or populations. Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Sharp-tailed Sandpiper is considered to be 'Possible' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low' with an associated priority for		with no long-term effect on individuals or populations. A residual loss of habitat for Southern Whiteface that could result in a localised impact to the species. The likelihood of an impact to Southern Whiteface is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. The likelihood of an impact to Dusky Hopping-mouse is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'.

	action of 'monitor the threat occurrence and reassess threat level if likelihood or consequences change'. **Finding: Blue-winged Parrot** There are 10 records of Blue-winged Parrot from within 50 km and 19 records from within 100 km of the project area but has not been recorded from within PL 1125 or adjacent areas. It is not a core area for the species and south-west Queensland is at the edge of its range however it is possible that it may occur within PL1125 or the surrounding area on a temporary and infrequent basis. The disturbance to potential habitat, RE 5.3.22 and RE 5.9.3 / 5.9.4 from the project is 21.78 hectares which represents less than 1 % of the available habitat within PL1125. An estimated 2302 ha of suitable habitat remains throughout PL1125 and any Blue-winged Parrot individuals that arrive in the area would still be able to find suitable habitat. The project would lead to a residual loss of potential habitat from the project at a localised scale. The area to be cleared is however unlikely to be critical to the survival of Blue-winged Parrot at the local or regional scale. Considering the extent of remaining habitat the risk of an impact from disturbance of the project is considered to be low with no long-term effect on individuals or populations. The residual impact of the Vali Field project is not considered to be ecologically significant. Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Blue-winged Parrot is considered to be 'Possible' and the consequence is considered to be 'Not significant – no long-term effect on individuals or populations'. Consequently, the Risk is considered to be 'Low' with an associated priority for		

	action of 'monitor the threat occurrence and reassess threat level if likelihood or consequences change'. **Finding: Southern Whiteface** There are 45 records of Southern Whiteface from within 50 km and 115 records from within 100 km. The species was not recorded during the survey despite it being one of the target species and environmental conditions being good at the time of survey, however it is possible that it may occur within PL1125 or the surrounding area. Given that this species is generally sedentary or resident it is likely that it is either in low abundance or not present. Clearance of 11.41 hectares of 5.6.4 could possibly have an impact on the size of a local population in the immediate area of the disturbance if the species is present. The area to be cleared is unlikely to be critical to the survival of Southern Whiteface at the local or regional scale and is considered unlikely to lead to the loss of a population. It is possible that individuals may be affected however it is considered that sufficient habitat remains adjacent to the disturbance area and throughout PL 1125 to sustain a population should it be present. A residual loss of habitat from the project for Southern Whiteface could result in a localised impact to the species however the impact is not considered to be significant. Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Southern Whiteface is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. Consequently, the Risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.		

	Finding: Dusky Hopping-mouse There are 14 records of Dusky Hopping-mouse from within 50 km and 77 records from within 100 km of the project area and the project area is modelled as habitat for this species. It is possible that this species may use dune habitats (RE 5.6.5 / 5.6.8) within the project area. It is likely to occur on a temporary and infrequent basis during boom times but it is possible that PL1125 contains refugial populations that persist in times of drought. The disturbance to potential habitat, RE 5.3.22 and from the project is 8.80 hectares which represents 0.41 % of the available habitat within PL1125. Disturbance from construction of the flowline and other pipelines is temporary with rehabilitation resulting in habitat being restored as observed during the field survey. Areas of suitable habitat cleared for tracks and other infrastructure represent a loss of potential habitat but are unlikely to act as a barrier to the movement of Dusky Hopping-mouse. An estimated 2142 ha of suitable habitat remains throughout PL1125. A residual loss of potential habitat from the project for Dusky Hopping-mouse could result in a localised impact to some Dusky Hopping-mouse individuals. Considering the small scale of the project and extent of remaining habitat the risk of an impact from the project is not considered to be significant with no long-term effect on a population. Using the DCCEEW risk assessment for threatened species within national recovery plans, the likelihood of an impact to Dusky Hopping-mouse is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. Consequently, the Risk is considered to be 'Moderate' with an		

	associated priority for action of 'obtain additional information and develop mitigation action if required'.		
Connectivity areas			
Connectivity area that is a regional ecosystem (not in urban area) Impacts to connectivity were assessed using the DETSI Landscape Fragmentation and Connectivity (LFC) tool and the associated LFC Tool User Guide. A development impact on connectivity areas is determined to be significant if either of the following tests are true: 1. The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale; or 2. Any core area that is greater than or equal to 1 hectare is lost or reduced to patch fragments (core to non-core).	**Summary of Assessment in Section 5.4.2** PL 1125 is not within a Terrestrial or Riparian Bioregional Corridor see Appendix 12, Figure 3. The LFC Connectivity Impact Assessment (CIA) Tool and the Standalone Landscape Fragmentation Analysis Tool were run using the project disturbance footprint. The LFC Tool User Guide was used to interpret the results and determine whether the disturbance constitutes a significant residual impact to the connectivity prescribed environmental matter. If either of the test results are True, then the project impact is considered to cause a significant residual impact on connectivity areas. The results of the LFC Assessment Tool analysis results found that the core area is identified as greater than 500 ha and is 100 % covered by remnant vegetation. For Test 1 the local change threshold for an impact is 50% and the change to the core area from the impact is 0.9601% which is well below the threshold for an impact. For Test 2 the number of pre-clearance core areas is identified as 1 and the number of each post clearance core areas is also identified as 1 and therefore does not change and the core areas is not reduced to a patch fragment. The Significance Assessment results identify a FALSE result for both tests which confirms that the project does not result in a significant impact to connectivity.	0 ha	No residual impact

Wetlands and watercourses			
A wetland in a wetland protection area shown on the Map of referable wetlands (HES wetlands in GBR)	No wetland protection areas shown on the Map of referable wetlands (HES wetlands in GBR) are present in PL 1125, see Appendix 12 Figure 4 - PL 1125 – MSES – Wetlands and waterways (from MSES Report for PL 1125 – Table 2, Map 2 (Appendix 1)).	0 ha, none identified within PL 1125	No residual impact
A wetland of high ecological significance shown on the Map of referable wetlands	No wetlands of high ecological significance shown on the Map of referable wetlands are present in PL 1125, see Appendix 12 Figure 4 - PL 1125 – MSES – Wetlands and waterways (from MSES Report for PL 1125 – Table 2, Map 2 (Appendix 1)).	0 ha	No residual impact
Designated precincts in strategic environmental areas			
Designated precinct in a strategic environmental area	No Designated precinct in a strategic environmental area are present in PL 1125, see MSES Report for PL 1125 – Table 2 (Appendix 1).	0 ha	No residual impact
Protected wildlife habitat			
An area shown as a high-risk area on the flora survey trigger map that contains plants that are endangered or vulnerable wildlife	There are no high-risk areas on the flora survey trigger map that contain plants that are endangered or vulnerable wildlife that are present in PL 1125, see Appendix 12 Figure 4 and Figure 5.	0 ha	No residual impact
An area not shown as a high risk area on the flora survey trigger map that contains plants that are endangered or vulnerable wildlife	No plants that are endangered or vulnerable wildlife have been recorded within PL 1125, see Appendix 11 WildNet Records: Conservation Significant Species List.	0 ha	No residual impact
A non-juvenile koala habitat tree located in an area shown as a bushland habitat, high value rehabilitation habitat or medium value rehabilitation habitat in the 'Map of Assessable Development Area Koala Habitat Values'	No Koala habitat trees have been recorded within PL 1125, see Appendix 12 Figure 6- PL 1125 – MSES – Species Koala habitat area (SEQ) (from MSES Report for PL 1125 – Table 2, Map 3b (Appendix 1)).	0 ha	No residual impact

Habitat for an animal that is endangered wildlife as follows: • Curlew Sandpiper *Calidris ferruginea*, EPBC Critically Endangered; • Common Greenshank *Tringa nebularia* EPBC Endangered and Migratory; • Australian Painted Snipe *Rostratula australis*, EPBC Endangered. This impact is assessed in accordance with Section 5 of the SRI guideline.	No habitat for endangered wildlife is identified within desktop reports as occurring in PL 1125, see Appendix 12 Figure 2- PL 1125 – MSES – Species Threatened (Endangered or Vulnerable) wildlife and species least concern animals (from MSES Report for PL 1125 – Table 2, Map 3a (Appendix 1)). The desktop review identified records for Curlew Sandpiper, Common Greenshank and Australian Painted Snipe within 50 km and suitable habitat for these species has been identified within PL 1125 as RE 5.3.22.	8.69 ha of RE 5.3.22	A residual loss of 8.69 ha of habitat for these species is identified. See Assessment under Essential Habitat.
Habitat for an animal that is vulnerable wildlife: • Sharp-tailed Sandpiper *Calidris acuminata*; EPBC Vulnerable; • Blue-winged Parrot *Neophema chrysostoma,* EPBC Vulnerable; • Southern Whiteface *Aphelocephala leucopsis*, EPBC Vulnerable; • Dusky Hopping-mouse *Notomys fuscus*, EPBC Vulnerable; This impact is assessed in accordance with Section 5 of the SRI	No habitat for vulnerable wildlife is identified within desktop reports as occurring in PL 1125, see Appendix 12 Figure 2- PL 1125 – MSES – Species Threatened (Endangered or Vulnerable) wildlife and species least concern animals (from MSES Report for PL 1125 – Table 2, Map 3a (Appendix 1)). The desktop review identified records for Sharp-tailed Sandpiper, Blue-winged Parrot, Southern Whiteface and Dusky Hopping-mouse within 50 km and suitable habitat for all species has been identified within PL 1125. Suitable habitats are: • RE 5.3.22 for Sharp-tailed Sandpiper and Blue-winged Parrot; • RE 5.6.4 for Southern Whiteface;	8.69 ha of RE 5.3.22 11.41 ha of RE 5.6.4 8.80 ha of RE 5.6.5 / RE 5.6.8 (combined) 13.09 ha of RE 5.93 / RE 5.94 (combined)	A residual loss of habitat for Sharp-tailed Sandpiper, Blue-winged Parrot, Southern Whiteface and Dusky Hopping-mouse. See Assessment under Essential Habitat.

guideline.	• RE 5.6.5 and RE 5.6.8 for Dusky Hopping-mouse; and • RE 5.9.3 and RE 5.9.4 for Blue-winged Parrot. This disturbance area results in habitat loss for these species as follows: • 8.69 ha of 5.3.22 which is equivalent to 0.92% of this community as mapped within PL 1125; • 11.41 ha of RE 5.6.4 which is equivalent to 17.05% of this community as mapped for PL 1125; • 8.80 ha of RE 5.6.5/RE 5.6.8 which is equivalent to 0.41% of this community as mapped for PL 1125; • 13.09 ha of RE 5.93/RE 5.94 (combined) which is equivalent to 0.95% of this community as mapped for PL 1125.		
Habitat for an animal that is special least concern wildlife. No wildlife have been identified as species least concern however EPBC listed migratory species which are not threatened are included here. • Common Sandpiper *Actitis hypoleucos*, EPBC Migratory; • Pectoral Sandpiper *Calidris melanotos*, EPBC Migratory; • Marsh Sandpiper *Tringa*	No habitat for a special wildlife of least concern is identified within desktop reports as occurring in PL 1125, see Appendix 12 Figure 2- PL 1125 – MSES – Species Threatened (Endangered or Vulnerable) wildlife and species least concern animals (from MSES Report for PL 1125 – Table 2, Map 3a (Appendix 1)). No such species were identified within the field survey. The desktop review identified records for Common Sandpiper, Pectoral Sandpiper, Marsh Sandpiper and Red-necked Stint within 50 km and suitable habitat has been identified within PL 1125 as RE 5.3.22. This disturbance area results in a loss of	8.69 ha of RE 5.3.22	A residual loss of 8.69 ha of habitat for these species is identified. This is not assessed to be a significant impact.

stagnatilis, EPBC Migratory; • Red-necked Stint *Calidris ruficollis*, EPBC Migratory. This impact is assessed in accordance with Section 5 of the SRI guideline.	8.69 ha which is equivalent to 0.92% of RE 5.3.22 within PL 1125. An assessment of the impact against criteria contained within the SRI guideline to determine a significant impact on endangered wildlife found that the impact was not significant. This finding is appropriate for these species also.		
Protected areas			
National park	PL 1125 is not located in a National Park, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1))	0 ha	No residual impact
Regional park	PL 1125 is not located in a Regional Park, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1))	0 ha	No residual impact
Nature refuge	PL 1125 is not located in a Nature Refuge, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).	0 ha	No residual impact
Highly protected zones of State marine parks			
Conservation park zone	PL 1125 is not located in a Conservation park zone, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).	0 ha	No residual impact
Marine national park zone	PL 1125 is not located in a Marine national park zone, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).	0 ha	No residual impact
Preservation zone	PL 1125 is not located in a Preservation zone, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).	0 ha	No residual impact
Other zones	PL 1125 is not located in any other protected zone, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation	0 ha	No residual impact

	Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).		
Fish habitat areas			
A declared fish habitat area	PL 1125 is not located in a declared fish habitat area, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).	0 ha	No residual impact
Waterway providing for fish passage			
Fish passage (not in an urban area)	PL 1125 does not contain any waterways providing for fish passage, see Appendix 12 Figure 7 PL 1125 – MSES – State Conservation Areas (from MSES Report for PL 1125 – Table 2, Map 1 (Appendix 1)).	0 ha	No residual impact
Marine plants			
Marine plant (not in an urban area)	PL 11255 is not coastal or marine and therefore does not contain any marine plants.	0 ha	No residual impact
Legally secured offset area			
secured offset area	PL 1125 does not contain any secured offset areas see Appendix 12 Figure 8 - PL 1125 – MSES – Offset Areas (from MSES Report for PL 1125 – Table 2, Map 5 (Appendix 1))	0 ha	No residual impact

5.7. Residual Impacts

The Significant Residual Impact Assessment identified the following residual impacts:

- The disturbance footprint results in a residual impact to 8.69 ha of RE 5.3.22 which lies within mapped wetlands but is not endangered or of concern. This is identified as a significant residual impact to RE 5.3.22 under Section 2.1 of the Significant Residual Impact Guideline due to Criteria 1 and Criteria 2 of being exceeded.
- A residual loss of 8.69 ha of habitat for EPBC Endangered species Curlew Sandpiper, Common Greenshank and Australian Painted Snipe is identified. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the risk of an impact from project disturbance is considered to be low and the potential impact is not considered to be significant with no long-term effect on individuals or populations.
- A residual loss of 8.69 ha of potential habitat (RE 5.3.22) for the EPBC Vulnerable Sharp-tailed Sandpiper is identified. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact with no long-term effect on individuals or populations.
- A residual loss of 21.78 hectares of potential habitat (8.69 ha of RE 5.3.22 and 13.09 ha of RE 5.9.3 / 5.9.4) for the EPBC Vulnerable Blue-winged Parrot is identified. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact with no long-term effect on individuals or populations.
- A residual loss of 11.41 ha of potential habitat (RE 5.6.4) for the EPBC: Vulnerable Southern Whiteface that could result in a localised impact to the species. The likelihood of an impact to Southern Whiteface is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals may be adversely affected but no effect at population level'. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the impact was not significant as the impact is unlikely to:
    - lead to a long-term decrease in the size of a local population,
    - reduce the extent of occurrence of the species; or
    - fragment an existing population.

  Using the DCCEEW risk assessment framework for threatened species within national recovery plans the risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.

- A residual loss of habitat (8.80 ha of RE 5.6.5 / RE 5.6.8 combined) for the EPBC Vulnerable Dusky Hopping-mouse. The likelihood of an impact to Dusky Hopping-mouse is considered to be 'Possible' and the consequence is considered to be 'Minor – individuals are adversely affected but no effect at population level'. An assessment of the residual impact against the significant impact criteria for endangered wildlife (Section 5.1 of the SRI guideline) found that the impact was not significant as the impact is unlikely to:
    - lead to a long-term decrease in the size of a local population,
    - reduce the extent of occurrence of the species; or
    - fragment an existing population.

  Using the DCCEEW risk assessment framework for threatened species within national recovery plans the risk is considered to be 'Moderate' with an associated priority for action of 'obtain additional information and develop mitigation action if required'.
- A residual loss of 8.69 ha of habitat (RE 5.3.22) for four EPBC Migratory species; Common Sandpiper, Pectoral Sandpiper, Marsh Sandpiper and Red-necked Stint. An assessment of the residual impact against the significant impact criteria for vulnerable wildlife (Section 5.1 of the SRI guideline) found that the loss of habitat was not a significant impact.

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Appendix 1: Matters of State Environmental Significance Report for PL1125

Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

PL: 1125

Environmental Reports - General Information

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

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

Figures in tables may be affected by rounding.

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

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

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

Disclaimer

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

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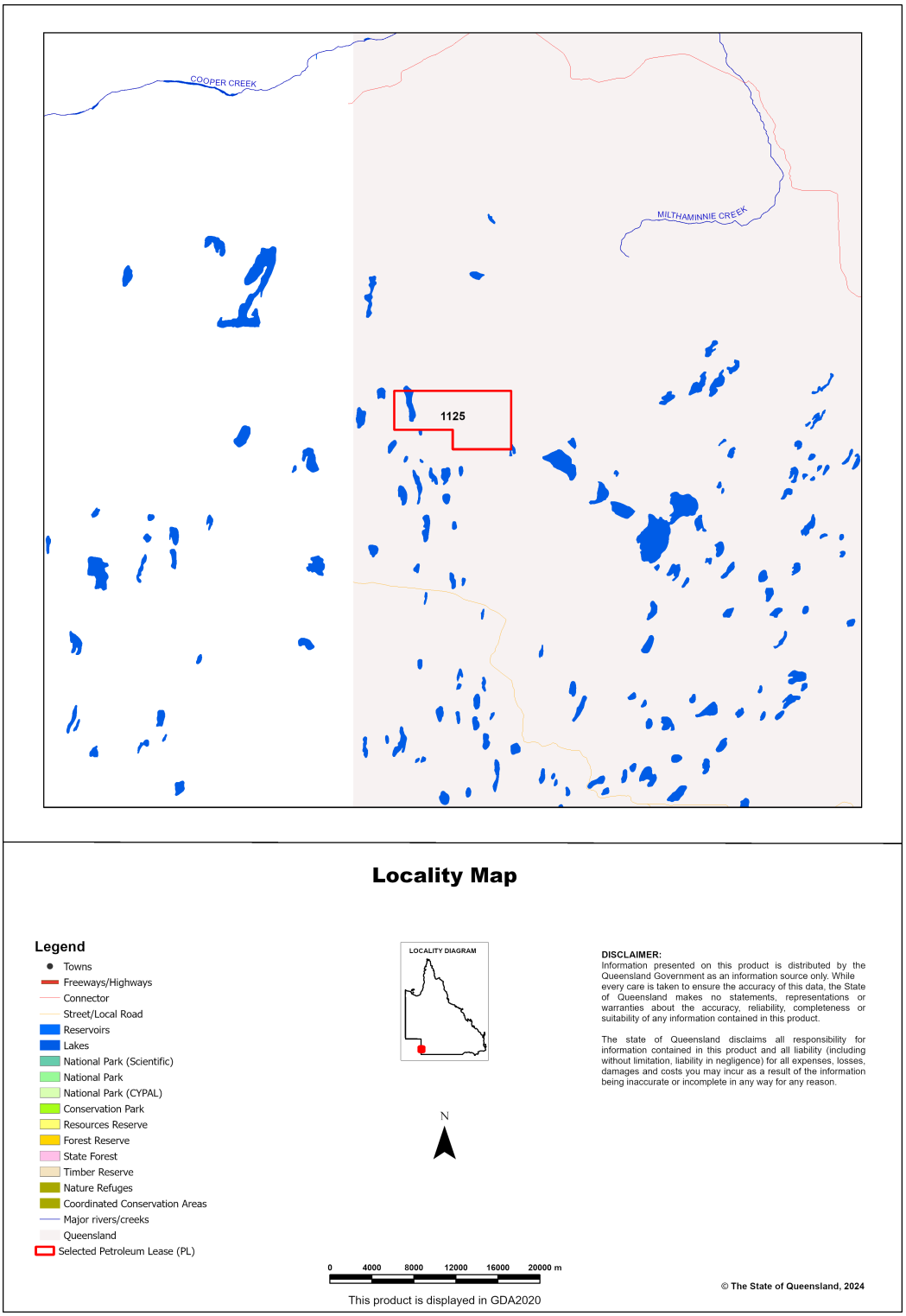
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Assessment Area Details

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

Table 1: Summary table, details for AOI: PL: 1125, with area 4542.41 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Bulloo Shire	Cooper Creek	Channel Country	Strzelecki Desert
		Channel Country	Sturt Stony Desert



Matters of State Environmental Significance (MSES)

MSES Categories

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

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

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

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992;*

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004 ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
  - Category R areas on the regulated vegetation management map;
  - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
  - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

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

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0 ha	0.0%
7b Special least concern animals	0 ha	0.0%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0 ha	0.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0 ha	0.0%
8d Regulated Vegetation - Essential habitat	0 ha	0.0%
8e Regulated Vegetation - intersecting a watercourse	10.2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	1041.48 ha	22.9%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

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

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(No results)

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

(no results)

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

(no results)

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

(no results)

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

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Not applicable

7b. Special least concern animals

Not applicable

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

Not applicable

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

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

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

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

Threatened (endangered or vulnerable) wildlife species records

(No results)

Special least concern animal species records

(No results)

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

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

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

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

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

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

MSES - Regulated Vegetation

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

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

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

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

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

Not applicable

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

Not applicable

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

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

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

Regulated vegetation map category	Map number
B	7141
B	7142

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

MSES - Offsets

9a. Legally secured offset areas - offset register areas

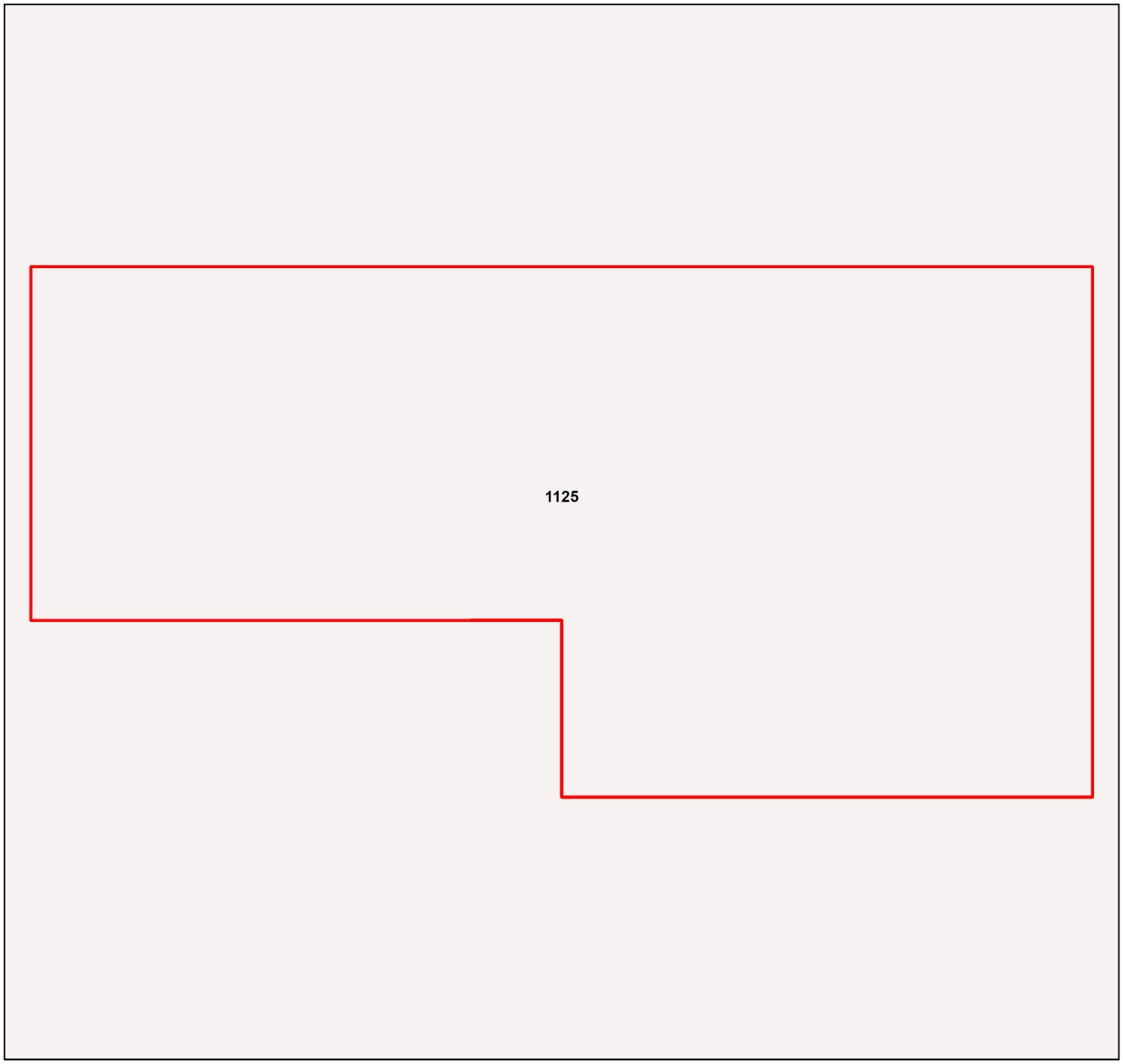
(No results)

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

(No results)

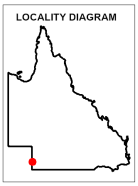
Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

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



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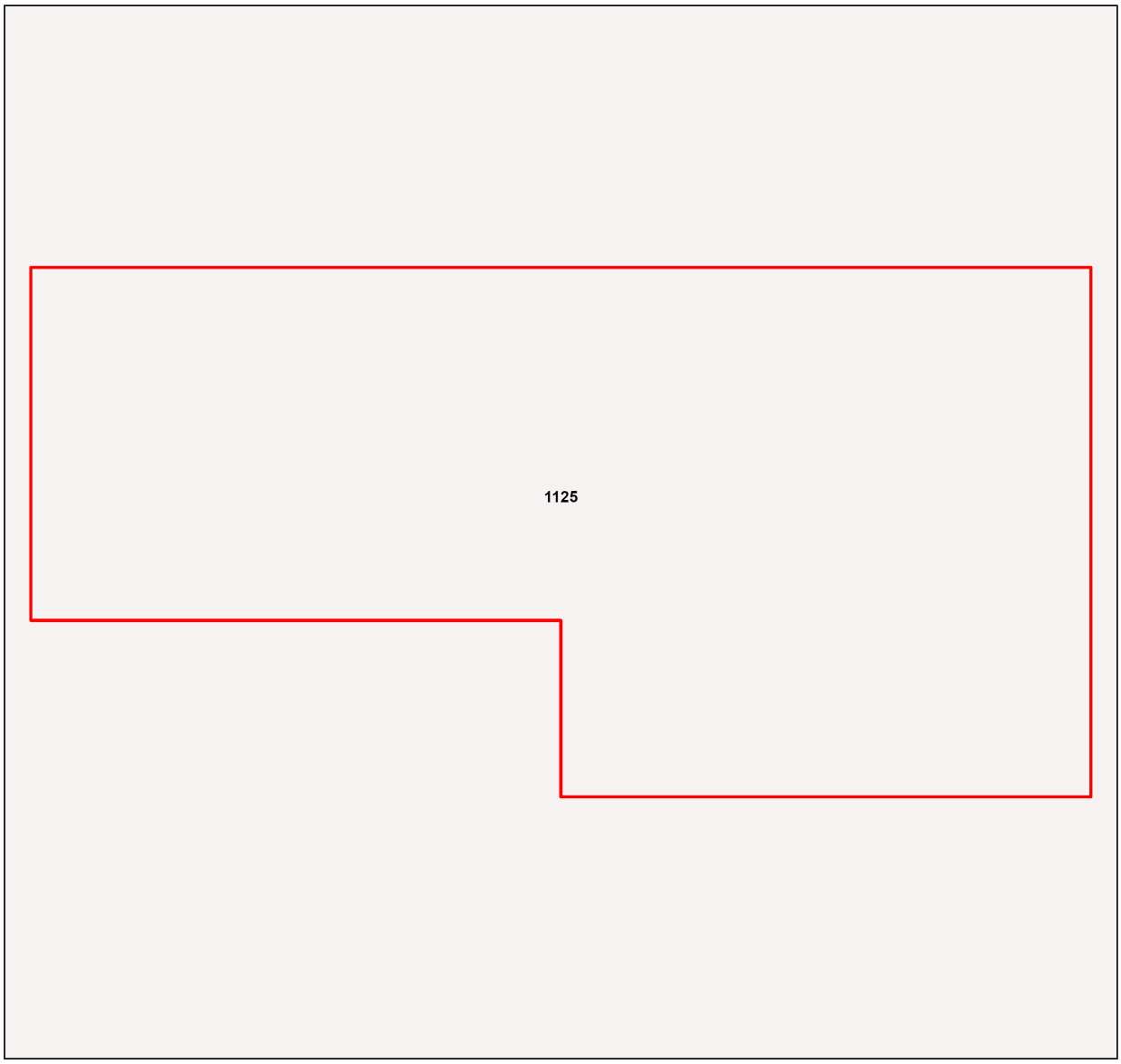




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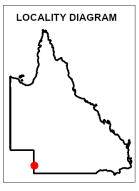
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Map 2 - MSES - Wetlands and Waterways



MSES - Wetlands and Waterways

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



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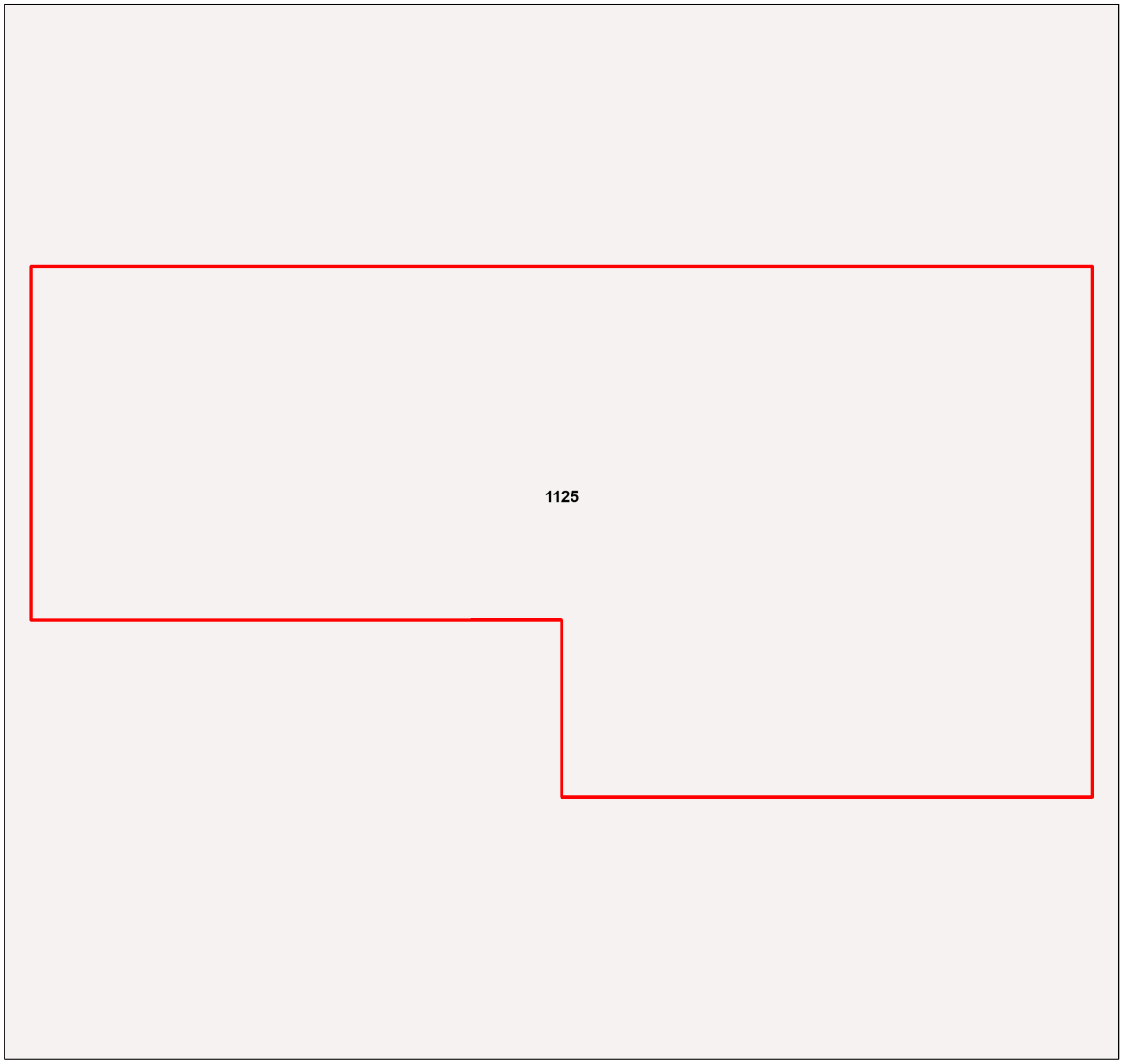
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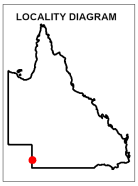
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Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



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

- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)
- Selected Petroleum Lease (PL)



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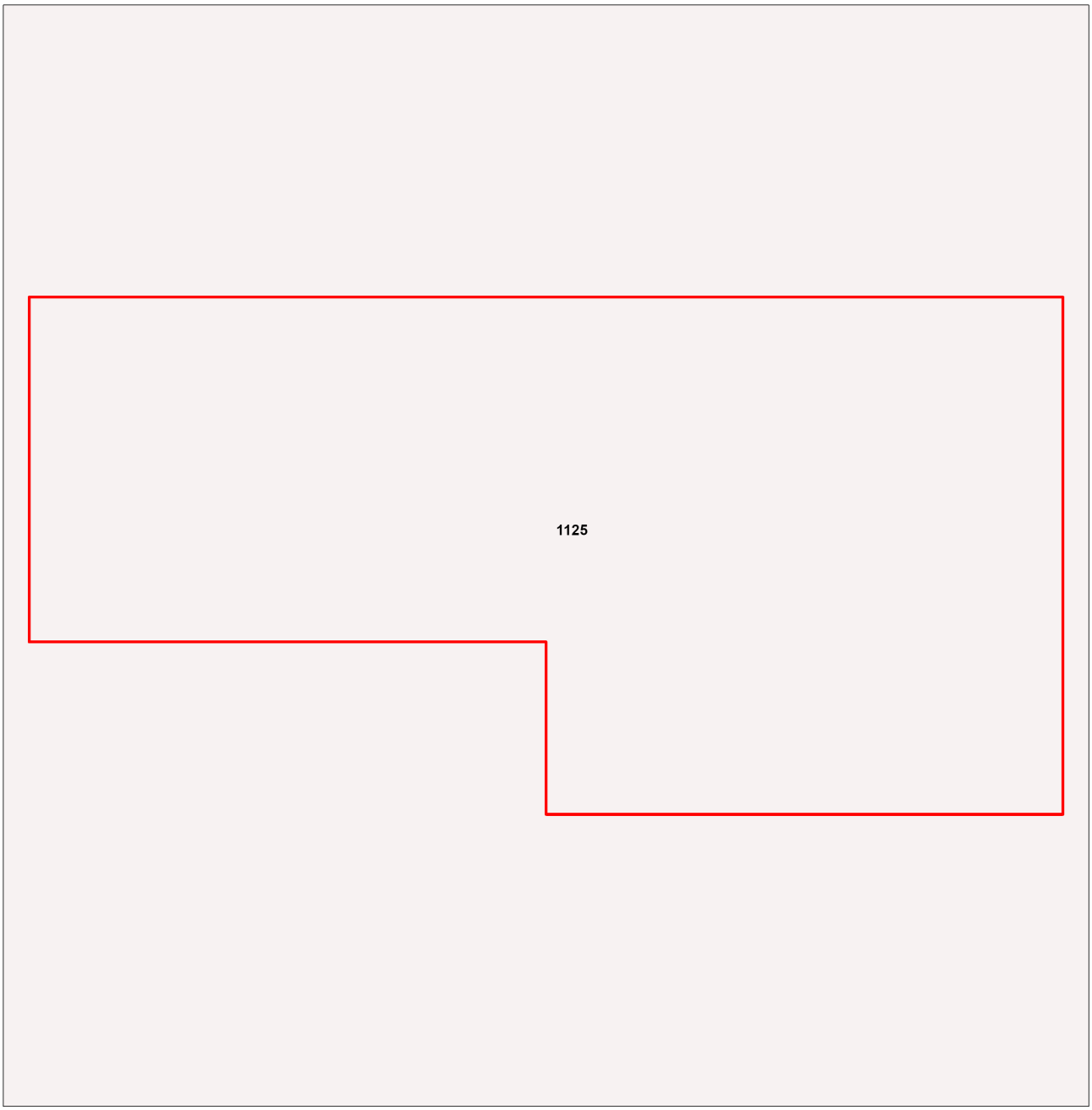
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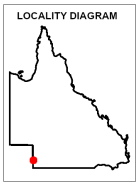
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

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

LOCALITY DIAGRAM



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

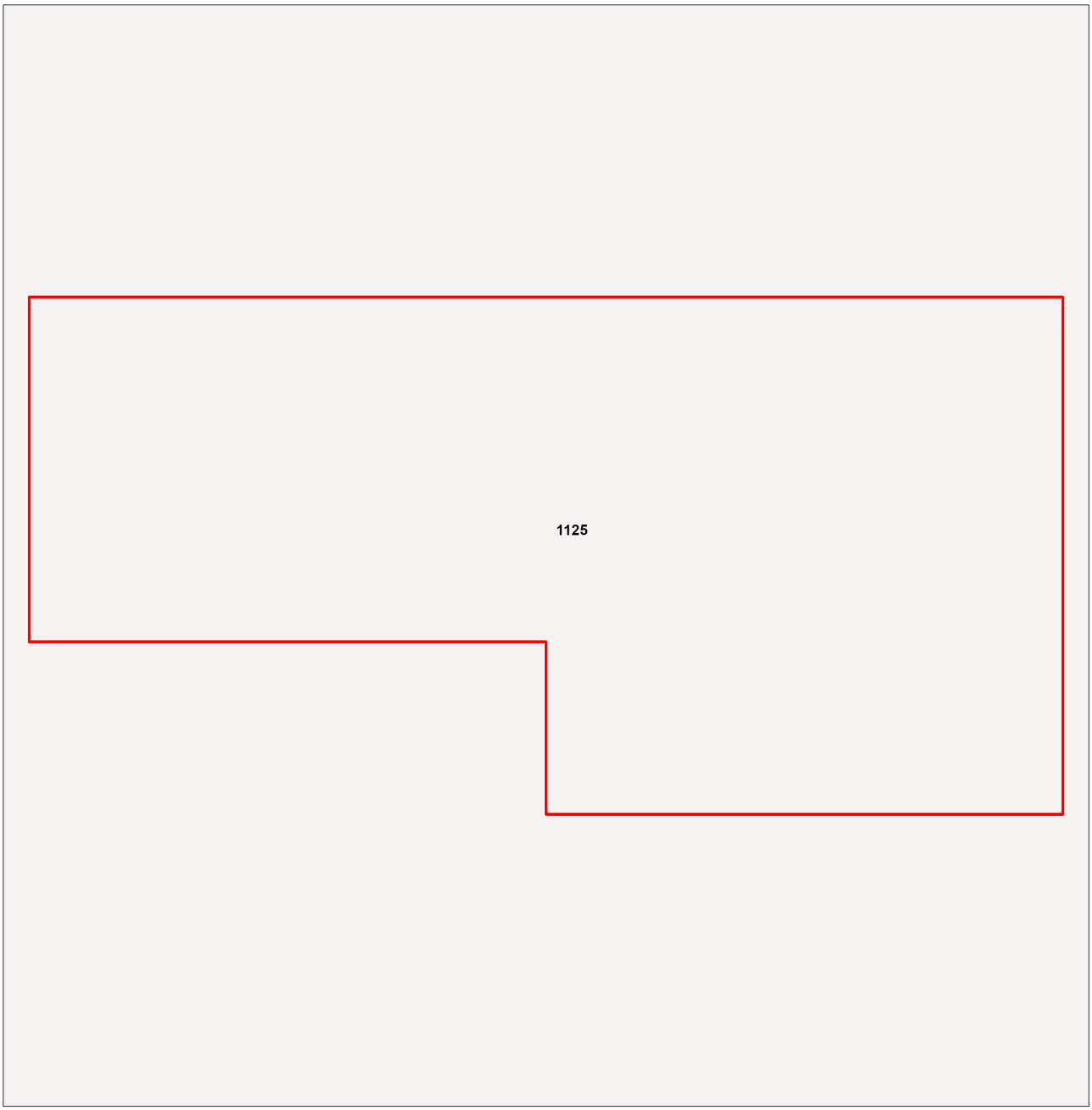
The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

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0 600 1,200 1,800 2,400 3,000 m

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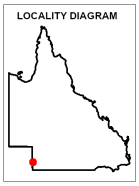
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)
- Selected Petroleum Lease (PL)

LOCALITY DIAGRAM



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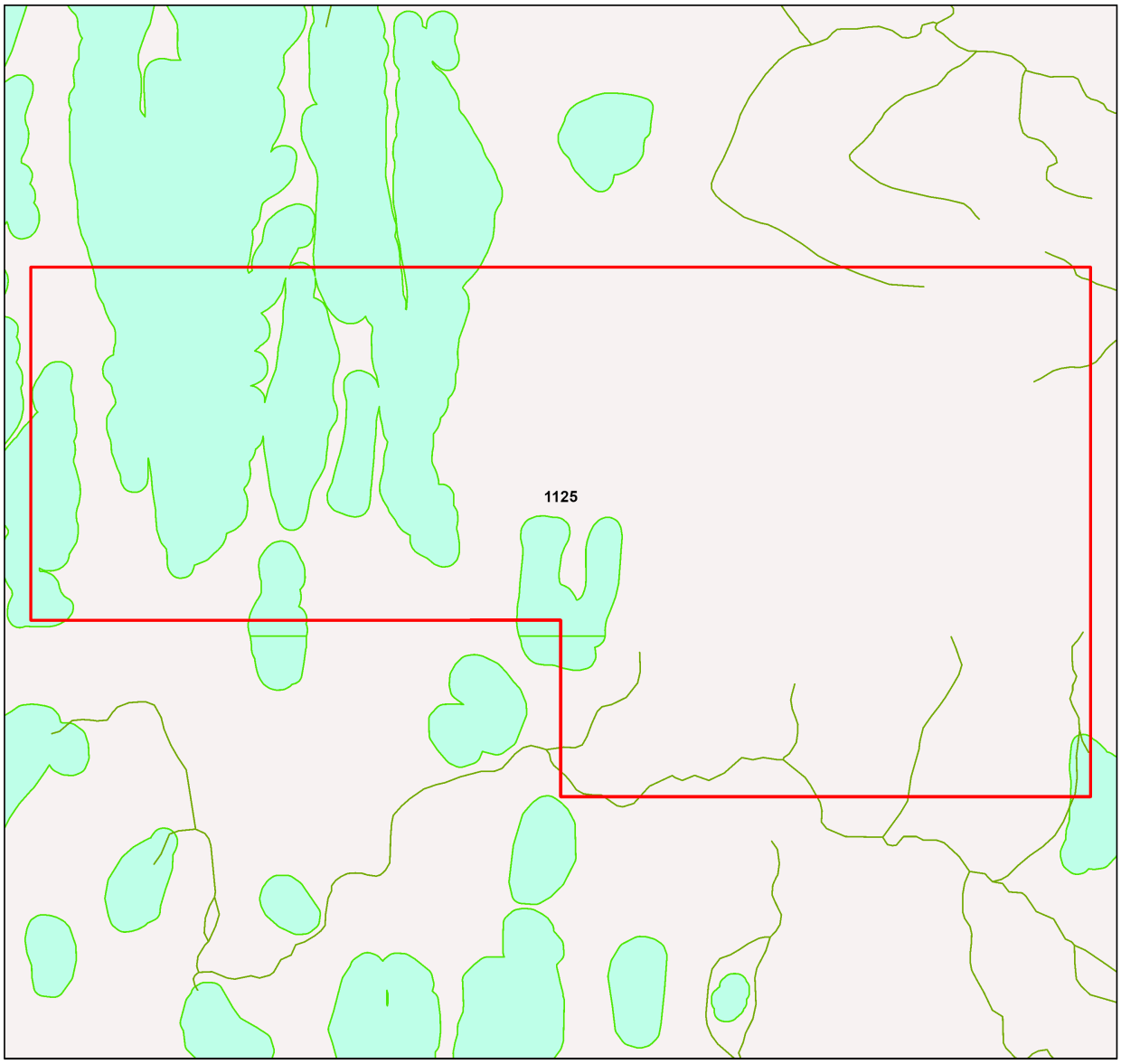
MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and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

0 600 1,200 1,800 2,400 3,000 m

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Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

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



N

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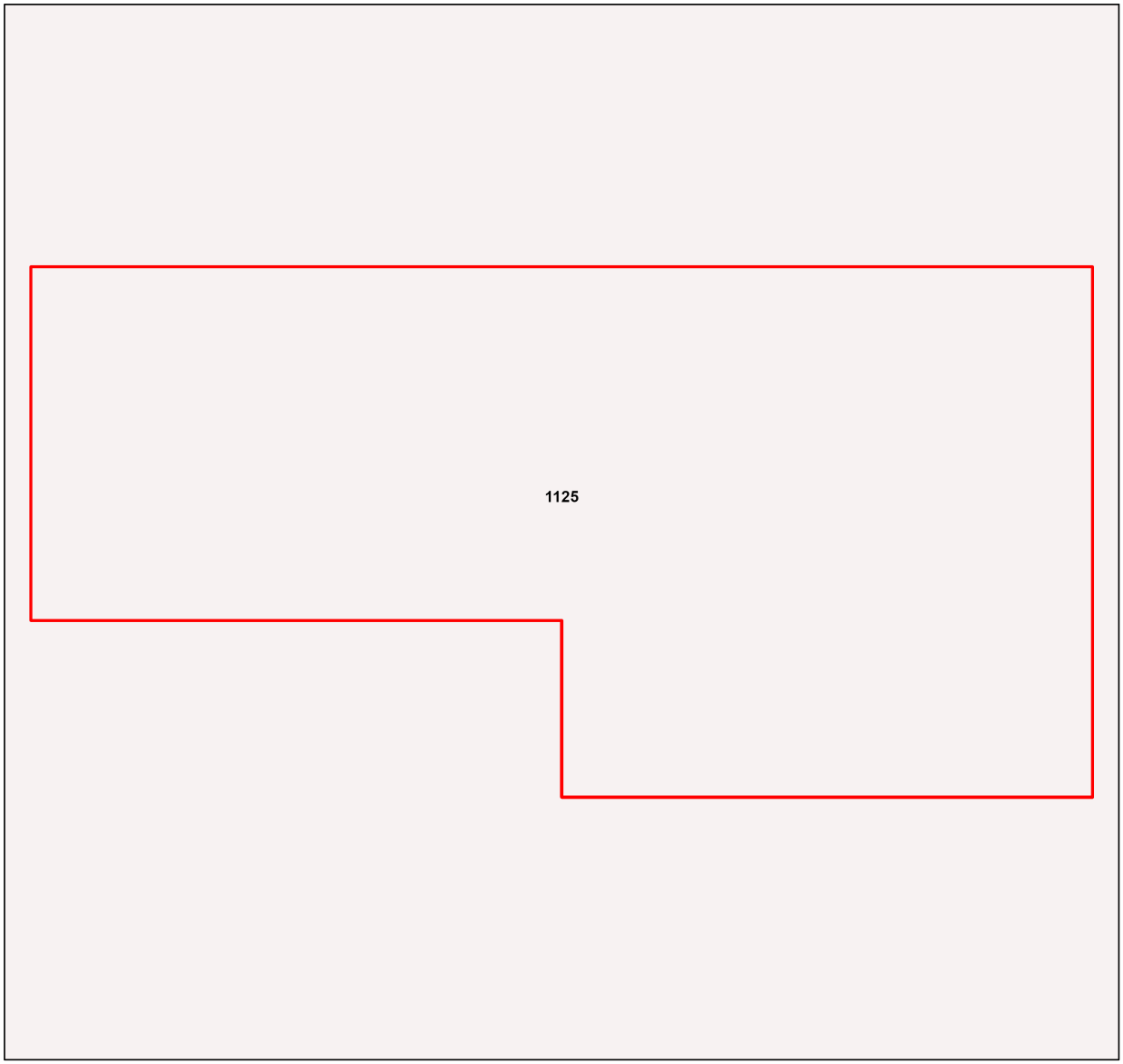
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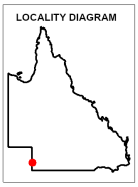
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Map 5 - MSES - Offset Areas



MSES - Offsets

- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)
- Selected Petroleum Lease (PL)



N

0 640 1280 1920 2560 3200 m

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Appendices

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

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

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

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

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

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

Appendix 2 - Source Data

The datasets listed below are available on request from:

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

- Matters of State environmental significance

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

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

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

Appendix 3 - Acronyms and Abbreviations

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

Appendix 2: Biodiversity and Conservation Values: Biodiversity Planning Assessments and Aquatic Conservation Assessments Report for PL1125.

Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

PL: 1125

Environmental Reports - General Information

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

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

Figures in tables may be affected by rounding.

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

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

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

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Summary Information

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

Table 1: Details for area of interest: PL: 1125, with area 4542.41 ha

Local Government(s)
Bulloo Shire
Bioregion(s)
Channel Country
Channel Country
Subregion(s)
Strzelecki Desert
Sturt Stony Desert
Catchment(s)
Cooper Creek

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

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Biodiversity Planning Assessment(s)	Aquatic Conservation Assessment(s) (riverine)	Aquatic Conservation Assessment(s) (non-riverine)
Channel Country v1.1	Lake Eyre and Bulloo Basins v1.1	Lake Eyre and Bulloo Basins v.1.1

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

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	4,542.41	100.00

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

Table 4: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
Local or Other Values	132.33	2.91
Regional	3,344.93	73.64
State	1,065.16	23.45

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Lacustrine wetlands	8

Total number of non-riverine wetlands	8

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

Table 6: Named waterways intersecting the AOI

(No Records)

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

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

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

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Low	3,399.59	74.84
Very High	1,142.83	25.16

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

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Medium	652.71	14.37

Biodiversity Planning Assessments

Introduction

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

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

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

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

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

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

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

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

Table 9: Summary table, biodiversity significance

Biodiversity Status	Area (Ha)	% of AOI
State	1,065.16	23.45
Regional	3,344.93	73.64
Local or Other Values	132.33	2.91

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

Diagnostic Criteria

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

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

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

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

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

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

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

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

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

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

Biodiversity significance	Description	Area (Ha)	% of AOI
Local or Other Values	Refer to diagnostic data for additional information	2,885.83	63.53
Regional	Remnant contains an RE that is one of the largest of its type in the subregion (D2)	761.17	16.76
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has Ecosystem diversity in the top quartile (F)	895.41	19.71

Assessment of diagnostic criteria with respect to the AOI

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

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

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	0.00	0.00	0.00	0.00	895.41	19.71	3,647.00	80.29
B1: Ecosystem Value (Bioregion)	0.00	0.00	0.00	0.00	1,792.69	39.47	2,749.73	60.53
B2: Ecosystem Value (Subregion)	0.00	0.00	0.00	0.00	1,031.52	22.71	3,510.89	77.29
C: Tract Size	0.00	0.00	4,542.41	100.00	0.00	0.00	0.00	0.00
D1: Relative RE Size (Bioregion)	895.41	19.71	0.00	0.00	0.00	0.00	3,647.00	80.29

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
D2: Relative RE Size (Subregion)	1,656.58	36.47	0.00	0.00	0.00	0.00	2,885.83	63.53
F: Ecosystem Diversity	899.97	19.81	3,642.44	80.19	0.00	0.00	0.00	0.00
G: Context and Connection	4,542.41	100.00	0.00	0.00	0.00	0.00	0.00	0.00

Other Essential Criteria

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

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

Biodiversity significance	Description	Area (Ha)	% of AOI
	No information	1,053.56	23.19
Regional	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	3,319.11	73.07
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	169.74	3.74

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

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

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

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

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

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

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ia: Centres of Endemism	169.74	3.74	0.00	0.00	0.00	0.00	0.00	0.00
Ib: Wildlife Refugia	169.74	3.74	0.00	0.00	0.00	0.00	0.00	0.00
Ic: Disjunct Populations	0.00	0.00	169.74	3.74	0.00	0.00	0.00	0.00
Id: Limits of Geographic Ranges	3,484.29	76.71	4.56	0.10	0.00	0.00	0.00	0.00
Ie: High Species Richness	169.74	3.74	3,319.11	73.07	0.00	0.00	0.00	0.00
If: Relictual Populations	0.00	0.00	169.74	3.74	0.00	0.00	0.00	0.00
Ig: Variation in Species Composition	3,488.85	76.81	0.00	0.00	0.00	0.00	0.00	0.00
Ih: Artificial Wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ii: Hollow Bearing Trees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ij: Breeding or Roosting Site	169.74	3.74	0.00	0.00	0.00	0.00	0.00	0.00
Ik: Climate Refugia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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

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

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

The functions of these corridors are:

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

  - Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
  - Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;

- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

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

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

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;
- Include and maximise connectivity between large tracts/patches of remnant vegetation;
- Include and maximise connectivity between remnant vegetation in good condition; and

- Riparian

- Located on the major river or creek systems within the bioregion in question.

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

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

Biodiversity Significance	Area (Ha)	% of AOI
	4,542.41	100.00

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

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

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

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

Special Area Decisions

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

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

Decision Number	Description	Panel Recommended Significance	Criteria Values
chc_l_06	Southern Simpson Desert	Regional	Id (geographic range limit): VERY HIGH Ie (high species diversity): HIGH Ig (RE's show distinct variation in species composition): VERY HIGH

Decision Number	Description	Panel Recommended Significance	Criteria Values
chc_l_16	Ephemeral wetlands	State	la (centre of endemism): VERY HIGH lb (wildlife refugia): VERY HIGH lc (disjunct populations): HIGH ld (geographic range limit): HIGH le (high species diversity): VERY HIGH lf (relictual populations): HIGH lg (RE's show distinct variation in species composition): VERY HIGH lj (breeding or roosting sites): VERY HIGH

Expert panel decision descriptions:

Decision Number	Description
chc_l_06	Habitat for EVR taxa including: woma and the dusky hopping-mouse. Supports high species richness, especially reptiles and birds with moderate richness of arid zone endemics and threatened taxa. Likely habitat for kowaris. Known periodic habitat for night parrots. There is a different mix of geologies and a different rainfall pattern- negligible rainfall. The area is regarded as being more Strezleckie (IBRA) rather than Simpson. Unique river systems typified by a lack of connectivity. Likely to contain more values but as yet the area is poorly surveyed and hence remains largely unknown.
chc_l_16	Habitat for a wider range of invertebrates and algae than permanent and semi-permanent waterholes, including species such as fairy shrimp and shield shrimp which do not occur in more permanent waterholes where fish predation is higher. Support waterbird populations estimated systematically to be in the millions of individuals and breeding colonies or dispersed waterbird breeding numbering tens of thousands of pairs (for multiple species) (Reid and Jaensch in Costelloe et al 2004); among the most important recruitment areas for waterbirds in Australia (Jaensch 2009); include the most important sites in Australia for a suite of waterbird species in terms of numbers (supporting >1% of total population size). Many of the wetlands, at several scales, can be demonstrated to meet criteria for international importance. Includes areas outside of floodplains that may fill from local runoff. Includes salt pan systems which have their own unique suit of species. These wetlands go dry every year or nearly every year. They will go dry by end of the year in average seasons but last during good seasons or after very large floods and when clusters of good flood seasons occur.

Aquatic Conservation Assessments

Introduction

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

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

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

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

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

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

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

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

Explanation of Criteria

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

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

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

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

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

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

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

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

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

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

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

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

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

Riverine Wetlands

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

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

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

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Low	3,399.59	74.84
Very High	1,142.83	25.16

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

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

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	3,399.59	74.84	0.00	0.00	1,142.83	25.16	0.00	0.00
2. Naturalness catchment	3,399.59	74.84	0.00	0.00	0.00	0.00	1,142.83	25.16
3. Diversity and richness	0.00	0.00	1,142.83	25.16	0.00	0.00	3,399.59	74.84
4. Threatened species and ecosystems	0.00	0.00	1,142.83	25.16	3,399.59	74.84	0.00	0.00
5. Priority species and ecosystems	1,142.83	25.16	0.00	0.00	0.00	0.00	0.00	0.00
6. Special features	1,142.83	25.16	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	1,142.83	25.16	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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

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

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
cp_r_fa_07	Permanent waterholes — long term	Cooper	6.3.1	4

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
cp_r_fa_07	Ecological processes in the LEBB work over vast timeframes of centuries or 1000’s of years. The permanent waterholes (100% permanent >100 years) that never go dry over these longer timeframes are critically important to aquatic species persistence in these arid landscapes. They have a major influence on the genetic diversity and gene flow between river catchments. These waterholes act as refugia (Hamilton et al. 2005), e.g. metapopulation and genetics of the Cooper Creek turtle requires long time frames of persistence to sustain populations and species. However, the panel cautioned that care is required for broad application of this decision as some wetlands have been modified through water extraction (Bunn et al. 2006).

Non-riverine Wetlands

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

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

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Medium	652.71	14.37

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

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

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	290.56	6.40	0.00	0.00	362.16	7.97	0.00	0.00
2. Naturalness catchment	290.56	6.40	362.16	7.97	0.00	0.00	0.00	0.00
3. Diversity and richness	0.00	0.00	362.16	7.97	0.00	0.00	290.56	6.40
4. Threatened species and ecosystems	0.00	0.00	0.00	0.00	652.71	14.37	0.00	0.00
5. Priority species and ecosystems	0.00	0.00	652.71	14.37	0.00	0.00	0.00	0.00
6. Special features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Connectivity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Representativeness	302.11	6.65	0.00	0.00	195.95	4.31	154.65	3.40

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

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

Decision number	Special feature	Catchment	Criteria/Indicator/ Measure	Conservation rating (1-4)
cp_nr_ec_02	Temporary claypan wetlands	Cooper	5.2.1	3

4 is the highest rating/value

Expert panel decision descriptions:

Decision Number	Description
cp_nr_ec_02	A number of temporary claypan wetlands not fed by rivers have different biota adapted to different desiccation cycles e.g. fairy shrimp. For the majority of their time they are dry and are susceptible to cattle damage and woody debris removal. The REs associated with this decision are: 4.3.12b, d; 5.3.13b; 5.3.15a, b; 5.3.16a; 5.3.22a; 5.3.8b; 6.3.11; 6.3.11b.

Threatened and Priority Species

Introduction

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

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

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

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

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

Threatened Species

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

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

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

(No Records)

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

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

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

BPA Priority Species

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

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

(No Records)

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

ACA Priority Species

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

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

(No Records)

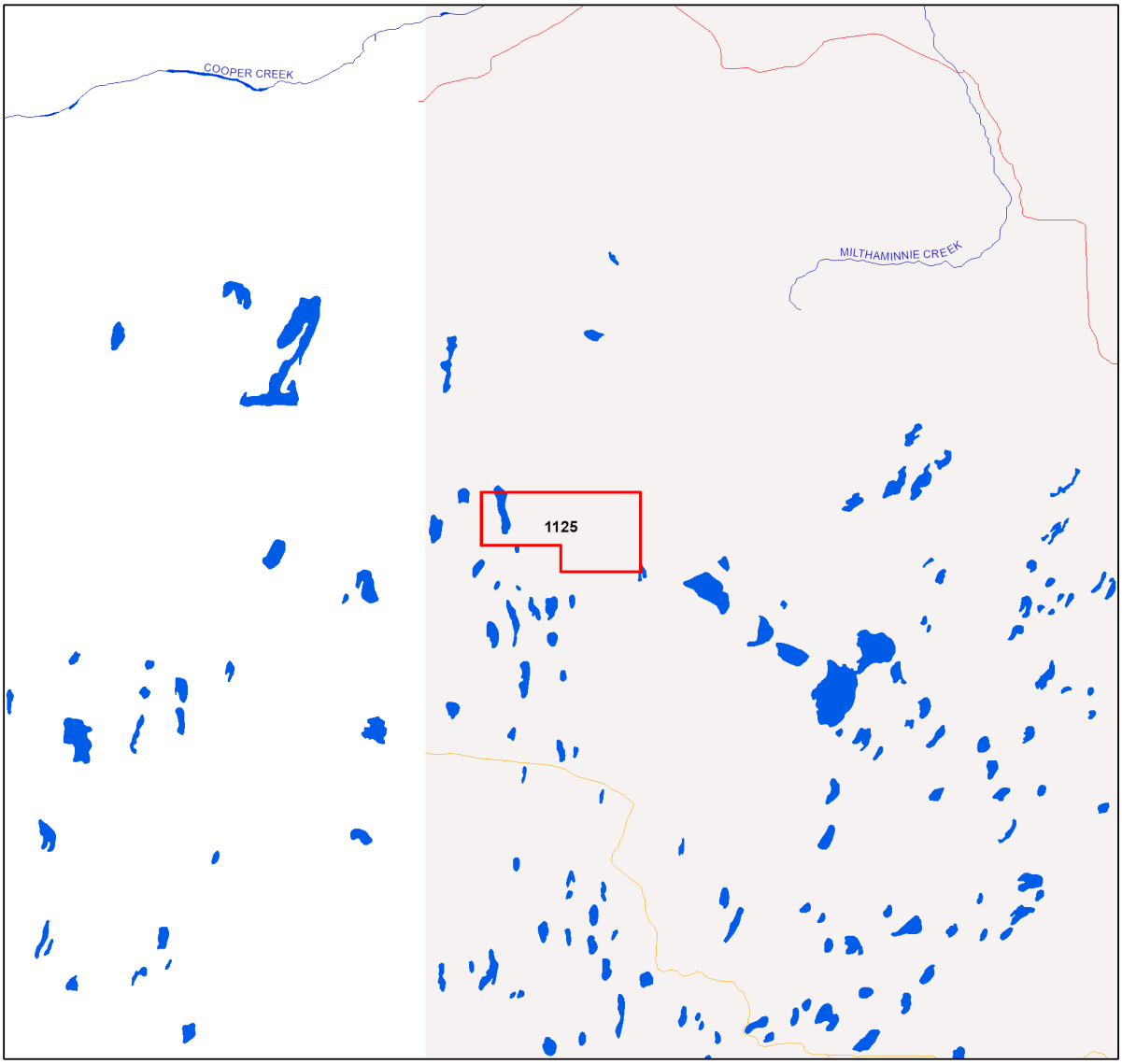
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(No Records)

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

Maps

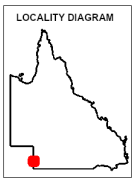
Map 1 - Locality Map



Locality Map

Legend

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



N

0 4000 8000 12000 16000 20000 m

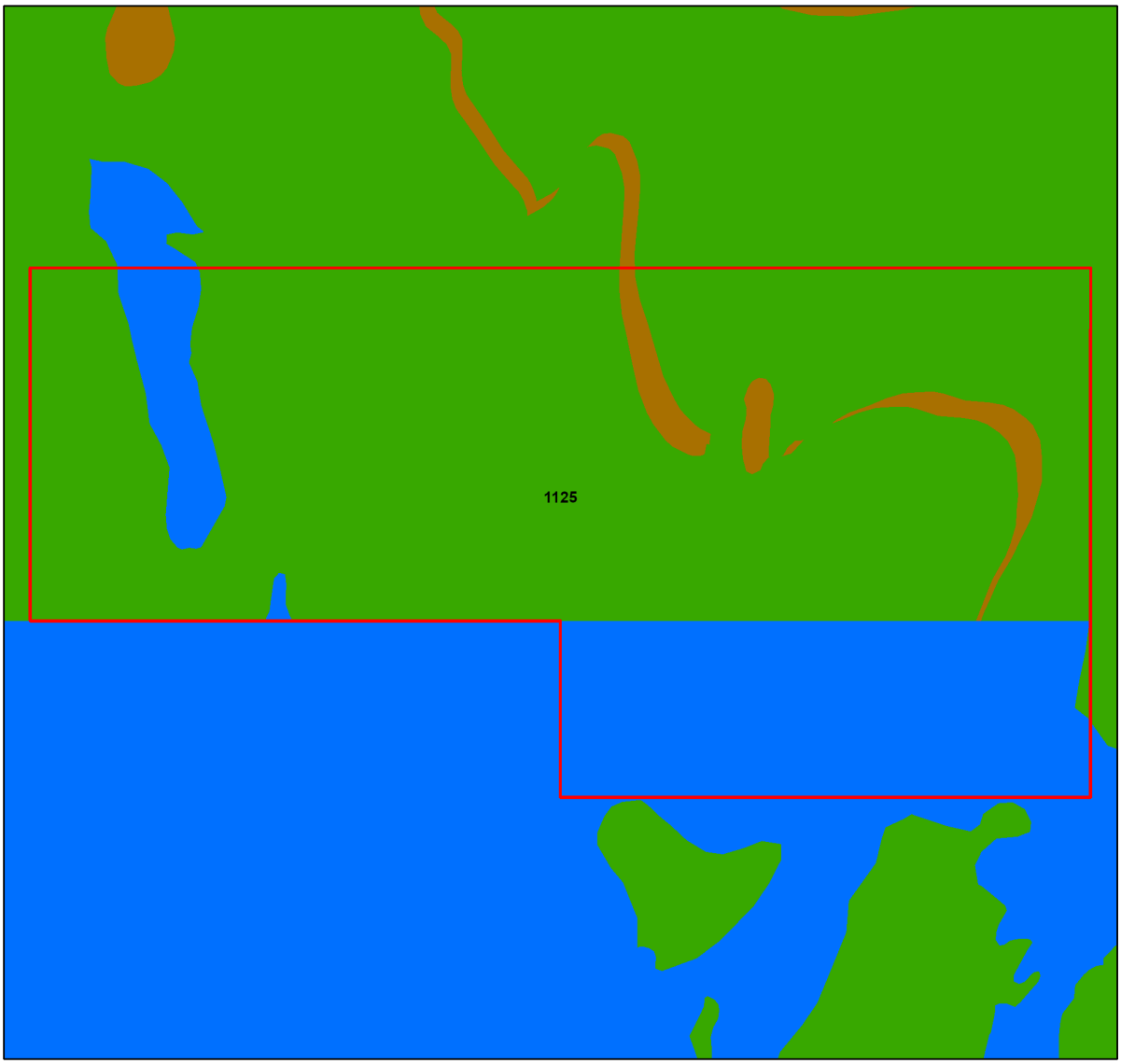
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Map 2 - Biodiversity Planning Assessment (BPA)

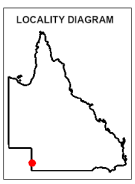


Biodiversity Planning Assessments

- Towns
- Roads
- Major Rivers/Creeks
- Queensland

Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Selected Petroleum Lease (PL)



N

0 640 1280 1920 2560 3200 m

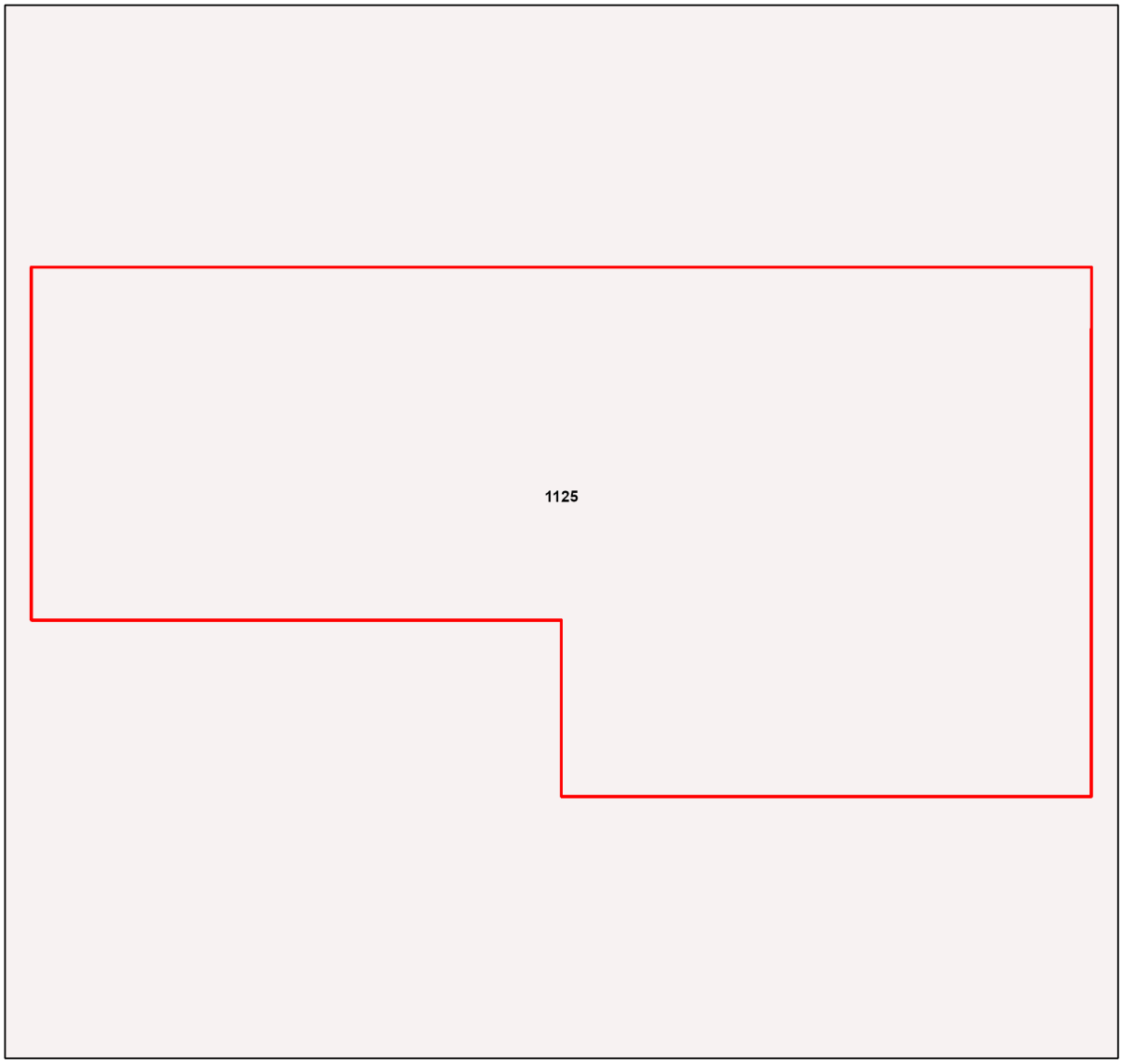
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Map 3 - Corridors



Corridors

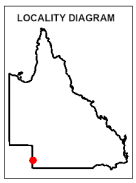
- Towns
- Roads
- Queensland
- Major Rivers/Creeks

Corridors
- State
- Regional

Corridor Triggered Vegetation
- State
- Regional
- Local

Core Area Vegetation
- Brigalow Belt Only
- Selected Petroleum Lease (PL)

LOCALITY DIAGRAM



N

0 640 1280 1920 2560 3200 m

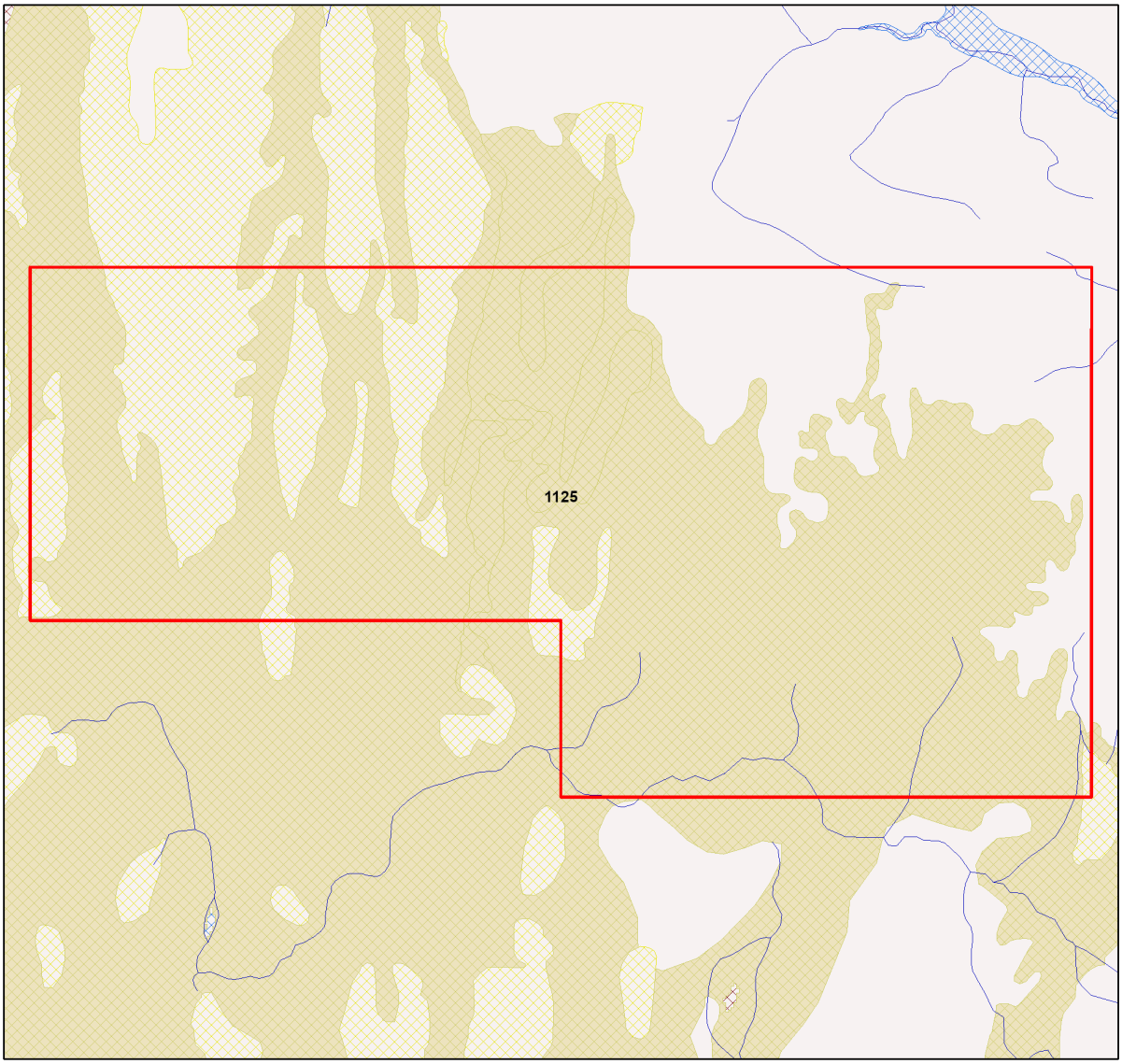
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Map 4 - Wetlands and waterways



Wetlands and Waterways

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

Wetland Type

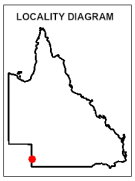
Hydrologically natural Wetlands
- Lacustrine Wetlands (hydrologically natural)
- Palustrine Wetlands (hydrologically natural)
- Riverine Wetlands (hydrologically natural)
- Intertidal Wetlands (hydrologically natural)
- Subtidal Wetlands (hydrologically natural)
- Intertidal/Subtidal Wetlands (hydrologically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

Hydrologically Modified and Artificial Wetlands
- Lacustrine Wetlands (hydrologically modified or artificial)
- Palustrine Wetlands (hydrologically modified or artificial)
- Riverine Wetlands (hydrologically modified or artificial)
- Intertidal Wetlands (hydrologically modified or artificial)
- Subtidal Wetlands (hydrologically modified or artificial)
- Intertidal/Subtidal Wetlands (hydrologically modified or artificial)

Subdominant Wetlands
- Subdominant Wetlands (51 - 80%)

Contains Wetlands
- Contains Wetlands (1 - 50%)
- Queensland
- Selected Petroleum Lease (PL)

LOCALITY DIAGRAM



N

0 640 1280 1920 2560 3200 m

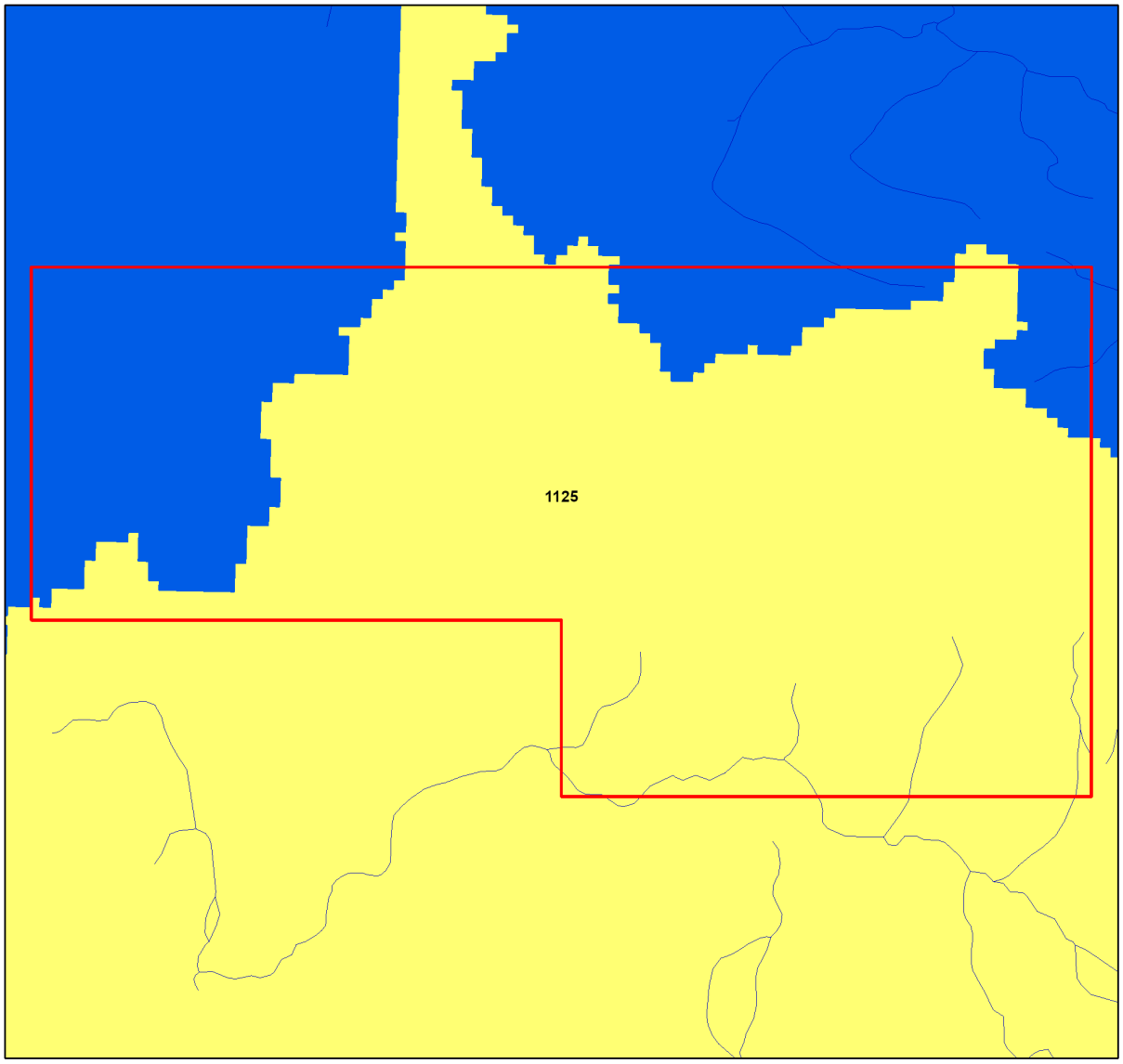
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Map 5 - Aquatic Conservation Assessment (ACA) - riverine



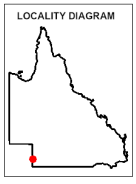
Aquatic Conservation Assessment (ACA) - riverine

- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

- Very High
- High
- Medium
- Low
- Very Low
- Selected Petroleum Lease (PL)

LOCALITY DIAGRAM



N

0 640 1280 1920 2560 3200 m

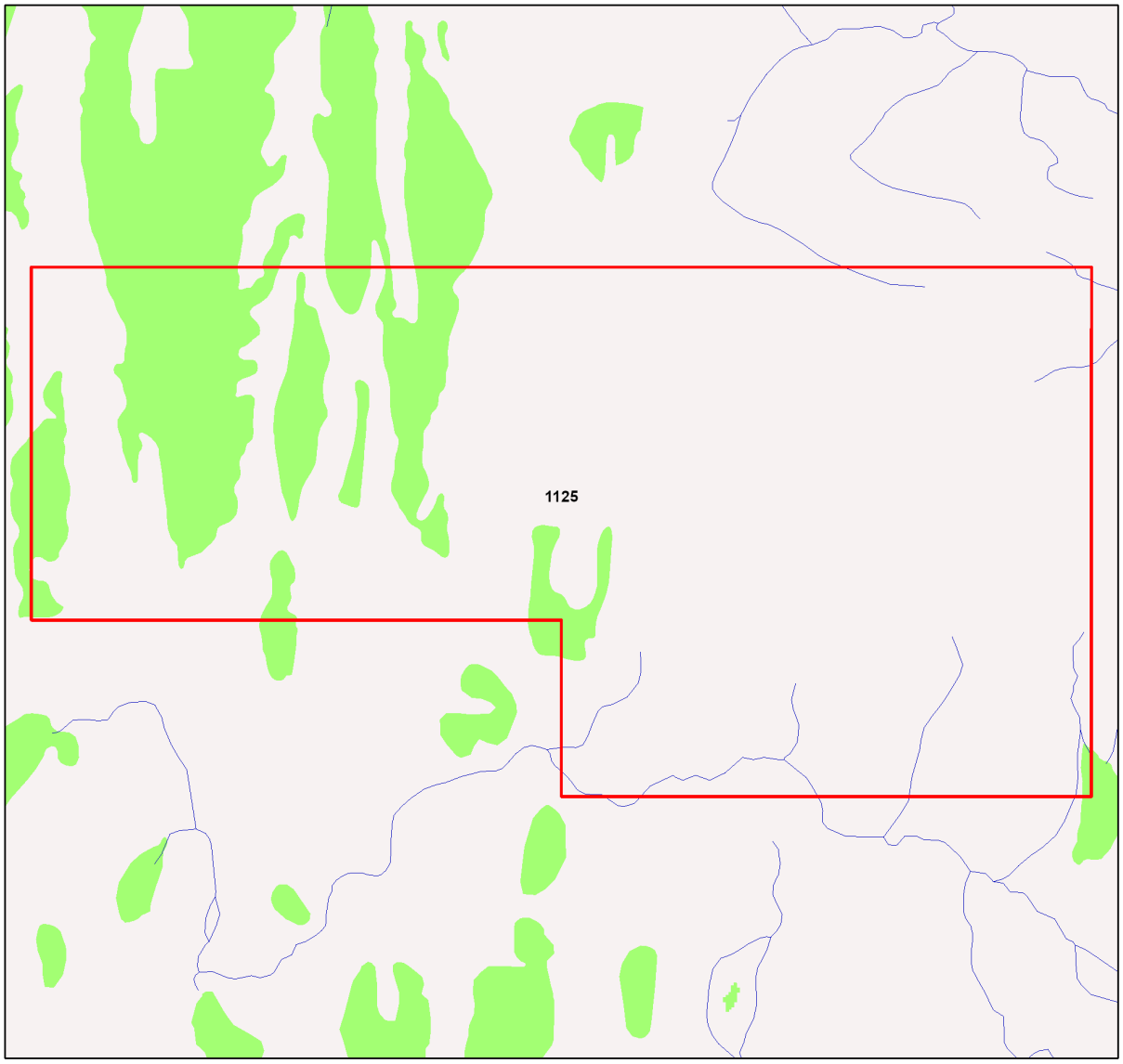
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Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



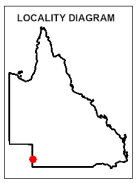
Aquatic Conservation Assessment (ACA) - nonriverine

- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

- Very High
- High
- Medium
- Low
- Very Low
- Selected Petroleum Lease (PL)

LOCALITY DIAGRAM



N

0 640 1280 1920 2560 3200 m

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

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Appendices

Appendix 1 - Source Data

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

These datasets are available at:
http://dds.information.qld.gov.au/DDS

Appendix 2 - Acronyms and Abbreviations

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

Appendix 3: Regional Ecosystems Report for PL 1125

Queensland Government

Department of Environment, Science and Innovation

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
PL: 1125

Environmental Reports - General Information

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

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

Figures in tables may be affected by rounding.

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

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

Important Note to User

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

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

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

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Summary Information

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

Table 1: Details for area of interest:
PL: 1125, with area 4542.41 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Bulloo Shire	Cooper Creek	Channel Country	Strzelecki Desert
		Channel Country	Sturt Stony Desert

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

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

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.00	0.00
Of concern	0.00	0.00
No concern at present	4,542.41	100.00
Total remnant vegetation	4,542.41	100.00

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

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and may be distinguished by differences in structure or sub-dominant species in the ecologically dominant layer. Vegetation communities with different dominant species in the ecologically dominant layer may be amalgamated in to a regional ecosystem if they are not mappable and predictable in the landscape at 1:100 000 scale. Vegetation communities may be mappable at a scale larger than 1:100 000. Vegetation communities within a regional ecosystem are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2023) provides further details on regional ecosystem concepts and terminology.

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

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 percent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 percent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (<1000 ha); or patch size (<100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
5.3.22a	Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes	No concern at present	665.33	14.65
5.3.22d	Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes	No concern at present	279.89	6.16
5.6.4	Atalaya hemiglauca +/- Acacia aneura +/- Acacia spp. +/- Corymbia terminalis low open woodland on reticulate sand dunes	No concern at present	66.91	1.47
5.6.5	Variable sparse to open-herbland or Triodia basedowii hummock grassland on dune flanks, crests and sandy interdunes	No concern at present	2,011.35	44.28
5.6.8b	Zygochloa paradoxa and/or Crotalaria eremaea +/- Triodia basedowii open tussock grassland and herbland on mobile crests and slopes of sand dunes	No concern at present	140.19	3.09
5.9.3	Astrebla spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments	No concern at present	818.97	18.03
5.9.4x1	Aristida contorta sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover	No concern at present	559.78	12.32

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
5.3.22a	Pre-clearing 594000 ha; Remnant 2021 594000 ha	34a	Lacustrine	Low

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
5.3.22d	Pre-clearing 594000 ha; Remnant 2021 594000 ha	34b	Palustrine	Low
5.6.4	Pre-clearing 1087000 ha; Remnant 2021 1087000 ha	23a	Not a Wetland	Low
5.6.5	Pre-clearing 2464000 ha; Remnant 2021 2464000 ha	33a	Not a Wetland	High
5.6.8b	Pre-clearing 379000 ha; Remnant 2021 378000 ha	33a	Not a Wetland	High
5.9.3	Pre-clearing 3389000 ha; Remnant 2021 3383000 ha	30b	Not a Wetland	Low
5.9.4x1	Pre-clearing 940000 ha; Remnant 2021 939000 ha	31b	Not a Wetland	Low

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
5.3.22a	5.3.22: Provides wetland habitat for flora and fauna. 5.3.22a: Provides wetland habitat for flora and fauna. 5.3.22b: Provides wetland habitat for flora and fauna. 5.3.22d: Provides wetland habitat for flora and fauna.
5.3.22d	5.3.22: Provides wetland habitat for flora and fauna. 5.3.22a: Provides wetland habitat for flora and fauna. 5.3.22b: Provides wetland habitat for flora and fauna. 5.3.22d: Provides wetland habitat for flora and fauna.
5.6.4	5.6.4: High fauna diversity.
5.6.5	5.6.5: High reptile diversity. Potential habitat for threatened fauna species including mulgara Dasycerus cristicauda. 5.6.5a: High reptile diversity. Potential habitat for threatened fauna species including mulgara Dasycerus cristicauda.
5.6.8b	5.6.8: Habitat for the endemic eyrean grass wren Amytornis goyderi and threatened fauna species including the dusky hopping mouse Notomys fuscus, mulgara Dasycercus cristicauda and plant species including Acacia peuce. 5.6.8a: Habitat for the endemic eyrean grass wren Amytornis goyderi and threatened fauna species including the dusky hopping mouse Notomys fuscus, mulgara Dasycercus cristicauda and flora species. 5.6.8b: Habitat for the endemic eyrean grass wren Amytornis goyderi and threatened fauna species including the dusky hopping mouse Notomys fuscus, mulgara Dasycercus cristicauda and flora species.
5.9.3	None

Regional Ecosystem	Special Values
5.9.4x1	5.9.4: Habitat for threatened fauna species including kowari Dasyuroides byrnei. 5.9.4x2: Habitat for threatened fauna species including kowari Dasyuroides byrnei.

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at: https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
23a	Woodlands to low woodlands dominated by Acacia aneura on red earth plains or sandplains (soft mulga).	66.91	1.47
30b	Tussock grasslands dominated by Astrebla spp. (mitchell grass) or Dichanthium spp. (bluegrass) often with Iseilema spp. on undulating downs or clay plains.	818.97	18.03
31b	Short grass / forb associations on stony downs.	559.78	12.32
33a	Hummock grasslands dominated by Triodia basedowii (hard spinifex) or Zygochloa paradoxa (sandhill canegrass) associations on dunefields or sandplains.	2,151.54	47.37
34a	Lacustrine wetlands. Lakes, ephemeral to permanent. Includes fringing woodlands and sedgelands.	665.33	14.65
34b	Palustrine wetlands. Generally intermittent swamps/claypans (non floodplains) in inland areas dominated by chenopods e.g. Chenopodium auricomum (Queensland blue bush) or Tecticornia spp. (samphire) or herbs.	279.89	6.16

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See: http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium & Biodiversity Science's QBEIS database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2023 (PDF)* section 3.3 of: https://www.qld.gov.au/__data/assets/pdf_file/0033/459186/methodology-mapping-surveying-v7.pdf

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community. http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

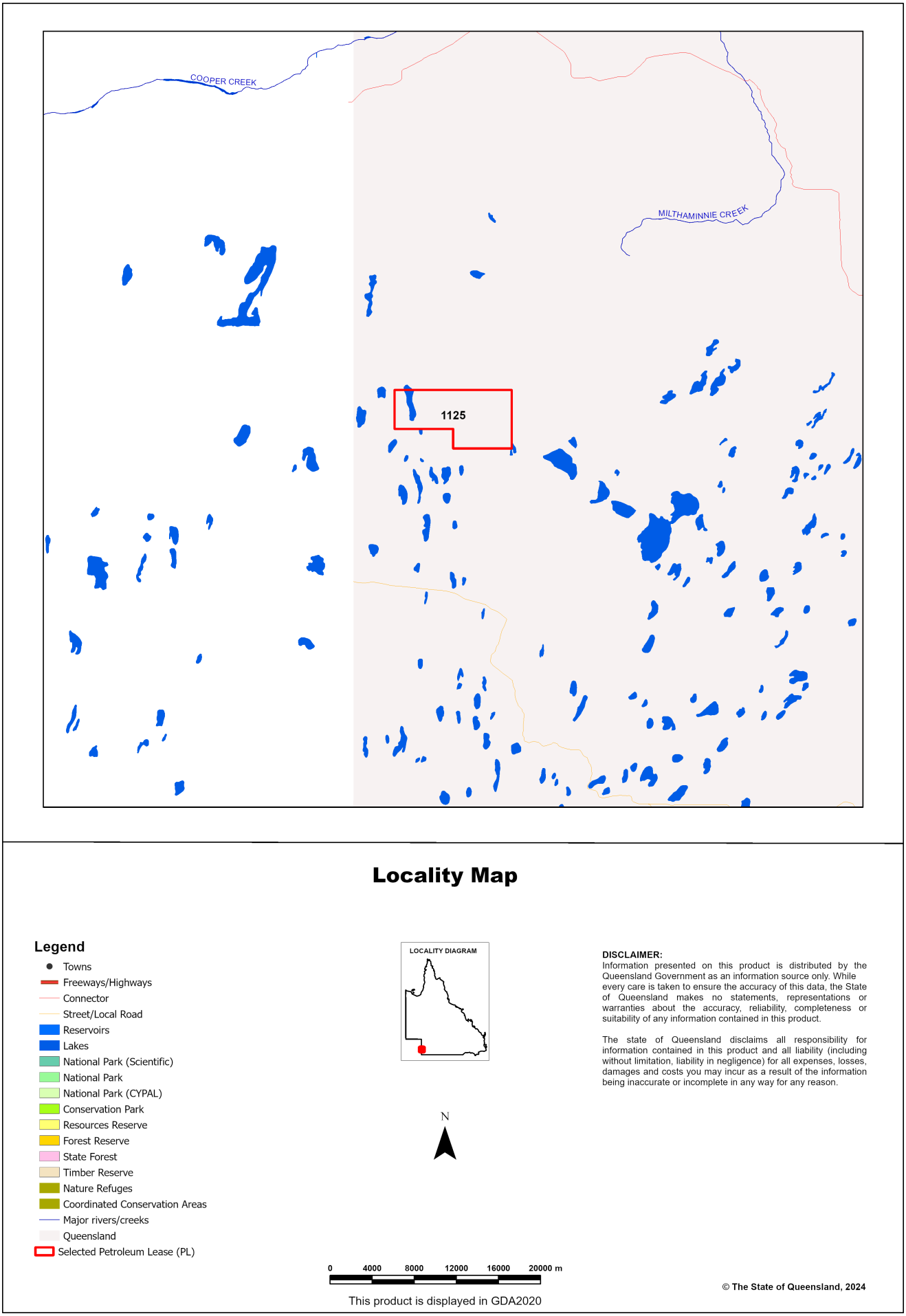
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

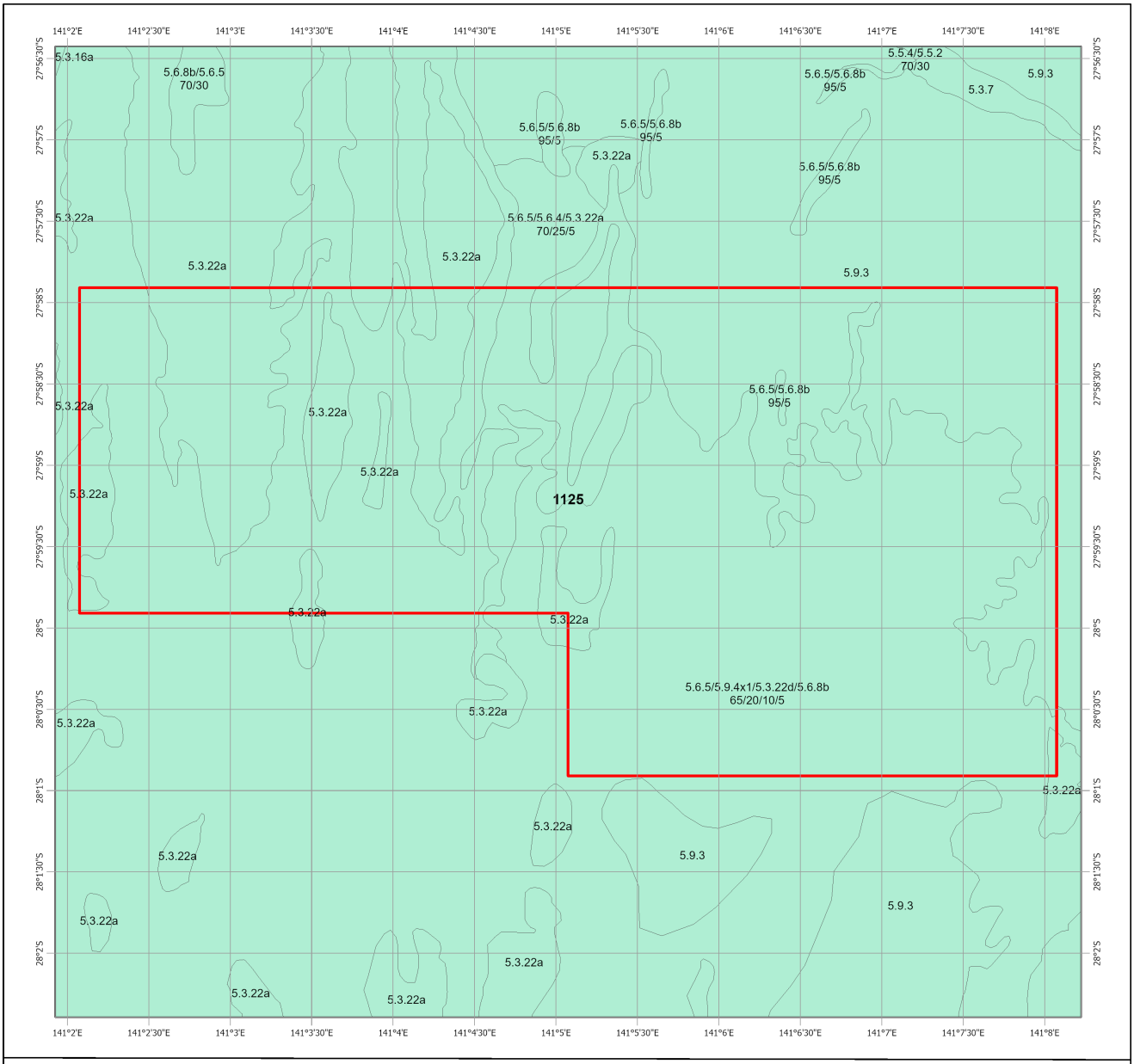
Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
5.3.22a	Not currently available	Not currently available
5.3.22d	Not currently available	Not currently available
5.6.4	Not currently available	Not currently available
5.6.5	Not currently available	Not currently available
5.6.8b	Not currently available	Not currently available
5.9.3	Not currently available	Not currently available
5.9.4x1	Not currently available	Not currently available

Maps

Map 1 - Location



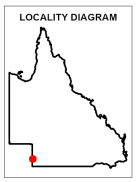
Map 2 - Remnant 2021 regional ecosystems

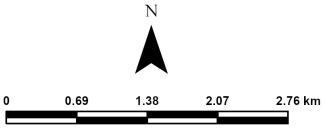


Remnant 2021 Regional Ecosystems

Biodiversity Status

- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant vegetation, cultivated or built environment
- Plantation
- Water
- Cadastral Boundaries
- Selected Petroleum Lease (PL)



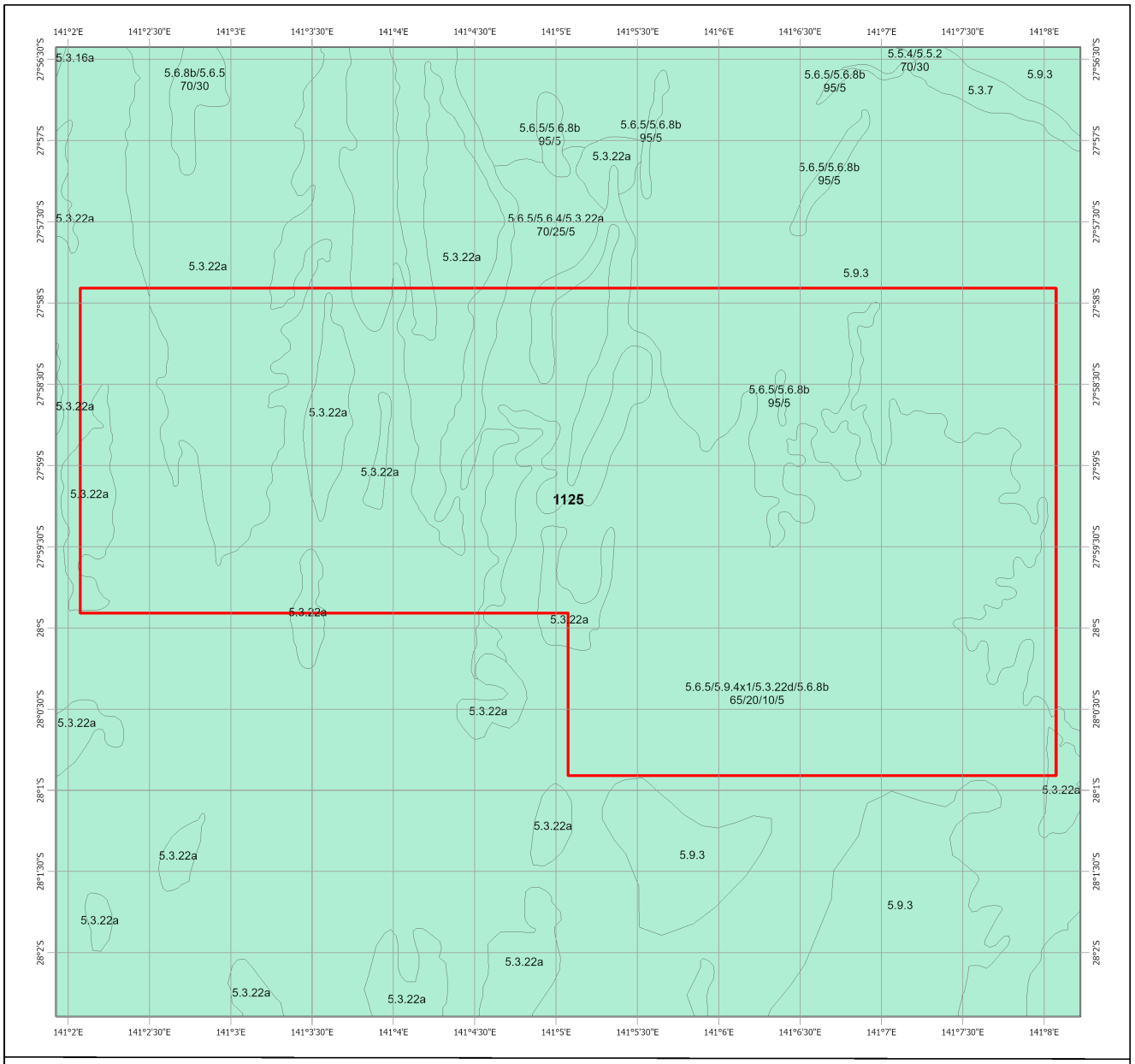


This product is projected into GDA2020

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

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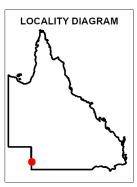
Map 3 - Pre-clearing regional ecosystems



Pre-clearing Regional Ecosystems

Biodiversity Status

- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries
- Selected Petroleum Lease (PL)



N

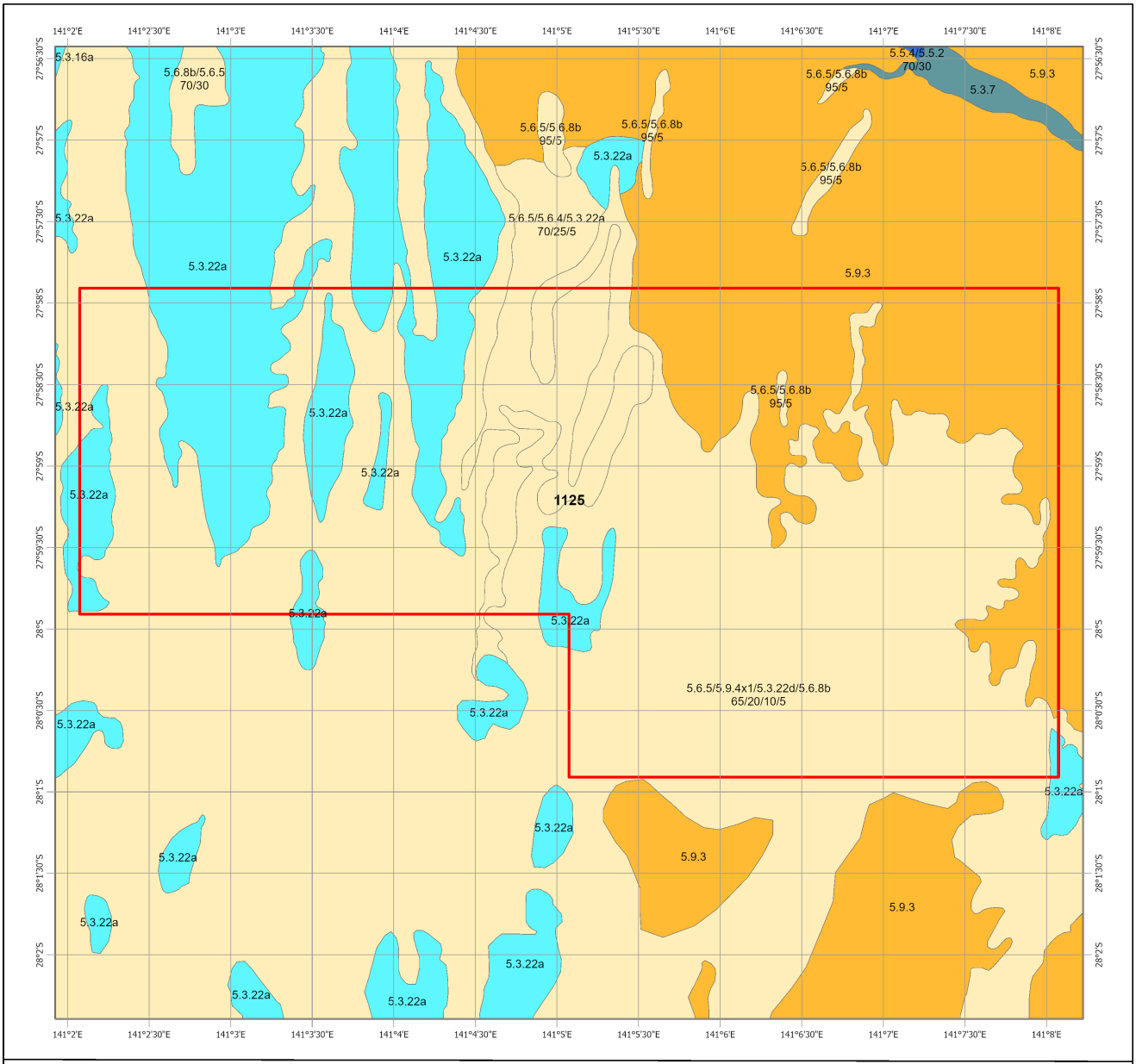
0 0.7 1.4 2.1 2.8 km

This product is displayed in GDA2020

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

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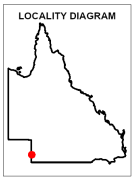
Map 4 - Remnant 2021 regional ecosystems by BVG (5M)



Remnant 2021 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries
- Selected Petroleum Lease (PL)



N

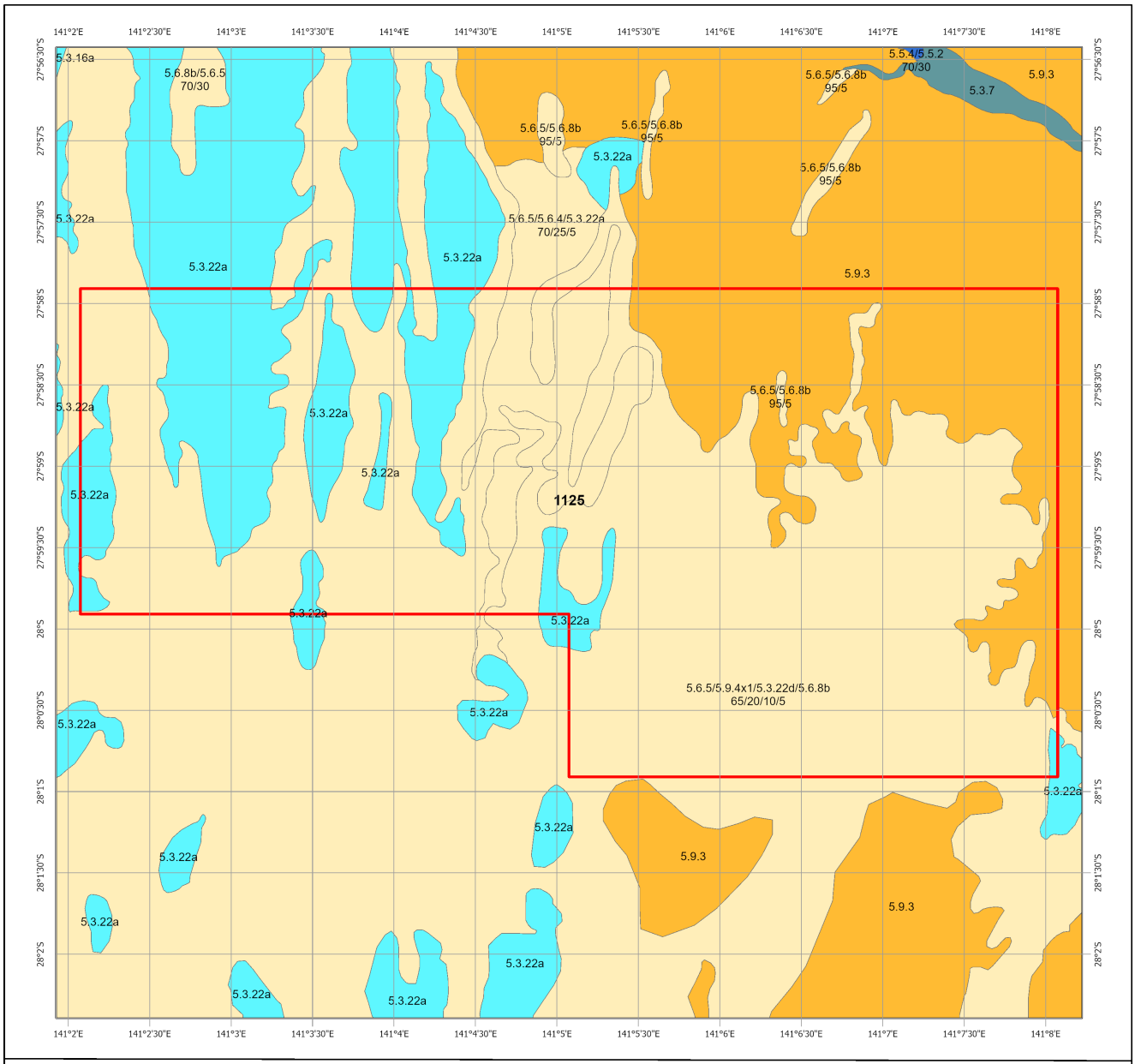
0 0.7 1.4 2.1 2.8 km

This product is displayed in GDA2020

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled. Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.
Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
Non-remnant vegetation includes regrowth and disturbed native vegetation.

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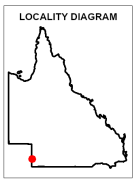
Map 5 - Pre-clearing regional ecosystems by BVG (5M)

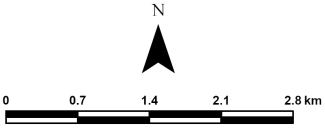


Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
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- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries
- Selected Petroleum Lease (PL)



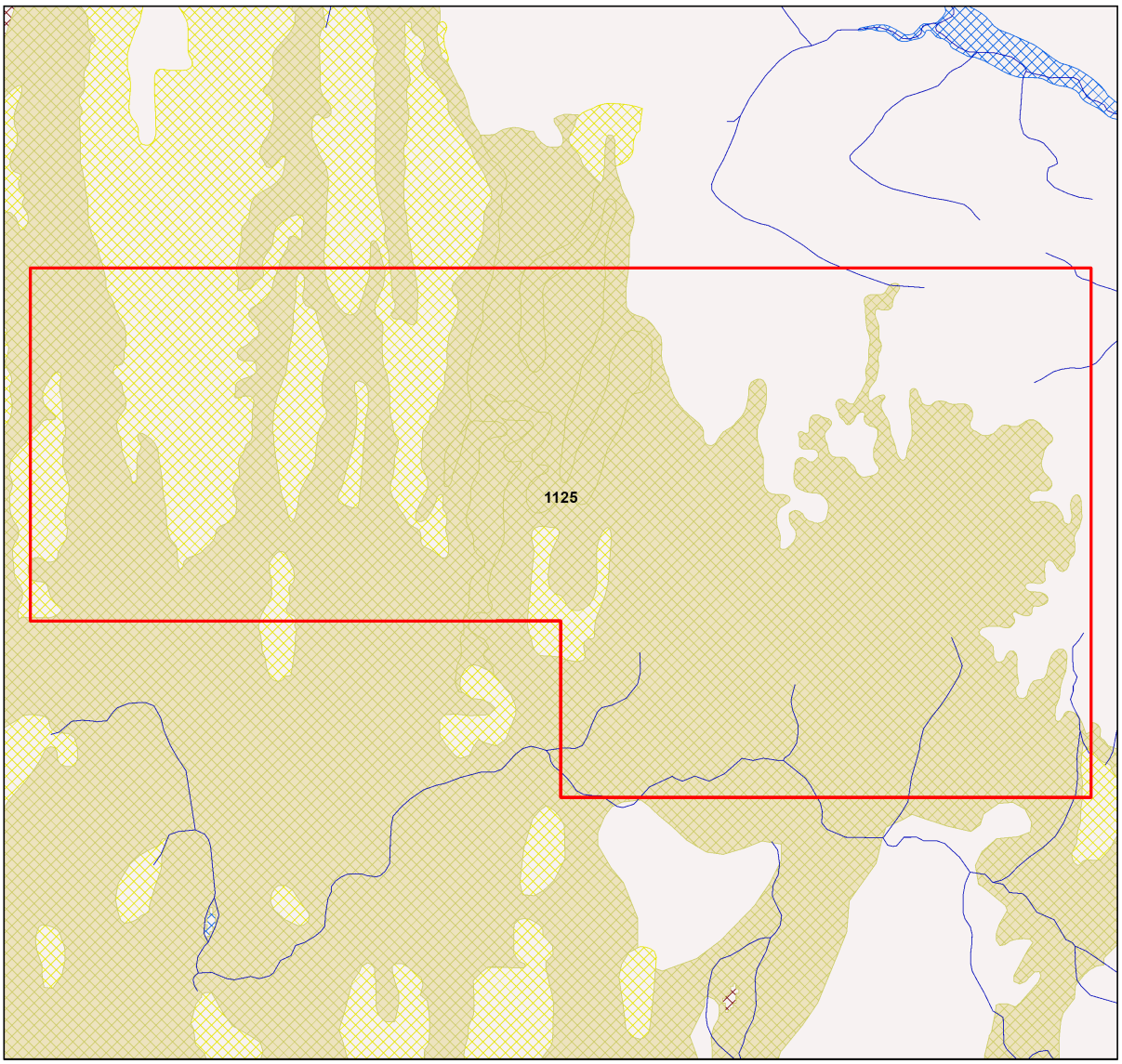


This product is displayed in GDA2020

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

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Map 6 - Wetlands and waterways



Wetlands and Waterways

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

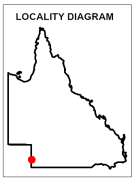
Wetland Type

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

Hydrologically Modified and Artificial Wetlands
- Lacustrine Wetlands (hydrologically modified or artificial)
- Palustrine Wetlands (hydrologically modified or artificial)
- Riverine Wetlands (hydrologically modified or artificial)
- Intertidal Wetlands (hydrologically modified or artificial)
- Subtidal Wetlands (hydrologically modified or artificial)
- Intertidal/Subtidal Wetlands (hydrologically modified or artificial)

Subdominant Wetlands
- Subdominant Wetlands (51 - 80%)

Contains Wetlands
- Contains Wetlands (1 - 50%)
- Queensland
- Selected Petroleum Lease (PL)



N

0 640 1280 1920 2560 3200 m

This product is displayed in GDA2020

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Links and Other Information Sources

The Department of Environment, Science and Innovation's Website - http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/ provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from: https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/broad-vegetation

The methodology for mapping regional ecosystems can be downloaded from: https://www.qld.gov.au/__data/assets/pdf_file/0033/459186/methodology-mapping-surveying-v7.pdf

Technical descriptions for regional ecosystems can be obtained from: http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from: http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Spatial Catalogue, Queensland Spatial Catalogue : Queensland Government (information.qld.gov.au)

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link: https://qldglobe.information.qld.gov.au/

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2023). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 6.0. Queensland Herbarium, Department of Environment and Science. (https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Richter,D., Addicott, E.P. and Appelman, C.N. (2023) Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 7.0. Updated December 2023. Queensland Herbarium, Queensland Department of Environment, Science and Innovation, Brisbane. (https://www.qld.gov.au/__data/assets/pdf_file/0033/459186/methodology-mapping-surveying-v7.pdf).

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

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:
http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:
Queensland Spatial Catalogue : Queensland Government (information.qld.gov.au)

- Biodiversity status of pre-clearing and 2021 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas
- Pre-clearing broad vegetation groups of Queensland
- Remnant 2021 broad vegetation groups of Queensland

Appendix 2 - Acronyms and Abbreviations

AOI - Area of Interest
GIS - Geographic Information System
RE - Regional Ecosystem
REDD - Regional Ecosystem Description Database
VMA - *Vegetation Management Act 1999*

Appendix 4: WildNet Species List Report for PL 1125

WildNet Records
Species List

For the selected area of interest 4542.41 PL: 1125
Current as at 17/06/2024 WildNetSpeciesList

Summary Information
The following table provides an overview of the area of interest: PL: 1125

Table 1. Area of interest details

Size (ha)	
4,542.41	
Local Government(s)	
Bulloo Shire	
Catchment(s)	
Cooper Creek	
Bioregion(s)	**Subregion(s)**
Channel Country	Strzelecki Desert
Channel Country	Sturt Stony Desert

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Introduction
This WildNet report is derived from a spatial layer that is generated from the WildNet database, managed by the Department of Enviornment, Science and Innovation. The layer, which is generated weekly, contains a subset of WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero. It does not include aspatial data such as some baseline species lists created for some protected areas.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest.

The Species List Application may provide additional information on species occurence within your area of interest.

Species data

Contextual location information is presented in Map 1.

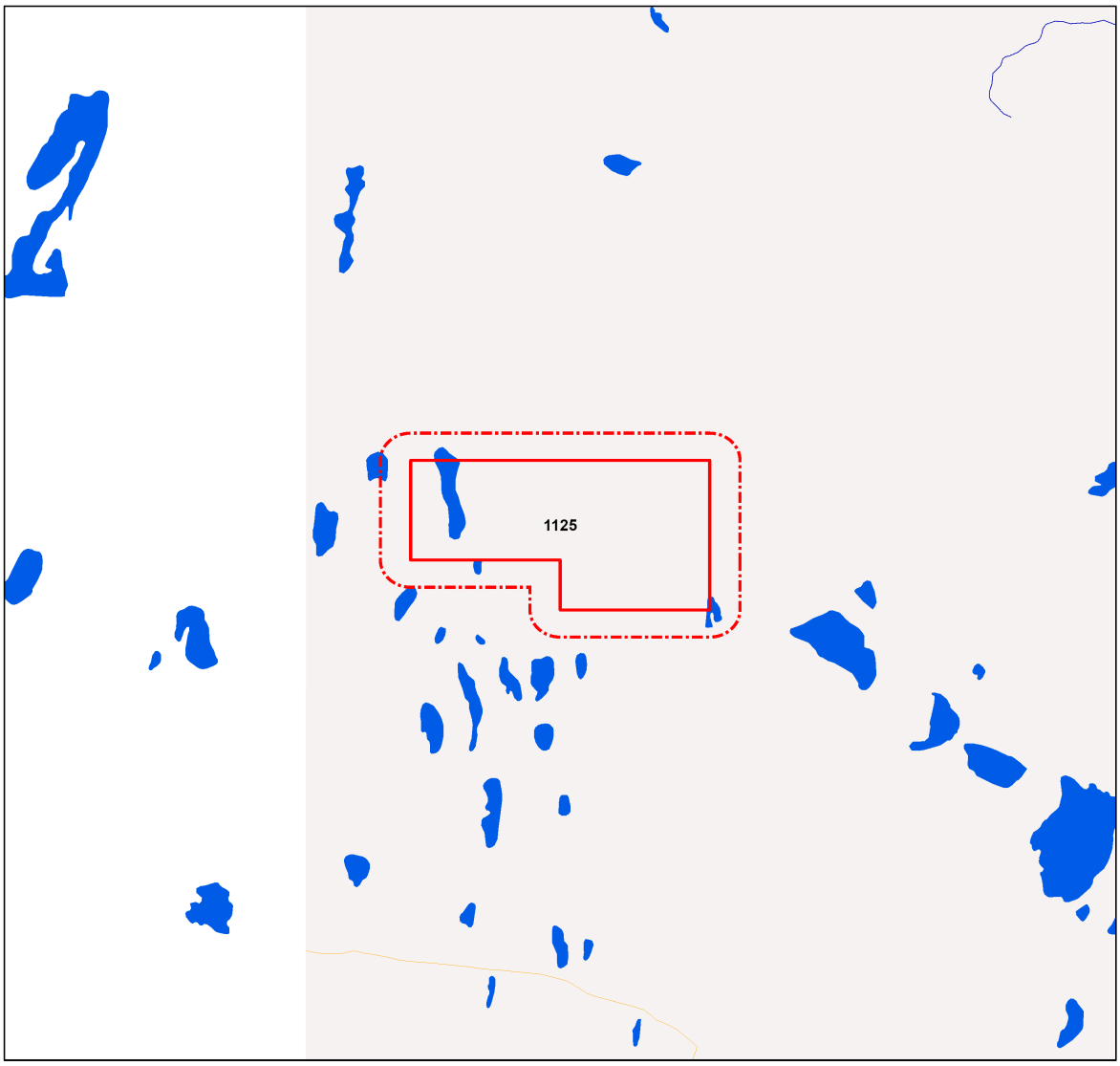
Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

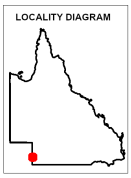
Map 1. Locality Map



Locality Map

Legend

- Towns
- Freeways/Highways
- Connector
- Street/Local Road
- Reservoirs
- Lakes
- National Park (Scientific)
- National Park
- National Park (CYPAL)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Nature Refuges
- Coordinated Conservation Areas
- Major rivers/creeks
- Queensland
- Selected Petroleum Lease (PL)
- 1 kilometre buffer



N

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Table 2. Animals recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 3. Plants recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes
Taxon Id: Unique identifier of the taxon from the WildNet database.
NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).
EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).
Specimens: The number of specimen-backed records of the taxon.
Records: The total number of records of the taxon.
Last record: Date of most recent record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team WildNet@des.qld.gov.au.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

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Appendix 5: WildNet Records: Conservation Significant Species List Report for PL 1125

WildNet Records
Conservation Significant Species List

For the selected area of interest PL: 1125
Current as at 17/06/2024 WildNetCSSpeciesList

Summary Information

The following table provides an overview of the area of interest: PL: 1125

Table 1. Area of interest details

Size (ha)	
4,542.41	
Local Government(s)	
Bulloo Shire	
Catchment(s)	
Cooper Creek	
Bioregion(s)	**Subregion(s)**
Channel Country	Strzelecki Desert
Channel Country	Sturt Stony Desert

Protected Area(s)

No estates or reserves are located within the area of interest.

World Heritage Area(s)

No World Heritage Areas are located within the area of interest.

Ramsar Area(s)

No Ramsar Areas are located within the area of interest.

Introduction

This WildNet report is derived from a spatial layer that is generated from the WildNet database, managed by the Department of Enviornment, Science and Innovation. The layer, which is generated weekly, contains a subset of WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero. It does not include aspatial data such as some baseline species lists created for some protected areas.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a conservation significant species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest.

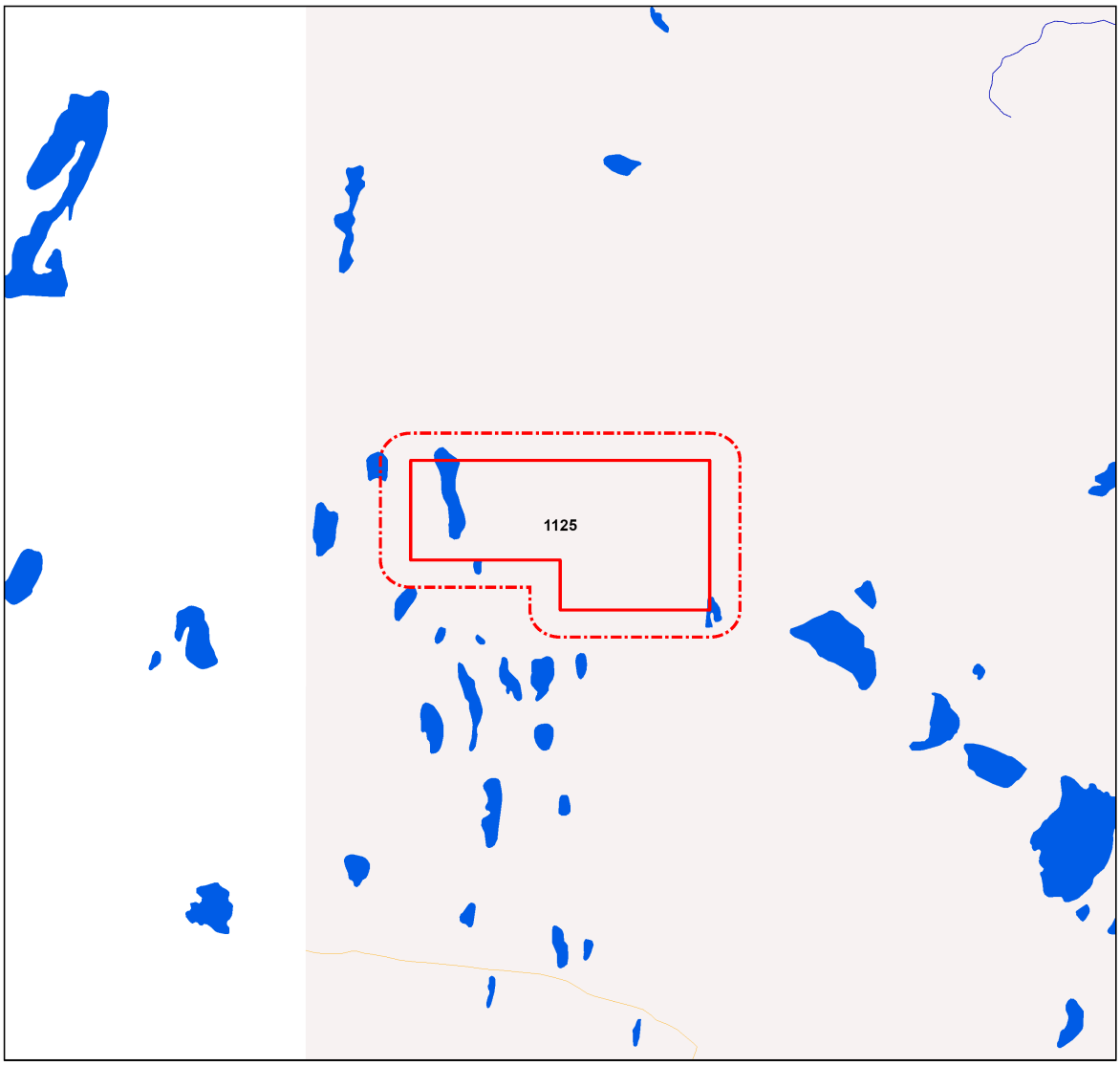
The Species List Application may provide additional information on species occurence within your area of interest.

Conservation significant species are species listed:

- as threatened or near threatened under the Nature Conservation Act 1992;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
    - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
    - China-Australia Migratory Bird Agreement
    - Japan-Australia Migratory Bird Agreement
    - Republic of Korea-Australia Migratory Bird Agreement

Table 2 lists the species recorded within the area of interest and its one kilometre buffer.

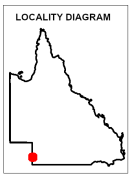
Map 1. Locality Map



Locality Map

Legend

- Towns
- Freeways/Highways
- Connector
- Street/Local Road
- Reservoirs
- Lakes
- National Park (Scientific)
- National Park
- National Park (CYPAL)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Nature Refuges
- Coordinated Conservation Areas
- Major rivers/creeks
- Queensland
- Selected Petroleum Lease (PL)
- 1 kilometre buffer



N

0 2000 4000 6000 8000 10000 m

This product is displayed in GDA2020

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Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

(No Records)

Taxon Id: Unique identifier of the taxon from the WildNet database.
NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).
EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).
Specimens: The number of specimen-backed records of the taxon.
Records: The total number of records of the taxon.
Last record: Date of most recent record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
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Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
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- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

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Appendix 6: EPBC Act (1999) Protected Matters Search for PL 1125 with a 50 km buffer zone

Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 17-Jun-2024

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	16
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	3
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	1

Details

Matters of National Environmental Significance

National Heritage Places			[Resource Information]
Name	State	Legal Status	Buffer Status
Historic			
The Burke, Wills, King and Yandruwandha National Heritage Place	QLD	Listed place	In buffer area only

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Coongie lakes	Within Ramsar site	In feature area

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Amytornis barbatus barbatus			
Bulloo Grey Grasswren, Grey Grasswren (Bulloo) [67065]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos			
Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Grantiella picta](#) Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Neophema chrysostoma](#) Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pedionomus torquatus](#) Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pezoporus occidentalis](#) Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area	In feature area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
[Notomys fuscus](#) Dusky Hopping-mouse, Wilkiniti [125]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pseudomys australis](#) Plains Rat, Palyoora, Plains Mouse [108]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			
[Frankenia plicata](#) [4225]	Endangered	Species or species habitat likely to occur within area	In feature area
[Swainsona murrayana](#) Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Xerothamnella parvifolia](#) [3141]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Bubulcus ibis as Ardea ibis](#) Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Innamincka	Regional Reserve	SA	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Coongie Lakes	SA	In buffer area only
Cooper Creek Swamps - Nappa Merrie	QLD	In buffer area only
Strzelecki Creek Wetland System	SA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
QSN3 Project, expand 935km gas pipeline and supporting infrastructure	2009/5072	Not Controlled Action	Completed	In buffer area only
Thoar 3D seismic survey at Cooper Creek-Wilson River floodplain	2003/1178	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
QSN Underground Gas Pipeline	2008/4043	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				

Bioregional Assessments [Resource Information]

SubRegion	BioRegion	Website	Buffer Status
Cooper	Lake Eyre Basin	BA website	In feature area

Geological and Bioregional Assessments [Resource Information]

Name	State	Website	Buffer Status
Cooper GBA region	QLD, SA, NSW	GBA website	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

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

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

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

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Appendix 7: EPBC Act (1999) Protected Matters Search for PL 1125 with a 100 km buffer zone

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 22-Jul-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

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World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	22
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	4
EPBC Act Referrals:	8
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	1

Details

Matters of National Environmental Significance

National Heritage Places		[Resource Information]
Name	State	Legal Status
Historic		
The Burke, Wills, King and Yandruwandha National Heritage Place	QLD	Listed place

Wetlands of International Importance (Ramsar Wetlands)	[Resource Information]
Ramsar Site Name	Proximity
Coongie lakes	Within Ramsar site

Listed Threatened Species		[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Amytornis barbatus barbatus		
Bulloo Grey Grasswren, Grey Grasswren (Bulloo) [67065]	Endangered	Species or species habitat known to occur within area
Aphelocephala leucopsis		
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lophochroa leadbeateri leadbeateri		
Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo, Pink Cockatoo (eastern) [82926]	Endangered	Species or species habitat may occur within area
Neophema chrysostoma		
Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat may 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
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
MAMMAL		
Dasyuroides byrnei		
Kowari, brushy-tailed marsupial rat, Byrne's crest-tailed marsupial rat [329]	Endangered	Species or species habitat may occur within area
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 known to occur within area
Pseudomys australis		
Plains Rat, Palyoora, Plains Mouse [108]	Vulnerable	Species or species habitat may occur within area
PLANT		

Scientific Name	Threatened Category	Presence Text
Frankenia plicata [4225]	Endangered	Species or species habitat likely to occur within area
Grevillea kennedyana Flame Spider-flower [6974]	Vulnerable	Species or species habitat may occur within area
Sclerolaena walkeri [16152]	Vulnerable	Species or species habitat likely to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area
Xerothamnella parvifolia [3141]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Calidris ferruginea](#)		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#)		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
[Gallinago hardwickii](#)		
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area
[Tringa nebularia](#)		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat known to occur within area
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
[Bubulcus ibis as Ardea ibis](#)		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
[Calidris acuminata](#)		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
[Calidris ferruginea](#)		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Innamincka	Regional Reserve	SA
Malkumba-Coongie Lakes	National Park	SA
Strzelecki	Regional Reserve	SA

Nationally Important Wetlands	[Resource Information]
Wetland Name	State
Coongie Lakes	SA
Cooper Creek Swamps - Nappa Merrie	QLD
Cooper Creek - Wilson River Junction	QLD
Strzelecki Creek Wetland System	SA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Ballera Lateral Gas Pipeline	2006/2563	Controlled Action	Completed
Expansion of the Olympic Dam copper, uranium, gold and silver mine, processing plant and associated	2005/2270	Controlled Action	Post-Approval
Not controlled action			
Gas Pipeline from Psyche to Winninia	2002/797	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
QSN3 Project, expand 935km gas pipeline and supporting infrastructure	2009/5072	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Thoar 3D seismic survey at Cooper Creek-Wilson River floodplain	2003/1178	Not Controlled Action	Completed
Not controlled action (particular manner)			
QSN Underground Gas Pipeline	2008/4043	Not Controlled Action (Particular Manner)	Post-Approval
Texas Tickalara Holdings Petroleum Production Project	2021/9088	Not Controlled Action (Particular Manner)	Post-Approval

Bioregional Assessments [Resource Information]

SubRegion	BioRegion	Website
Cooper	Lake Eyre Basin	BA website

Geological and Bioregional Assessments [Resource Information]

Name	State	Website
Cooper GBA region	QLD, SA, NSW	GBA website

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

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

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

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

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Appendix 8: Atlas of Living Australia area report for PL 1125

AREA REPORT

ATLAS OF LIVING AUSTRALIA
sharing biodiversity knowledge

www.ala.org.au

Area: 45.6 sq km	Species: 1	Occurrences: 1
Endemic species: 0	All threatened species: 0	Migratory species: 0
All invasive species: 0	Iconic species: 0	JournalMap Articles: 0
Animals: 0	Plants: 1	Birds: 0

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PL1125.zip

Area: 45.6 sq km

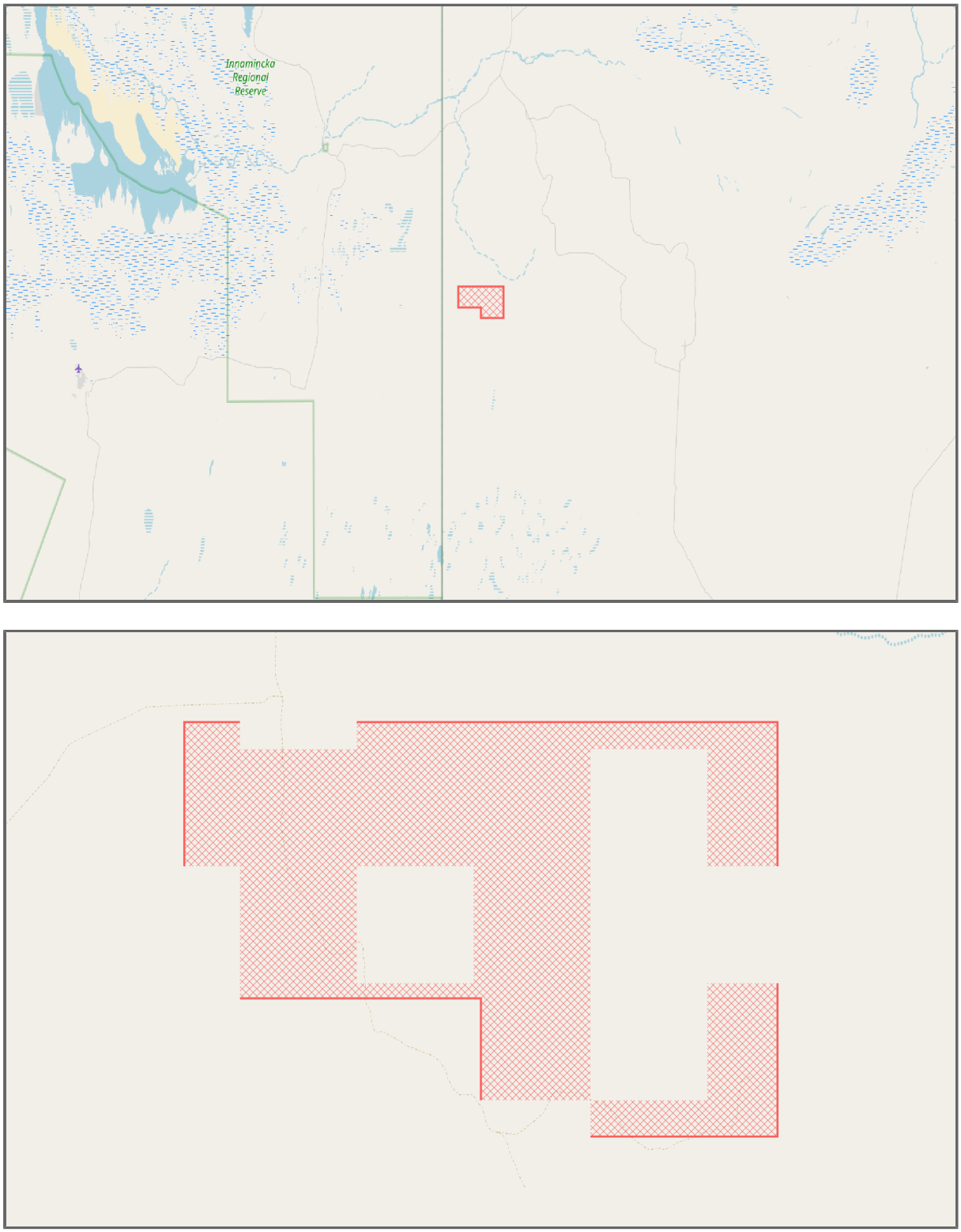


Figure 1 : Map of PL1125.zip

National Dynamic Land Cover

The Dynamic Land Cover Dataset is the first nationally consistent and thematically comprehensive land cover reference for Australia. It provides a base-line for reporting on change and trends in vegetation cover and extent. Information about land cover dynamics is essential to understanding and addressing a range of national challenges such as drought, salinity, water availability and ecosystem health. The data is a synopsis of land cover information for every 250m by 250m area of the country from April 2000 to April 2008. The classification scheme used to describe land cover categories in the Dataset conforms to the 2007 International Standards Organisation (ISO) land cover standard (19144-2). The Dataset shows Australian land covers clustered into 34 ISO classes. These reflect the structural character of vegetation, ranging from cultivated and managed land covers (crops and pastures) to natural land covers such as closed forest and open grasslands. [Ref1]

Australia's Dynamic Land Cover: http://www.ga.gov.au/earth-observation/landcover.html

National Dynamic Land Cover layer: Classification: Vegetation; Type: Contextual (polygonal); Metadata contact organisation: Geoscience Australia (GA). https://spatial.ala.org.au/ws/layers/view/more/dlcmv1

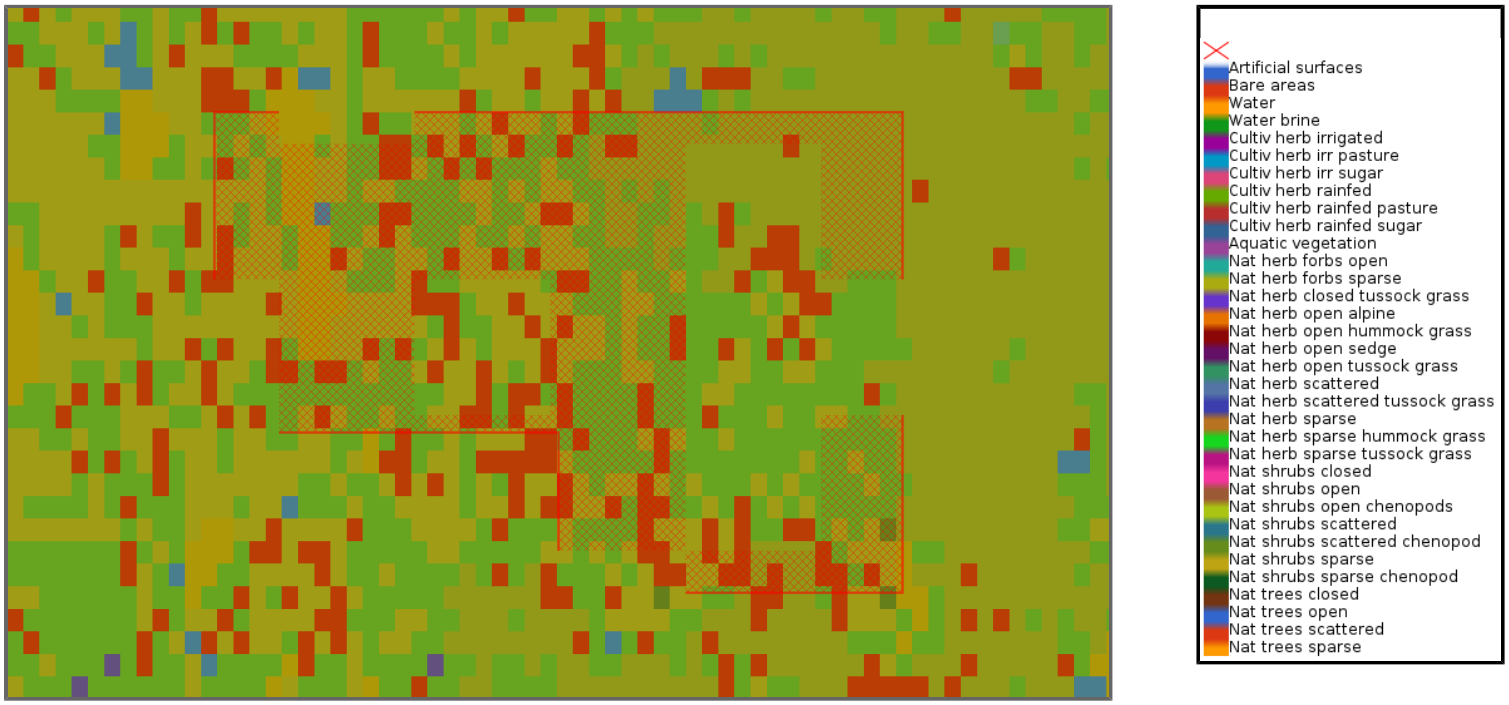


Figure 2 : Map of National Dynamic Land Cover

Table 1: National Dynamic Land Cover

Class/Region	Area (sq km)	% of total area
Primarily Vegetated Natural & Semi-Natural Terrestrial Vegetation Woody Shrubs Sparse Chenopods	0.07	0.14
Primarily Vegetated Natural & Semi-Natural Terrestrial Vegetation Herbaceous Graminoids Sparse Hummock Grasses	19.83	39.46
Primarily Non-Vegetated Waterbodies Water Brine	1.71	3.40
Primarily Vegetated Natural & Semi-Natural Terrestrial Vegetation Woody Shrubs Sparse	20.79	41.36
Primarily Vegetated Natural & Semi-Natural Terrestrial Vegetation Herbaceous Graminoids Open Hummock Grasses	7.79	15.51
Primarily Vegetated Natural & Semi-Natural Terrestrial Vegetation Herbaceous Graminoids Scattered	0.07	0.14

Global Context Ecoregions

Terrestrial Ecoregions of the World (TEOW)

Terrestrial Ecoregions of the World (TEOW) is a biogeographic regionalisation of the Earth's terrestrial biodiversity. Our biogeographic units are ecoregions, which are defined as relatively large units of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions. There are 867 terrestrial ecoregions, classified into 14 different biomes such as forests, grasslands, or deserts. Ecoregions represent the original distribution of distinct assemblages of species and communities. [Ref2]

TEOW: https://worldwildlife.org/biome-categories/terrestrial-ecoregions

Terrestrial Ecoregional Boundaries layer: Classification: Biodiversity - Region; Type: Contextual (polygonal); Metadata contact organisation: The Nature Conservancy (TNC). https://spatial.ala.org.au/ws/layers/view/more/1053

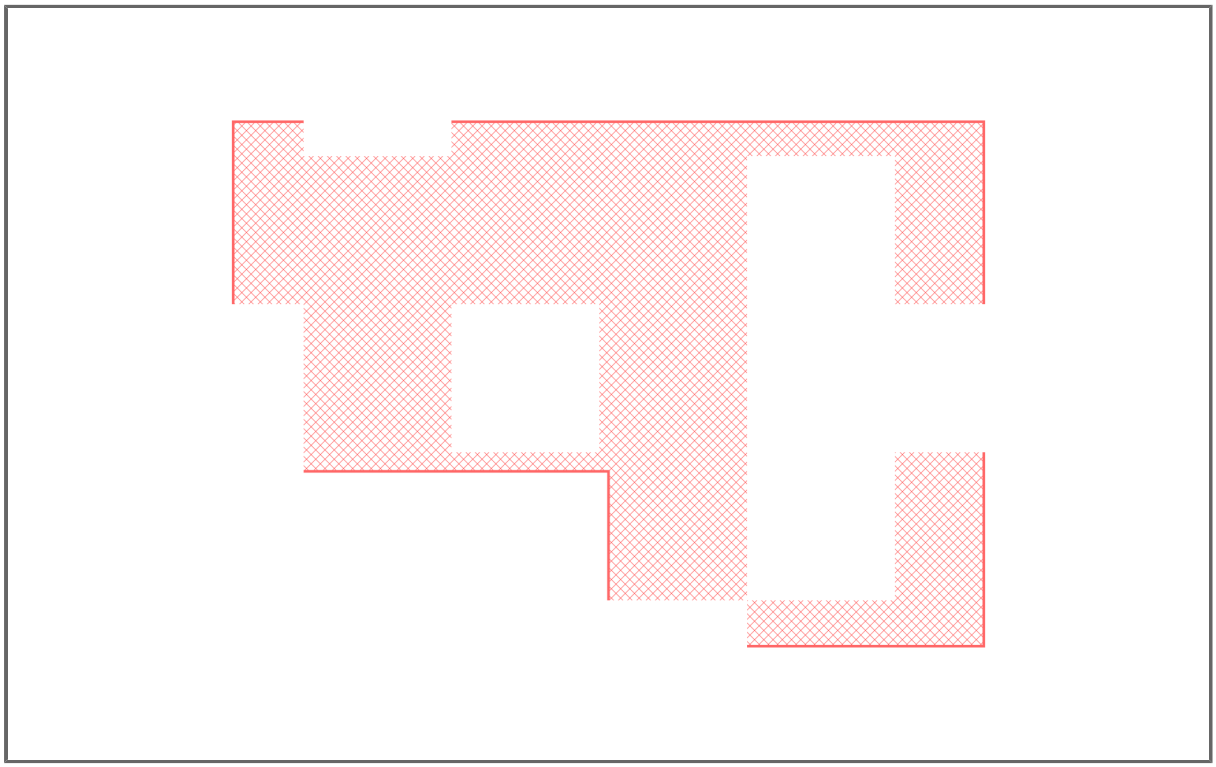


Figure 3 : Map of Global Context Ecoregions

Freshwater Ecoregions of the World (FEOW)

Freshwater Ecoregions of the World (FEOW) is a collaborative project providing the first global biogeographic regionalization of the Earth's freshwater biodiversity, and synthesizing biodiversity and threat data for the resulting ecoregions. We define a freshwater ecoregion as a large area encompassing one or more freshwater systems that contains a distinct assemblage of natural freshwater communities and species. The freshwater species, dynamics, and environmental conditions within a given ecoregion are more similar to each other than to those of surrounding ecoregions and together form a conservation unit. [Ref5]

FEOW: https://worldwildlife.org/biome-categories/freshwater-ecoregions

Freshwater Ecoregions of the World layer: Classification: Biodiversity - Region; Type: Contextual (polygonal); Metadata contact organisation: TNC. https://spatial.ala.org.au/ws/layers/view/more/1052

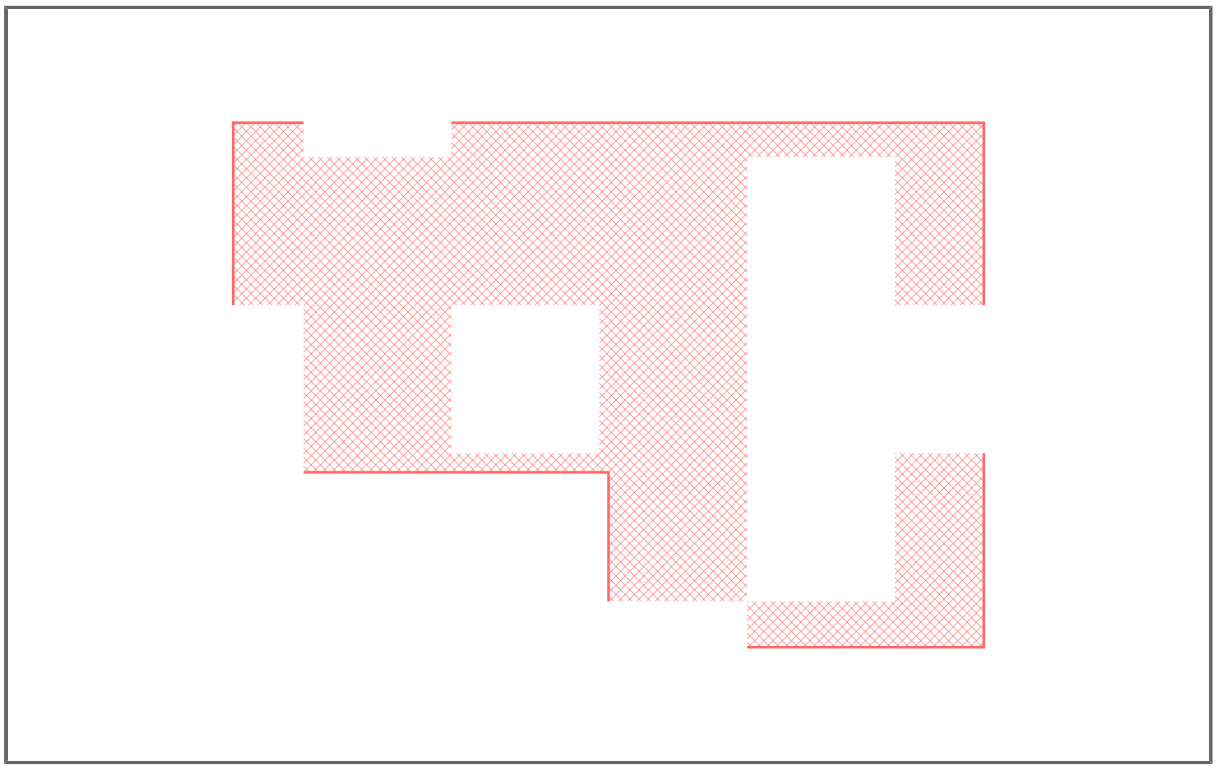


Figure 4 : Map of Freshwater Ecoregions of the World (FEOW)

Occurrences

Occurrences: **1**

Spatially valid records are considered those that do not have any type of flag questioning their location, for example a terrestrial species being recorded in the ocean. [Ref6]

Number of occurrences (spatially valid only): **1**

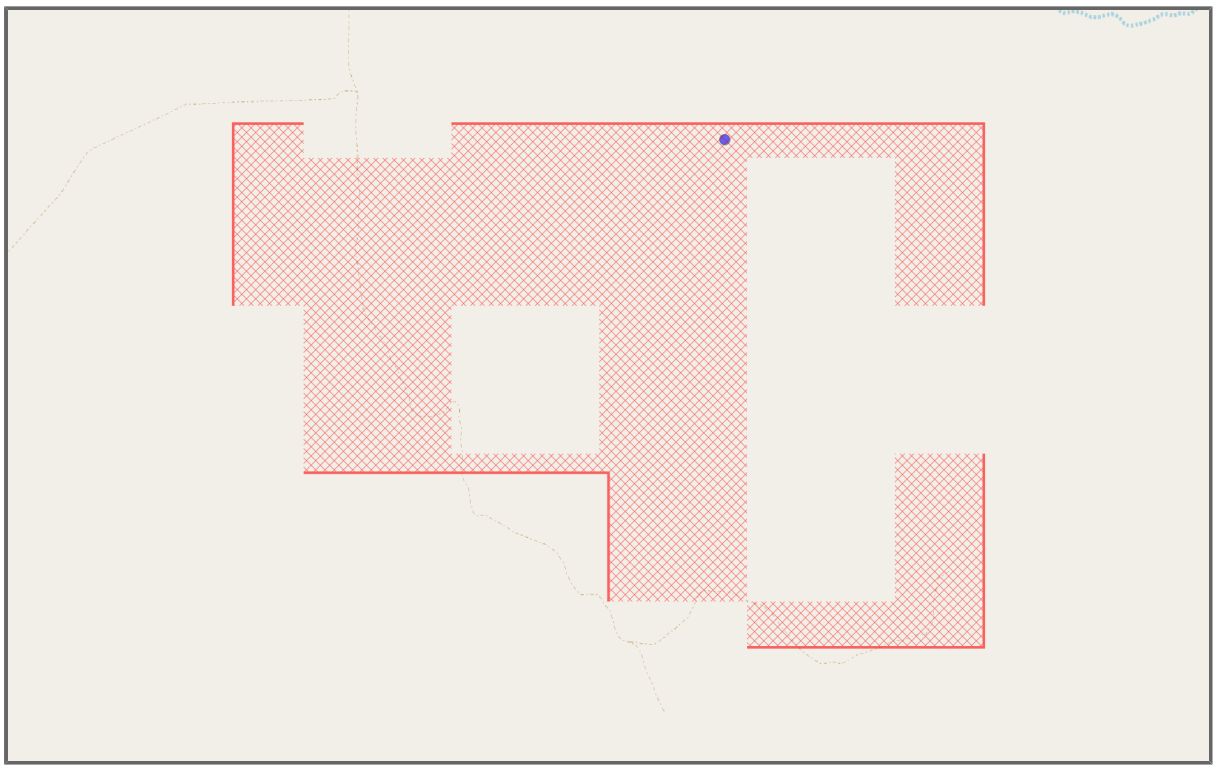


Figure 5 : Map of Occurrences

Species

Species: **1**

Spatially valid records are considered those that do not have any type of flag questioning their location, for example a terrestrial species being recorded in the ocean. [Ref6]

Number of species (spatially valid only): **1**

Table 4: Species

Family	*Scientific Name*	Common Name	No. Occurrences
Scrophulariaceae	Eremophila macgillivrayi	Dog-bush	1

Endemic Species

Endemic Species: **0**

Spatially valid records are considered those that do not have any type of flag questioning their location, for example a terrestrial species being recorded in the ocean. [Ref6]

Number of endemic species (spatially valid only): **0**

Table 5: Endemic Species

Family	*Scientific Name*	Common Name	No. Occurrences

All threatened species

Number of threatened species: **0**

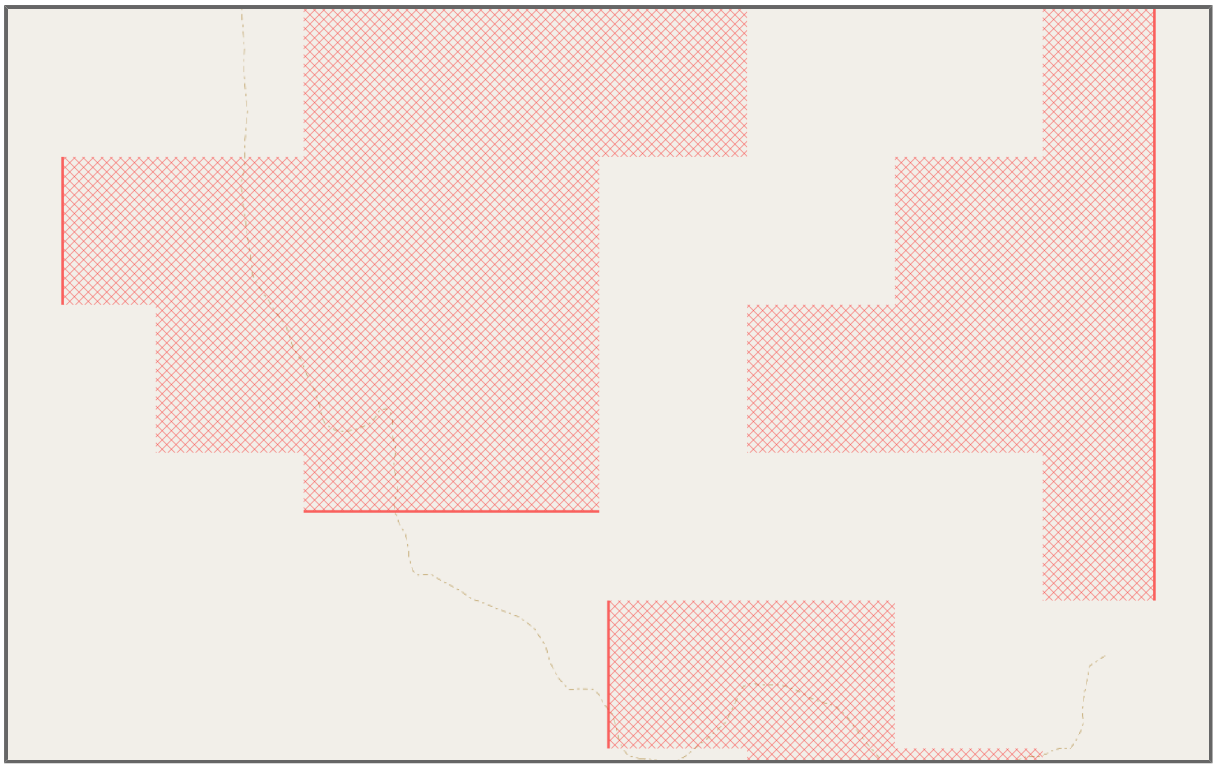


Figure 6 : Map of All threatened species

Table 6: All threatened species (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

All invasive species

Number of invasive species: **0**

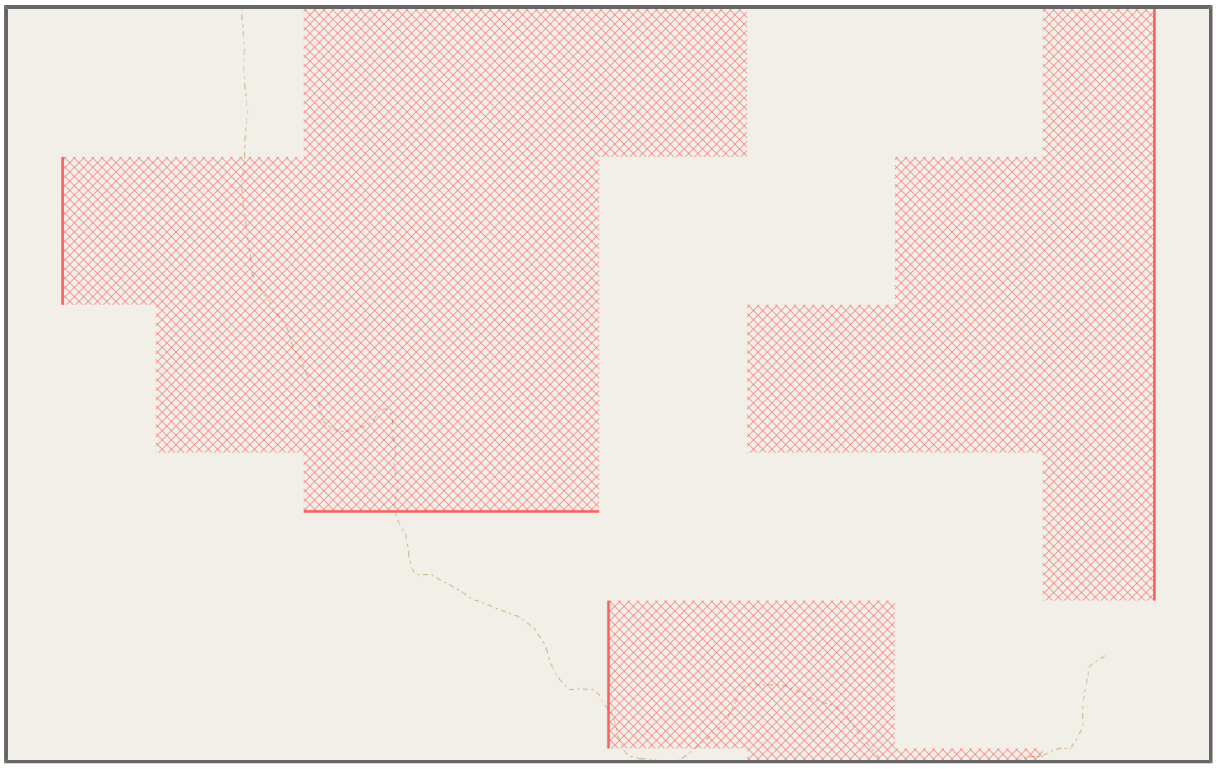


Figure 7 : Map of All invasive species

Table 7: All invasive species (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Iconic species

Number of iconic species: **0**

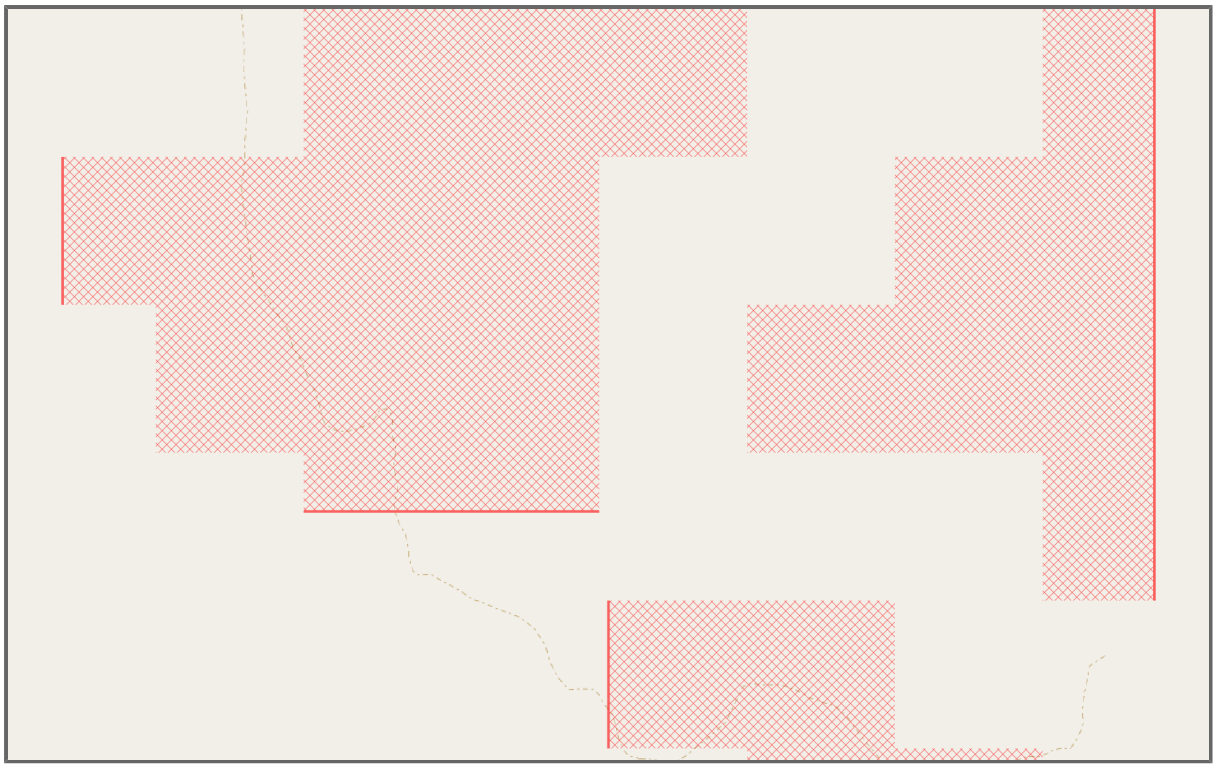


Figure 8 : Map of Iconic species

Table 8: Iconic species (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Migratory species

Number of migratory species: **0**

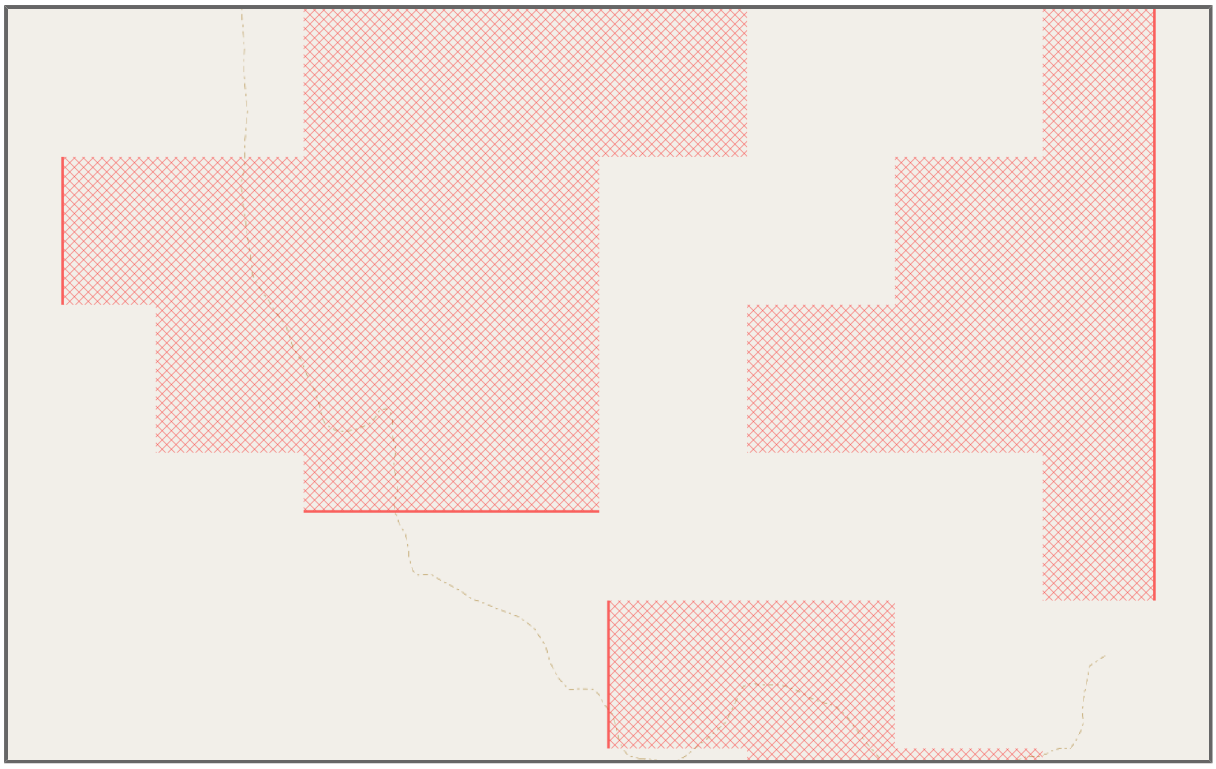


Figure 9 : Map of Migratory species

Table 9: Migratory species (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Amphibians

Number of Amphibians **0**

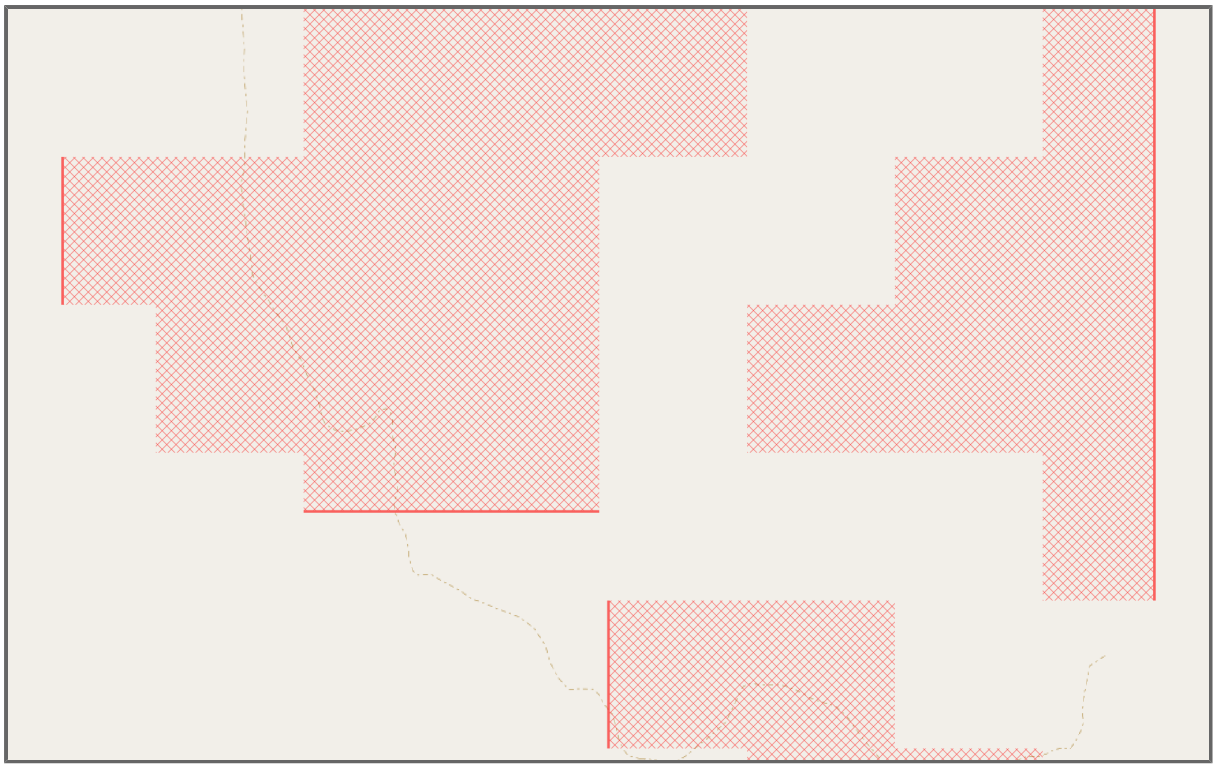


Figure 10 : Map of Lifeform - Amphibians

Table 10: Lifeform - Amphibians (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Angiosperms

Number of Angiosperms **0**

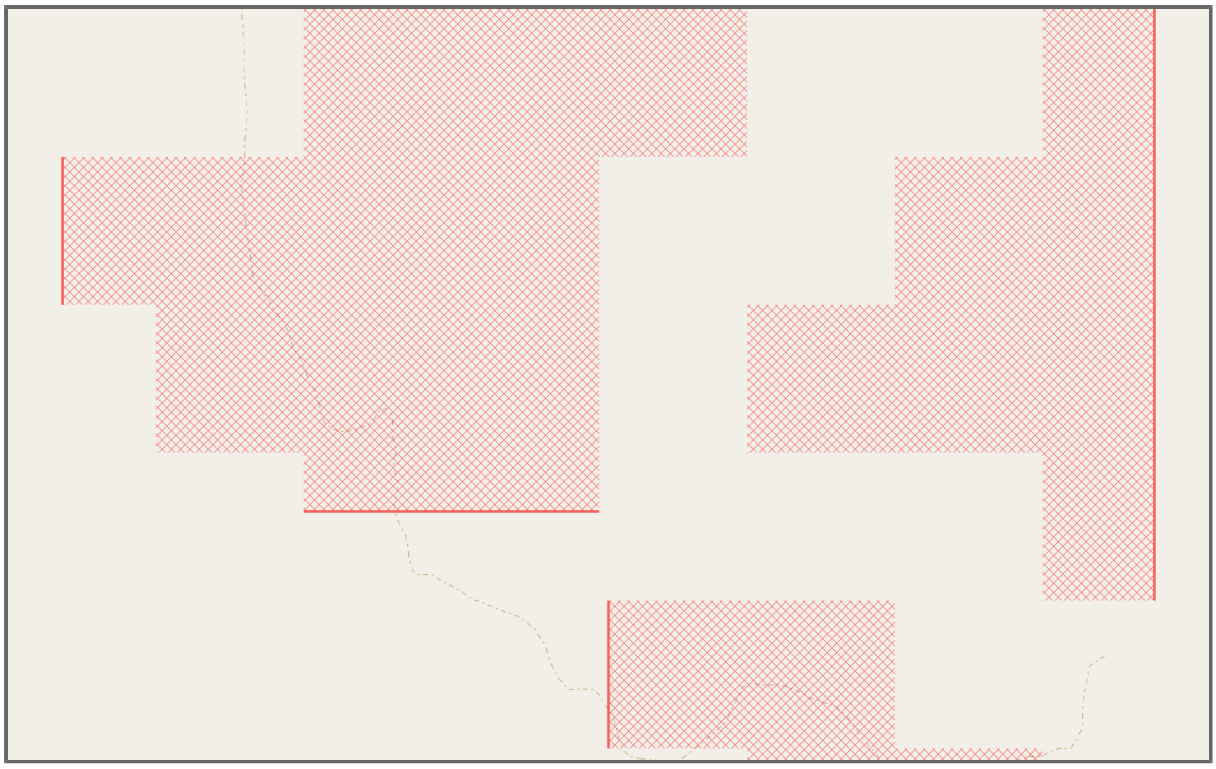


Figure 11 : Map of Lifeform - Angiosperms

Table 11: Lifeform - Angiosperms (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Animals

Number of Animals **0**

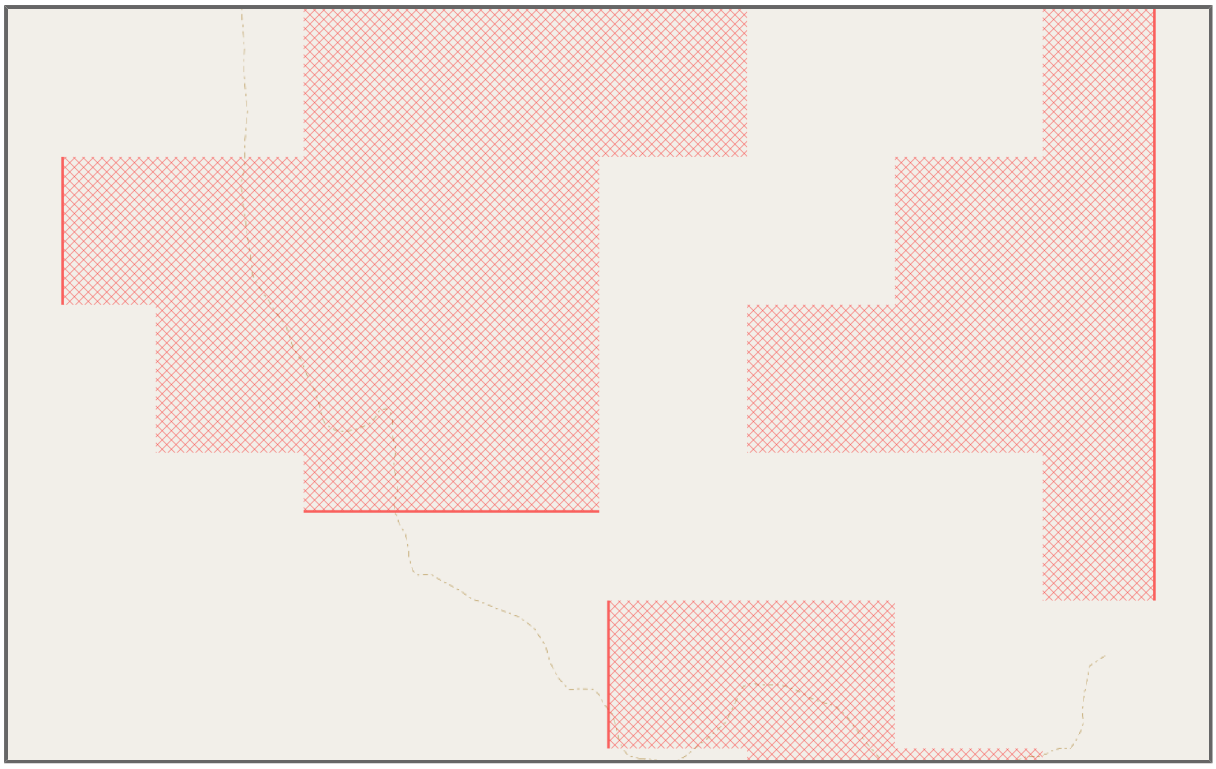


Figure 12 : Map of Lifeform - Animals

Table 12: Lifeform - Animals (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Birds

Number of Birds **0**

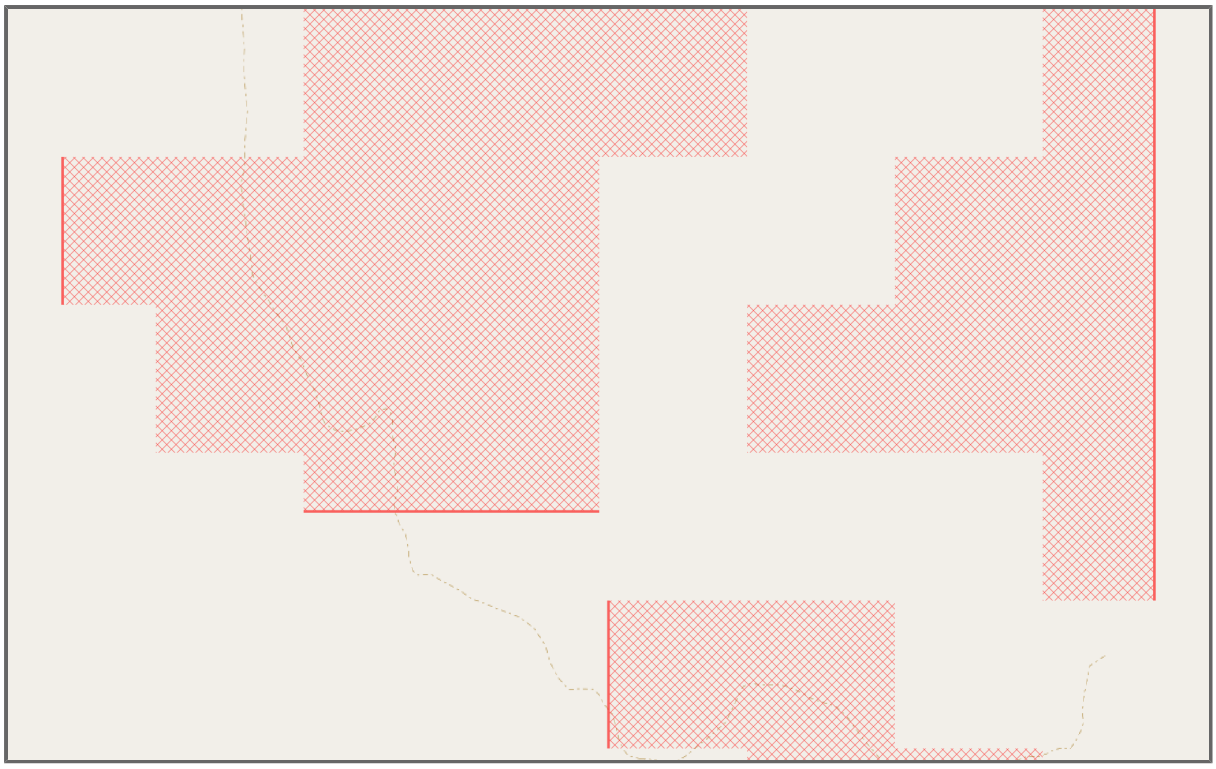


Figure 13 : Map of Lifeform - Birds

Table 13: Lifeform - Birds (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Dicots

Number of Dicots **1**

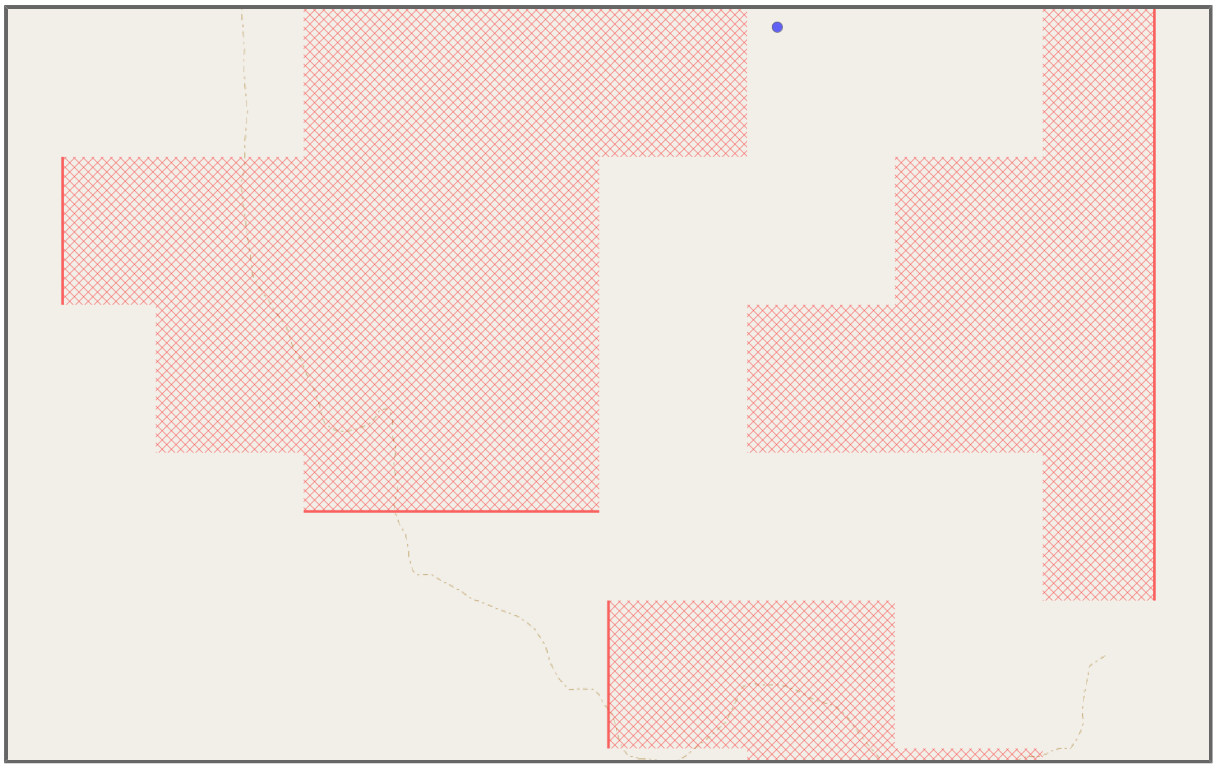


Figure 14 : Map of Lifeform - Dicots

Table 14: Lifeform - Dicots (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences
Scrophulariaceae	Eremophila macgillivrayi	Dog-bush	1

Lifeform - FernsAndAllies

Number of FernsAndAllies **0**

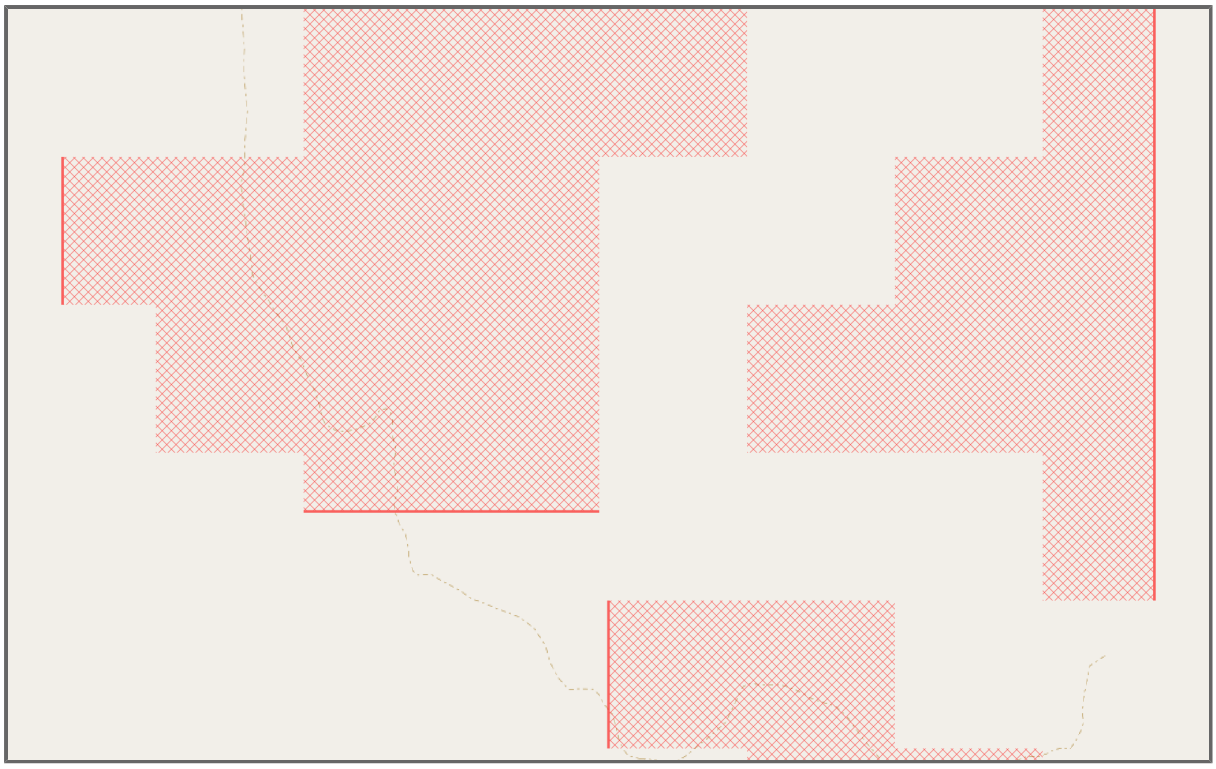


Figure 15 : Map of Lifeform - FernsAndAllies

Table 15: Lifeform - FernsAndAllies (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Fishes

Number of Fishes **0**

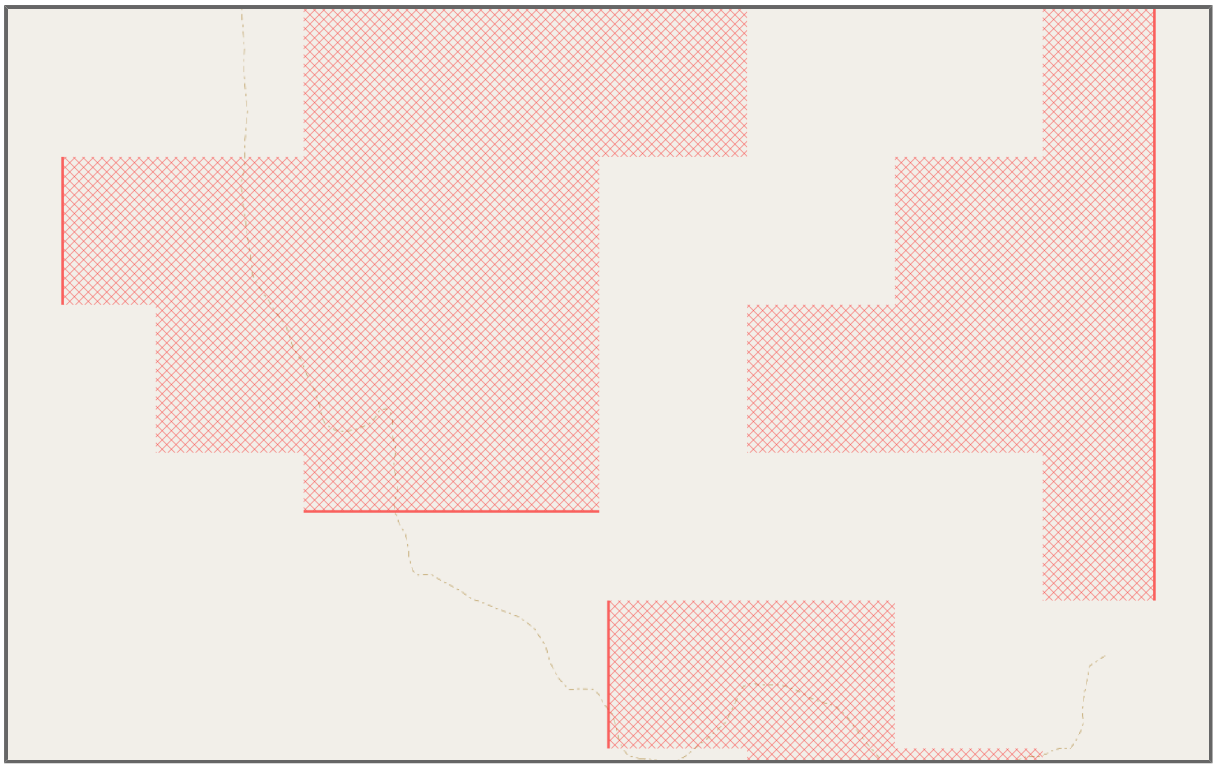


Figure 16 : Map of Lifeform - Fishes

Table 16: Lifeform - Fishes (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Gymnosperms

Number of Gymnosperms **0**

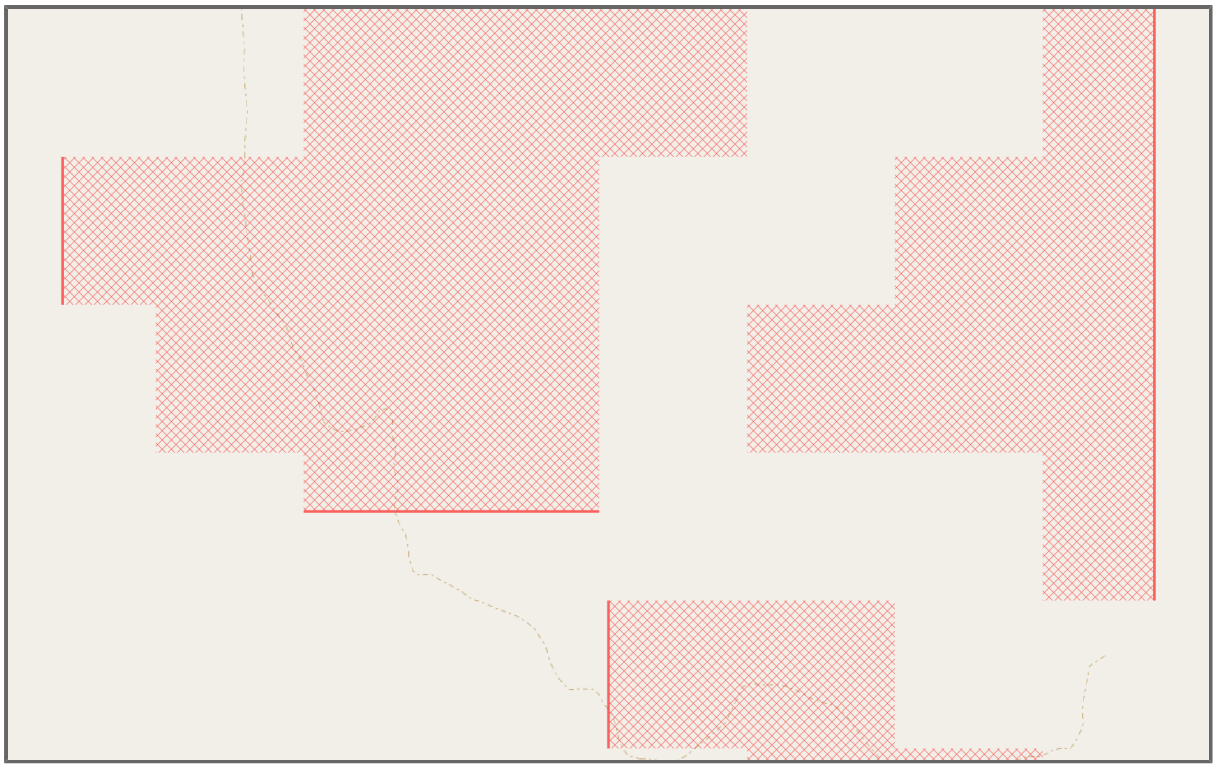


Figure 17 : Map of Lifeform - Gymnosperms

Table 17: Lifeform - Gymnosperms (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Mammals

Number of Mammals **0**

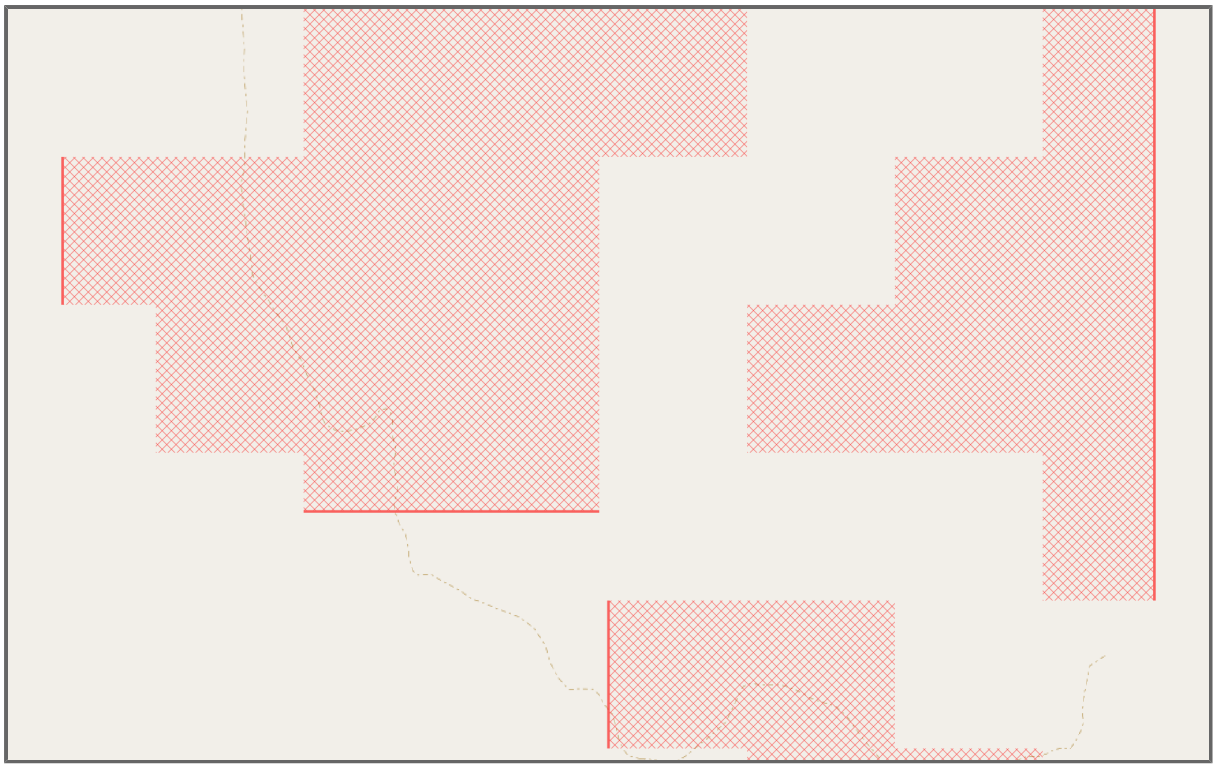


Figure 18 : Map of Lifeform - Mammals

Table 18: Lifeform - Mammals (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Monocots

Number of Monocots **0**

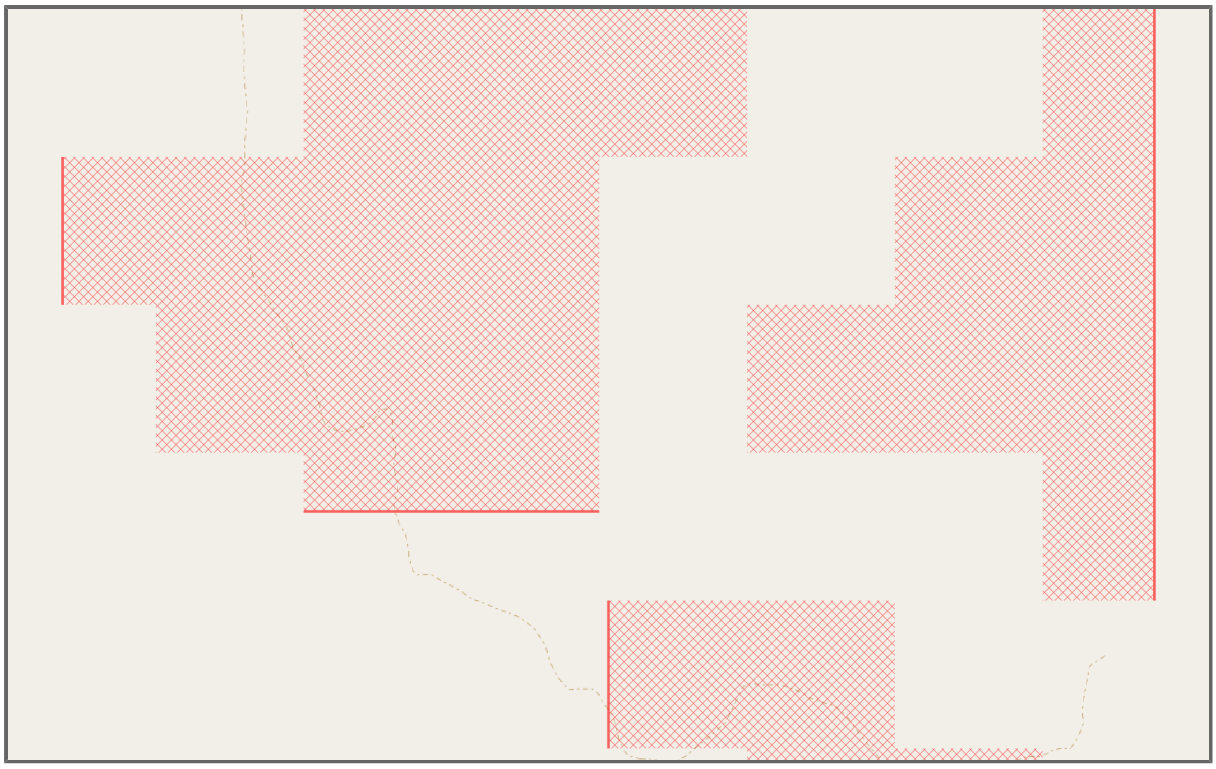


Figure 19 : Map of Lifeform - Monocots

Table 19: Lifeform - Monocots (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Lifeform - Plants

Number of Plants **1**

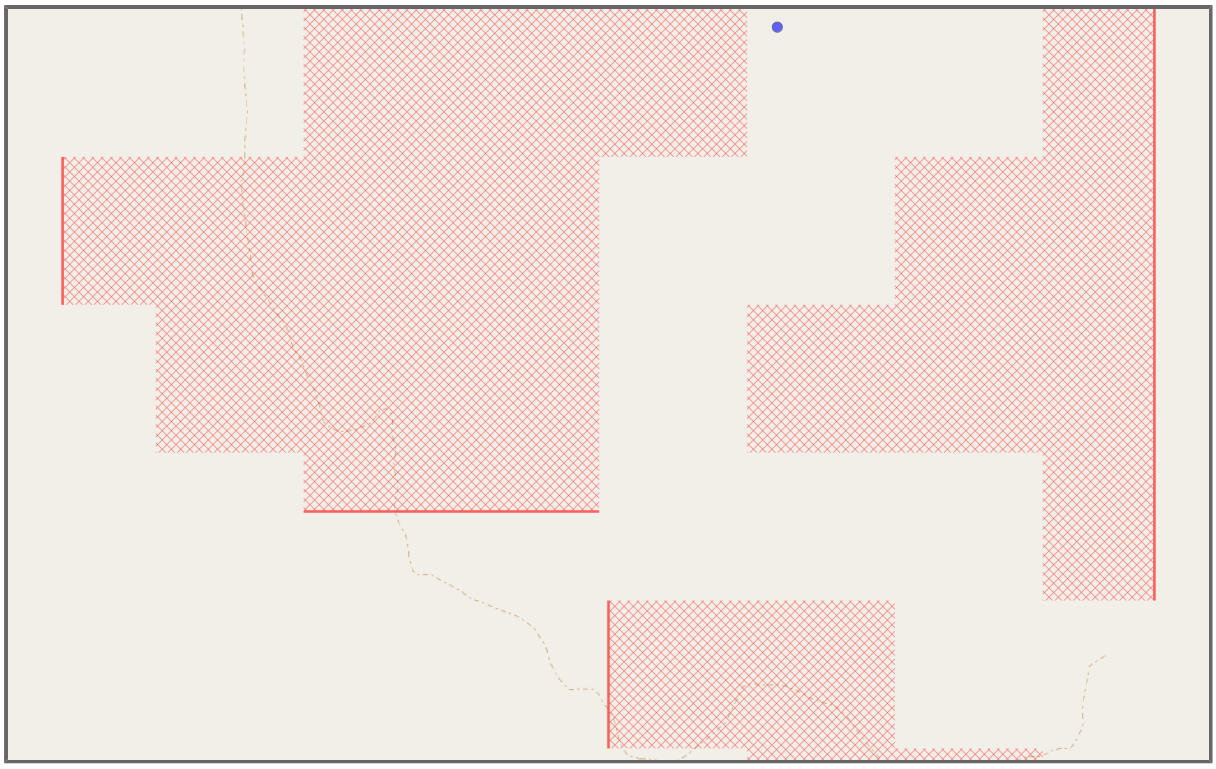


Figure 20 : Map of Lifeform - Plants

Table 20: Lifeform - Plants (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences
Scrophulariaceae	Eremophila macgillivrayi	Dog-bush	1

Lifeform - Reptiles

Number of Reptiles **0**

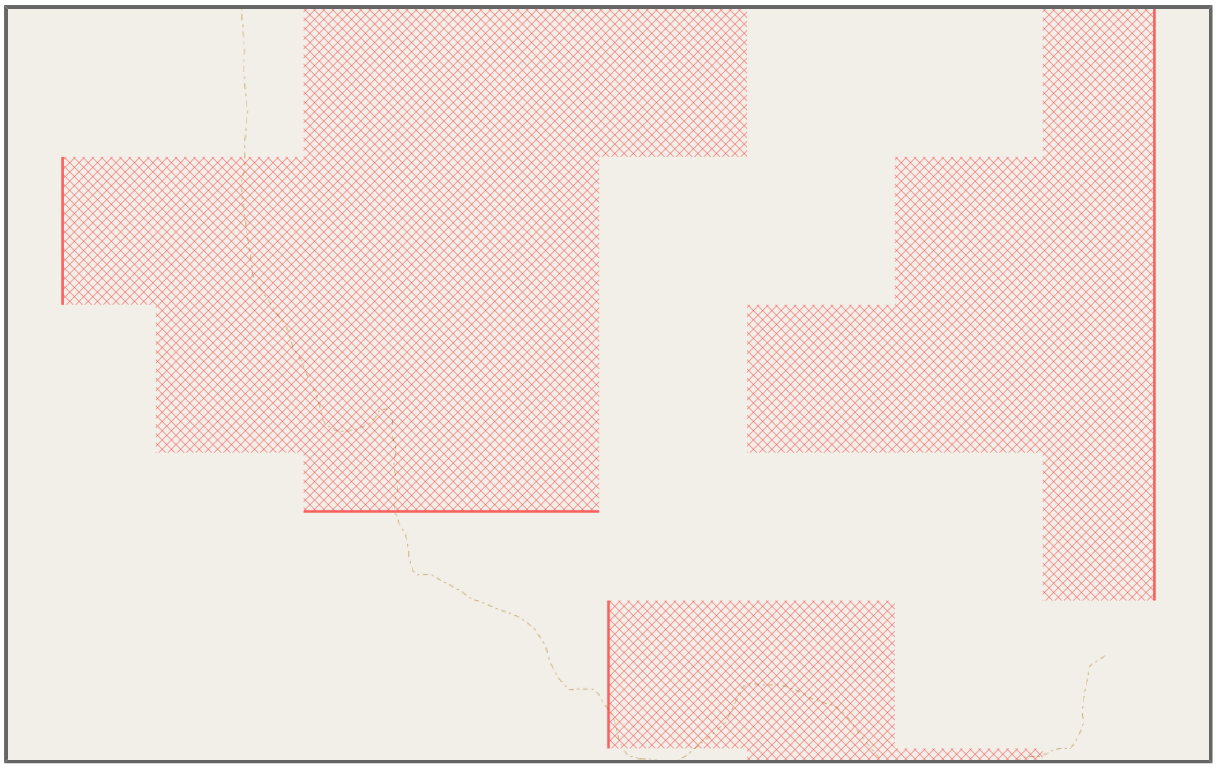


Figure 21 : Map of Lifeform - Reptiles

Table 21: Lifeform - Reptiles (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Expert Distributions

Number of expert distributions: **179**

Table 22: Expert Distributions

Family	*Scientific Name*	Common Name	Min Depth	Max Depth	Area Name	Area sq km
MELIPHAGIDAE	Certhionyx niger	Black Honeyeater			Expert distribution Certhionyx niger	5462673.98
CORVIDAE	Corvus bennetti	Little Crow			Expert distribution Corvus bennetti	5705338.98
CLIMACTERIDAE	Climacteris (Climacteris) picumnus	Brown Treecreeper			Expert distribution Climacteris picumnus	2277553.59
CAMPEPHAGIDAE	Coracina (Pteropodocys) maxima	Ground Cuckoo-shrike			Expert distribution Coracina maxima	6417009.57
PHASIANIDAE	Coturnix (Coturnix) pectoralis	Stubble Quail			Expert distribution Coturnix pectoralis	6348551.61
ARTAMIDAE	Cracticus torquatus	Grey Butcherbird			Expert distribution Cracticus torquatus	6428212.34
THRESKIORNITHIDAE	Platalea (Platibis) flavipes	Yellow-billed Spoonbill			Expert distribution Platalea flavipes	4717240.77
CAMPEPHAGIDAE	Coracina (Coracina) novaehollandiae	Black-faced Cuckoo-shrike			Expert distribution Coracina novaehollandiae	8275248.68
CORVIDAE	Corvus coronoides	Australian Raven			Expert distribution Corvus coronoides	4821723.12
ARTAMIDAE	Cracticus nigrogularis	Pied Butcherbird			Expert distribution Cracticus nigrogularis	6375272.64
CUCULIDAE	Cuculus pallidus	Palid Cuckoo			Expert distribution Cuculus pallidus	7788647.90
NECTARINIIDAE	Dicaeum (Dicaeum) hirundinaceum	Mistletoebird			Expert distribution Dicaeum hirundinaceum	6504923.75
PELECANIDAE	Pelecanus conspicillatus	Australian Pelican			Expert distribution Pelecanus conspicillatus	6627953.98
ARTAMIDAE	Artamus (Campbellornis) superciliosus	White-browed Woodswallow			Expert distribution Artamus superciliosus	7195470.64
LARIDAE	Chlidonias (Pelodes) hybrida	Whiskered Tern			Expert distribution Chlidonias hybrida	31766691.37
RALLIDAE	Fulica atra	Eurasian Coot			Expert distribution Fulica atra	40213555.69
SCOLOPACIDAE	Tringa (Rhyacophilus) stagnatilis	Marsh Sandpiper			Expert distribution Tringa stagnatilis	32002835.93
	Mesophoyx intermedia				Expert distribution Mesophoyx intermedia	28849005.88
	Phalacrocorax melanoleucos				Expert distribution Phalacrocorax melanoleucos	5881748.39
ARDEIDAE	Ardea (Ardea) pacifica	White-necked Heron			Expert distribution Ardea pacifica	7532467.66
CACATUIDAE	Cacatua (Licmetis) sanguinea	Little Corella			Expert distribution Cacatua sanguinea	5339700.99
ARDEIDAE	Nycticorax caledonicus	Nankeen Night-heron			Expert distribution Nycticorax caledonicus	7827831.87
Apodidae	Apus pacificus	Fork-tailed Swift			Expert distribution (likely) Apus pacificus	6850159.42
HIRUNDINIDAE	Cheramoeca leucosterna	White-backed Swallow			Expert distribution Cheramoeca leucosterna	5235941.71
RECURVIROSTRIDAE	Cladorhynchus leucocephalus	Banded Stilt			Expert distribution Cladorhynchus leucocephalus	1295039.34
ANATIDAE	Anas (Nettion) gracilis	Grey Teal			Expert distribution Anas gracilis	8854807.76
PHASIANIDAE	Coturnix (Synoicus) ypsilophora	Brown Quail			Expert distribution Coturnix ypsilophora	5867626.03
ALCEDINIDAE	Todiramphus (Todiramphus) sanctus	Sacred Kingfisher			Expert distribution Todiramphus sanctus	8251815.38
ANATIDAE	Anas (Anas) superciliosa	Pacific Black Duck			Expert distribution Anas superciliosa	8885221.53
RALLIDAE	Porzana (Porzana) tabuensis	Spotless Crake			Expert distribution Porzana tabuensis	2328613.11
MELIPHAGIDAE	Epthianura (Aurepthianura) crocea	Yellow Chat			Expert distribution Epthianura crocea	2190499.15
COLUMBIDAE	Phaps (Histriophaps) histrionica	Flock Bronzewing			Expert distribution Phaps histrionica	3752096.19
POMATOSTOMIDAE	Pomatostomus (Morganornis) superciliosus	White-browed Babbler			Expert distribution Pomatostomus superciliosus	4638332.32
ANATIDAE	Stictonetta naevosa	Freckled Duck			Expert distribution Stictonetta naevosa	2088858.97
ANATIDAE	Anas (Spatula) rhynchotis	Australasian Shoveler			Expert distribution Anas rhynchotis	4469444.80
MEGALURIDAE	Cincloramphus (Cincloramphus) cruralis	Brown Songlark			Expert distribution Cincloramphus cruralis	6413759.53
	Cincloramphus (Maclennania)				Expert distribution Cincloramphus	

MEGALURIDAE	mathewsi	Rufous Songlark	mathewsi	6703622.88
MALURIDAE	Malurus (Leggeornis) lamberti	Variegated Fairy-wren	Expert distribution Malurus lamberti	5949897.59
Rostratulidae	Rostratula benghalensis (sensu lato)	Painted Snipe	Expert distribution (maybe) Rostratula benghalensis (sensu lato)	4290580.99
PSITTACIDAE	Melopsittacus undulatus	Budgerigar	Expert distribution Melopsittacus undulatus	5915295.57
Thylacomyidae	Macrotis lagotis	Greater Bilby	Expert distribution (maybe) Macrotis lagotis	634419.35
CLIMACTERIDAE	Climacteris (Climacterobates) affinis	White-browed Treecreeper	Expert distribution Climacteris affinis	2639678.68
ANATIDAE	Biziura lobata	Musk Duck	Expert distribution Biziura lobata	2745184.89
ANATIDAE	Oxyura australis	Blue-billed Duck	Expert distribution Oxyura australis	2220865.40
PSITTACIDAE	Psephotus (Psephotus) haematonotus	Red-rumped Parrot	Expert distribution Psephotus haematonotus	1494396.43
ARDEIDAE	Ardea alba	Great White Egret	Expert distribution Casmerodius albus	75783095.10
SCOLOPACIDAE	Calidris (Erolia) acuminata	Sharp-tailed Sandpiper	Expert distribution Calidris acuminata	12325741.41
ARDEIDAE	Egretta garzetta	Little Egret	Expert distribution Egretta garzetta	40036024.12
LARIDAE	Gelochelidon nilotica	Gull-billed Tern	Expert distribution Sterna nilotica	17427456.75
LARIDAE	Hydroprogne caspia	Caspian Tern	Expert distribution Sterna caspia	13971242.26
PHALACROCORACIDAE	Phalacrocorax (Phalacrocorax) carbo	Great Cormorant	Expert distribution Phalacrocorax carbo	29810439.37
THRESKIORNITHIDAE	Plegadis falcinellus	Glossy Ibis	Expert distribution Plegadis falcinellus	28613832.12
RALLIDAE	Porphyrio (Porphyrio) porphyrio	Purple Swamphen	Expert distribution Porphyrio porphyrio	18612466.94
SCOLOPACIDAE	Steganopus tricolor	Wilson's Phalarope	Expert distribution Steganopus tricolor	43981867.07
TYTONIDAE	Tyto alba	Barn Owl	Expert distribution Tyto alba	63421904.27
ACCIPITRIDAE	Circus assimilis	Spotted Harrier	Expert distribution Circus assimilis	7850851.09
PACHYCEPHALIDAE	Colluricincla (Colluricincla) harmonica	Grey Shrike-thrush	Expert distribution Colluricincla harmonica	6948277.29
THRESKIORNITHIDAE	Platalea (Platalea) regia	Royal Spoonbill	Expert distribution Platalea regia	6253990.16
PODARGIDAE	Podargus strigoides	Tawny Frogmouth	Expert distribution Podargus strigoides	7706572.49
ACCIPITRIDAE	Elanus scriptus	Letter-winged Kite	Expert distribution Elanus scriptus	4311293.02
CACATUIDAE	Eolophus roseicapillus roseicapillus	Galah	Expert distribution Cacatua roseicapilla	7705836.89
MELIPHAGIDAE	Epthianura (Aurepthianura) aurifrons	Orange Chat	Expert distribution Epthianura aurifrons	5633073.89
MELIPHAGIDAE	Epthianura (Parepthianura) tricolor	Crimson Chat	Expert distribution Epthianura tricolor	5508389.08
FALCONIDAE	Falco (Hierofalco) subniger	Black Falcon	Expert distribution Falco subniger	5935857.83
COLUMBIDAE	Phaps (Phaps) chalcoptera	Common Bronzewing	Expert distribution Phaps chalcoptera	5913133.12
Ardeidae	Ardea ibis	Cattle Egret	Expert distribution (maybe) Ardea ibis	6474803.97
ANATIDAE	Anas (Nettion) castanea	Chestnut Teal	Expert distribution Anas castanea	3142293.12
ANATIDAE	Dendrocygna (Leptotarsis) eytoni	Plumed Whistling-duck	Expert distribution Dendrocygna eytoni	4799859.70
MELIPHAGIDAE	Phylidonyris albifrons	White-fronted Honeyeater	Expert distribution Phylidonyris albifrons	4042343.39
CHARADRIIDAE	Charadrius (Eupoda) australis	Inland Dotterel	Expert distribution Charadrius australis	2566074.29
PSITTACIDAE	Psephotus (Psephotus) varius	Mulga Parrot	Expert distribution Psephotus varius	3341400.38
ACANTHIZIDAE	Acanthiza (Geobasileus) uropygialis	Chestnut-rumped Thornbill	Expert distribution Acanthiza uropygialis	4806634.16
MELIPHAGIDAE	Certhionyx (Certhionyx) variegatus	Pied Honeyeater	Expert distribution Certhionyx variegatus	5142828.18
CHARADRIIDAE	Charadrius (Charadrius) ruficapillus	Red-capped Plover	Expert distribution Charadrius ruficapillus	4830132.20
STRIGIDAE	Ninox (Hieracoglaux) connivens	Barking Owl	Expert distribution Ninox connivens	2486340.95
PSOPHODIDAE	Cinclosoma (Samuela) cinnamomeum	Cinnamon Quail-thrush	Expert distribution Cinclosoma cinnamomeum	833783.67
CUCULIDAE	Chrysococcyx osculans	Black-eared Cuckoo	Expert distribution Chrysococcyx osculans	7071593.02
			Expert distribution Malacorhynchus	

ANATIDAE	Malacorhynchus membranaceus	Pink-eared Duck	membranaceus	7027203.52
ACANTHIZIDAE	Acanthiza (Acanthiza) apicalis	Inland Thornbill	Expert distribution Acanthiza apicalis	4140081.56
MELIPHAGIDAE	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	Expert distribution Acanthagenys rufogularis	6000053.87
THRESKIORNITHIDAE	Threskiornis spinicollis	Straw-necked Ibis	Expert distribution Threskiornis spinicollis	6591872.02
ACROCEPHALIDAE	Acrocephalus (Acrocephalus) australis	Australian Reed-warbler	Expert distribution Acrocephalus australis	3900510.52
ANHINGIDAE	Anhinga novaehollandiae	Australasian Darter	Expert distribution Anhinga novaehollandiae	7220532.85
PSITTACIDAE	Barnardius zonarius	Australian Ringneck	Expert distribution Barnardius zonarius	5326116.85
ACANTHIZIDAE	Calamanthus (Calamanthus) campestris	Rufous Fieldwren	Expert distribution Calamanthus campestris	1884126.72
CACATUIDAE	Nymphicus hollandicus	Cockatiel	Expert distribution Nymphicus hollandicus	6490031.09
ANATIDAE	Aythya (Nyroca) australis	Hardhead	Expert distribution Aythya australis	8179872.96
ANATIDAE	Tadorna (Casarca) tadornoides	Australian Shelduck	Expert distribution Tadorna tadornoides	3310144.12
APODIDAE	Apus (Apus) pacificus	Fork-tailed Swift	Expert distribution Apus pacificus	25317218.87
ARTAMIDAE	Cracticus tibicen	Australian Magpie	Expert distribution Gymnorhina tibicen	6938575.86
CHARADRIIDAE	Elseyornis melanops	Black-fronted Dotterel	Expert distribution Elseyornis melanops	7384843.66
CAPRIMULGIDAE	Eurostopodus (Eurostopodus) argus	Spotted Nightjar	Expert distribution Eurostopodus argus	7043900.66
PHALACROCORACIDAE	Phalacrocorax (Phalacrocorax) varius	Pied Cormorant	Expert distribution Phalacrocorax varius	4427211.02
GLAREOLIDAE	Stiltia isabella	Australian Pratincole	Expert distribution Stiltia isabella	5241998.56
PODICIPEDIDAE	Tachybaptus novaehollandiae	Australasian Grebe	Expert distribution Tachybaptus novaehollandiae	8158001.38
Meropidae	Merops ornatus	Rainbow Bee-eater	Expert distribution (maybe) Merops ornatus	7784899.62
MELIPHAGIDAE	Lichenostomus (Gavicalis) virescens	Singing Honeyeater	Expert distribution Lichenostomus virescens	7337047.11
MELIPHAGIDAE	Lichenostomus (Ptilotula) penicillatus	White-plumed Honeyeater	Expert distribution Lichenostomus penicillatus	4941855.61
MELIPHAGIDAE	Lichenostomus (Ptilotula) plumulus	Grey-fronted Honeyeater	Expert distribution Lichenostomus plumulus	5391385.45
FALCONIDAE	Falco (Ieracidea) berigora	Brown Falcon	Expert distribution Falco berigora	8309376.46
FALCONIDAE	Falco (Tinnunculus) cenchroides	Nankeen Kestrel	Expert distribution Falco cenchroides	8092779.67
RECURVIROSTRIDAE	Himantopus himantopus leucocephalus	Banded Stilt	Expert distribution Himantopus leucocephalus	8909101.48
CAMPEPHAGIDAE	Lalage tricolor	Australian White-winged Triller	Expert distribution Lalage tricolor	7665912.79
PETROICIDAE	Microeca (Microeca) fascinans	Jacky Winter	Expert distribution Microeca fascinans	5323897.16
ALAUDIDAE	Mirafra (Mirafra) javanica	Horsfield's Bushlark	Expert distribution Mirafra javanica	6688389.55
MELIPHAGIDAE	Manorina (Myzantha) flavigula	Yellow-throated Miner	Expert distribution Manorina flavigula	6844527.43
PETROICIDAE	Melanodryas (Melanodryas) cucullata	Hooded Robin	Expert distribution Melanodryas cucullata	6386250.78
ACCIPITRIDAE	Circus approximans	Swamp Harrier	Expert distribution Circus approximans	5155720.31
MOTACILLIDAE	Anthus (Anthus) novaeseelandiae	Australasian Pipit	Expert distribution Anthus novaeseelandiae	6504213.91
STRIGIDAE	Ninox (Ninox) novaeseelandiae	Southern Boobook	Expert distribution Ninox novaeseelandiae	8080194.91
PETROICIDAE	Petroica (Petroica) goodenovii	Red-capped Robin	Expert distribution Petroica goodenovii	6577525.66
RALLIDAE	Tribonyx ventralis	Black-tailed Native-hen	Expert distribution Gallinula ventralis	4636120.02
CHARADRIIDAE	Vanellus (Lobipluvia) miles	Masked Lapwing	Expert distribution Vanellus miles	5298978.32
CHARADRIIDAE	Vanellus (Lobivanellus) tricolor	Banded Lapwing	Expert distribution Vanellus tricolor	5665395.23
FALCONIDAE	Falco (Falco) longipennis	Australian Hobby	Expert distribution Falco longipennis	8298592.48
RALLIDAE	Gallinula (Gallinula) tenebrosa	Dusky Moorhen	Expert distribution Gallinula tenebrosa	3818628.75
ACCIPITRIDAE	Haliastur sphenurus	Whistling Kite	Expert distribution Haliastur sphenurus	5610016.45
ACCIPITRIDAE	Hieraaetus (Hieraaetus) morphnoides	Little Eagle	Expert distribution Hieraaetus morphnoides	7295760.24

RHIPIDURIDAE	Rhipidura (Sauloprocta) leucophrys	Willie Wagtail	Expert distribution Rhipidura leucophrys	8437314.02
THRESKIORNITHIDAE	Threskiornis molucca	Australian White Ibis	Expert distribution Threskiornis molucca	5606446.57
TYTONIDAE	Tyto (Megastrix) novaehollandiae	Masked Owl	Expert distribution Tyto novaehollandiae	5149773.71
PSITTACIDAE	Pezoporus occidentalis	Night Parrot	Expert distribution Pezoporus occidentalis	2693415.16
PSOPHODIDAE	Psophodes (Sphenostoma) cristatus	Chirruping Wedgebill	Expert distribution Psophodes cristatus	1159210.85
Pedionomidae	Pedionomus torquatus	Plains-wanderer	Expert distribution (maybe) Pedionomus torquatus	1062025.31
MALURIDAE	Malurus (Musciparus) leucopterus	White-winged Fairy-wren	Expert distribution Malurus leucopterus	5635255.97
AEGOTHELIDAE	Aegotheles (Aegotheles) cristatus	Australian Owlet-nightjar	Expert distribution Aegotheles cristatus	7734887.23
ACANTHIZIDAE	Aphelocephala leucopsis	Southern Whiteface	Expert distribution Aphelocephala leucopsis	3771465.98
Frankeniaceae	Frankenia plicata		Expert distribution (maybe) Frankenia plicata	419550.50
Muridae	Notomys fuscus	Dusky Hopping-mouse, Wilkiniti	Expert distribution (maybe) Notomys fuscus	132041.73
ACCIPITRIDAE	Elanus axillaris	Black-shouldered Kite	Expert distribution Elanus axillaris	7680926.93
ACCIPITRIDAE	Hamirostra melanosternon	Black-breasted Buzzard	Expert distribution Hamirostra melanosternon	5322195.01
COLUMBIDAE	Geopelia cuneata	Diamond Dove	Expert distribution Geopelia cuneata	5729437.59
COLUMBIDAE	Geopelia striata placida	Peaceful Dove	Expert distribution Geopelia placida	5604983.01
ESTRILDIDAE	Taeniopygia guttata	Zebra Finch	Expert distribution Taeniopygia guttata	6384312.10
PODICIPEDIDAE	Podiceps cristatus	Great Crested Grebe	Expert distribution Podiceps cristatus	30644062.36
SCOLOPACIDAE	Actitis hypoleucos	Common Sandpiper	Expert distribution Actitis hypoleucos	61323916.68
ACCIPITRIDAE	Milvus migrans	Black Kite	Expert distribution Milvus migrans	64724141.77
ACCIPITRIDAE	Accipiter (Leucospiza) fasciatus	Brown Goshawk	Expert distribution Accipiter fasciatus	8215601.74
ACCIPITRIDAE	Aquila (Uroaetus) audax	Wedge-tailed Eagle	Expert distribution Aquila audax	7711600.67
Ardeidae	Ardea alba	Great Egret, White Egret	Expert distribution (likely) Ardea alba	7998335.02
OTIDIDAE	Ardeotis australis	Australian Bustard	Expert distribution Ardeotis australis	6747155.01
ARTAMIDAE	Artamus (Angroyan) cinereus	Black-faced Woodswallow	Expert distribution Artamus cinereus	7455889.31
ARTAMIDAE	Artamus (Angroyan) minor	Little Woodswallow	Expert distribution Artamus minor	6541794.28
ARTAMIDAE	Artamus (Campbellornis) personatus	Masked Woodswallow	Expert distribution Artamus personatus	7602300.12
ARTAMIDAE	Artamus (Artamus) leucorynchus	White-breasted Woodswallow	Expert distribution Artamus leucorynchus	7668178.65
ANATIDAE	Chenonetta jubata	Australian Wood Duck	Expert distribution Chenonetta jubata	6020637.70
GRUIDAE	Grus (Mathewsia) rubicunda	Brolga	Expert distribution Grus rubicunda	3576758.72
FALCONIDAE	Falco (Hierofalco) hypoleucos	Grey Falcon	Expert distribution Falco hypoleucos	5390602.21
MELIPHAGIDAE	Ashbyia lovensis	Gibberbird	Expert distribution Ashbyia lovensis	858589.65
ACANTHIZIDAE	Aphelocephala nigricincta	Banded Whiteface	Expert distribution Aphelocephala nigricincta	1626240.03
ARTAMIDAE	Artamus (Angroyan) cyanopterus	Dusky Woodswallow	Expert distribution Artamus cyanopterus	3910611.37
MONARCHIDAE	Grallina cyanoleuca	Magpie-lark	Expert distribution Grallina cyanoleuca	6774362.21
CASUARIIDAE	Dromaius novaehollandiae	Emu	Expert distribution Dromaius novaehollandiae	6759542.46
RECURVIROSTRIDAE	Recurvirostra novaehollandiae	Red-necked Avocet	Expert distribution Recurvirostra novaehollandiae	3550921.74
CUCULIDAE	Chrysococcyx basalis	Horsfield's Bronze Cuckoo	Expert distribution Chrysococcyx basalis	7963191.79
CHARADRIIDAE	Erythrogonys cinctus	Red-kneed Dotterel	Expert distribution Erythrogonys cinctus	5131877.29
HIRUNDINIDAE	Hirundo ariel	Fairy Martin	Expert distribution Hirundo ariel	5393670.79

ACCIPITRIDAE	Lophoictinia isura	Square-tailed Kite	Expert distribution Lophoictinia isura	5787193.90
MEGALURIDAE	Megalurus gramineus	Little Grassbird	Expert distribution Megalurus gramineus	3287342.46
HIRUNDINIDAE	Hirundo (Hirundo) neoxena	Welcome Swallow	Expert distribution Hirundo neoxena	6051281.36
COLUMBIDAE	Ocyphaps lophotes	Crested Pigeon	Expert distribution Ocyphaps lophotes	7413153.51
PACHYCEPHALIDAE	Oreoica gutturalis	Crested Bellbird	Expert distribution Oreoica gutturalis	4977501.18
PACHYCEPHALIDAE	Pachycephala (Alisterornis) rufiventris	Rufous Whistler	Expert distribution Pachycephala rufiventris	7241012.34
PARDALOTIDAE	Pardalotus (Pardalotinus) rubricatus	Red-browed Pardalote	Expert distribution Pardalotus rubricatus	5215172.69
PARDALOTIDAE	Pardalotus (Pardalotinus) striatus	Striated Pardalote	Expert distribution Pardalotus striatus	6172513.14
PODICIPEDIDAE	Poliocephalus poliocephalus	Hoary-headed Grebe	Expert distribution Poliocephalus poliocephalus	7076105.52
RALLIDAE	Porzana (Porzana) fluminea	Australian Spotted Crake	Expert distribution Porzana fluminea	1982268.46
RHIPIDURIDAE	Rhipidura (Rhipidura) fuliginosa	New Zealand Fantail	Expert distribution Rhipidura fuliginosa	5840029.33
Rostratulidae	Rostratula australis	Australian Painted Snipe	Expert distribution (maybe) Rostratula australis	4290580.99
CORCORACIDAE	Struthidea cinerea	Apostlebird	Expert distribution Struthidea cinerea	2511273.32
ALCEDINIDAE	Todiramphus (Cyanalcyon) pyrrhopygius	Red-backed Kingfisher	Expert distribution Todiramphus pyrrhopygius	7466637.09
TURNICIDAE	Turnix (Alphaturnia) velox	Little Button-quail	Expert distribution Turnix velox	7007734.60
HIRUNDINIDAE	Petrochelidon (Hylochelidon) nigricans nigricans	Australian Tree Martin	Expert distribution Hirundo nigricans	8367826.45
ANATIDAE	Cygnus (Chenopis) atratus	Black Swan	Expert distribution Cygnus atratus	7281302.88
ARDEIDAE	Egretta novaehollandiae	White-faced Heron	Expert distribution Egretta novaehollandiae	7554193.63
PSITTACIDAE	Neophema (Neonanodes) chrysostoma	Blue-winged Parrot	Expert distribution Neophema chrysostoma	1396422.54
PSITTACIDAE	Northiella haematogaster	Blue Bonnet	Expert distribution Northiella haematogaster	1741101.14
POMATOSTOMIDAE	Pomatostomus (Morganornis) ruficeps	Chestnut-crowned Babbler	Expert distribution Pomatostomus ruficeps	1078317.05
POMATOSTOMIDAE	Pomatostomus (Pomatostomus) halli	Hall's Babbler	Expert distribution Pomatostomus halli	489446.68

Checklist Areas

Number of checklist areas: **0**

Table 23: Checklist Areas

Family	*Scientific Name*	Common Name	Area Name	Area sq km

JournalMap Articles

Number of JournalMap articles: **0**

Table 24: JournalMap Articles

Author/s	Year	Title	Publication	DOI	URL

Further Links

Geoscience Australia: http://www.ga.gov.au/
Global Biodiversity Information Facility: https://www.gbif.org/
Threatened Species & Ecological Communities: https://www.environment.gov.au/topics/threatened-species-ecological-communities
WWF Ecoregions: https://worldwildlife.org/biomes
Environmental Resources Information Network (ERIN): https://www.environment.gov.au/topics/science-and-research/databases-and-maps/erin
Australian National Fish Expert Distributions: https://collections.ala.org.au/public/show/dr803
Lists of Australian endemic species: http://Intreasures.com/australia.html

Federal

Department of the Environment: https://www.environment.gov.au/

State/Territory

Australian Capital Territory

Environment and Sustainable Development Directorate: https://www.environment.act.gov.au/

New South Wales

Office of Environment and Heritage: http://www.environment.nsw.gov.au/

Northern Territory

Department of Land Resource Management: 'https://www.lrm.nt.gov.au/

Queensland

Department of Environment and Heritage Protection: https://www.ehp.qld.gov.au/

South Australia

Department of Environment, Water and Natural Resources: 'https://www.environment.sa.gov.au/Home

Tasmania

Department of Primary Industries, Parks, Water and Environment: http://www.dpiw.tas.gov.au/

Western Australia

Department of Parks and Wildlife: https://www.dpaw.wa.gov.au/

Victoria

Department of Environment and Primary Industries: http://www.depi.vic.gov.au/

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Appendix 9: Regional Ecosystem Descriptions

5.3.22 Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes

Regional ecosystem	5.3.22
Vegetation Management Act class	Least concern
Short description	Sparse herbland, open water or bare areas on flood plain lakes and interdune clay pans and lakes
Structure \category	Other
Structure code	Sparse Herbland
Description	Open water, bare areas or sparse herbland of variable floristic and structural composition. Locally Eleocharis pallens and/or Eragrostis setifolia may predominate. An ephemeral herbland will often dominate bare areas exposed by receding water. Very occasional low shrubs such as Chenopodium auricomum, Duma florulenta and Tecticornia spp. may be present. Bare areas, water or scattered ephemeral vegetation of variable floristic and structural composition. Locally Eleocharis pallens and/or Eragrostis setifolia may predominate. An ephemeral herbland will often dominate bare areas exposed by receding water. Very occasional low shrubs such as Chenopodium auricomum, Duma florulenta and Tecticornia spp. may be present. Occurs on or fringing lakes and clay pans on flood plains, within interdunes or on sandplains minor occurrences on clay plains. Soils very deep, grey cracking clays. Lacustrine. (BVG1M: 34a). Vegetation communities in this regional ecosystem include: 5.3.22a: Bare areas, water or scattered ephemeral vegetation of variable floristic and structural composition. Locally Eleocharis pallens and/or Eragrostis setifolia may predominate. An ephemeral herbland will often dominate bare areas exposed by receding water. Very occasional low shrubs such as Chenopodium auricomum, Duma florulenta and Tecticornia spp. may be present. Occurs on lakes and larger clay pans (area generally greater than 8 ha) in interdunes or on sandplains or less frequently on clay plains. Soils very deep, grey cracking clays. Lacustrine. (BVG1M: 34a). 5.3.22b: Bare areas, open water or scattered ephemeral vegetation of variable floristic and structural composition. An ephemeral herbland will often dominate bare areas exposed by receding water. Very occasional low shrubs such as Chenopodium auricomum, Duma florulenta and Tecticornia spp. may be present. Occurs on or fringing lakes on flood plains. Soils very deep, grey cracking clays. Lacustrine.

(BVG1M: 34a).
5.3.22c: [RE not in use][2]: This vegetation community is now mapped as 5.3.22a, 5.3.22b. Scattered ephemeral vegetation of variable floristic and structural composition. Bare areas, water, sedges or grasses may predominate. Occurs on lakes usually fed by drainage lines. Lacustrine. (BVG1M: 34a).
5.3.22d: Bare areas, water or scattered ephemeral vegetation of variable floristic and structural composition. Locally Eleocharis pallens and/or Eragrostis setifolia may predominate. An ephemeral herbland will often dominate bare areas exposed by receding water. Very occasional low shrubs such as Chenopodium auricomum, Duma florulenta and Tecticornia spp. may be present. Occurs on smaller clay pans (area generally less than 8 ha) in interdunes or on sandplains or less frequently on clay plains. Soils very deep, grey cracking clays. Palustrine. (BVG1M: 34b).

5.6.4 Atalaya hemiglauca +/- Acacia aneura +/- Acacia spp. +/- Corymbia terminalis low open woodland on reticulate sand dunes

Regional ecosystem	5.6.4
Vegetation Management Act class	Least concern
Short description	Atalaya hemiglauca +/- Acacia aneura +/- Acacia spp. +/- Corymbia terminalis low open woodland on reticulate sand dunes
Structure category	Sparse
Structure code	Tall Shrubland
Description	Various trees and tall shrubs occur forming a distinct but discontinuous canopy. Acacia aneura usually predominates, but in places Atalaya hemiglauca, Hakea leucoptera and Ventilago viminalis may be co-dominant. Usually there is no well defined, low shrub layer, but in places, dense stands of Dodonaea viscosa subsp. angustissima and Eremophila sturtii may occur. The ground layer is seasonally variable and composed of grasses and forbs. The composition and structural formation of this association varies considerably. Occurs on low dunes with sloping flanks (less than 3%). The dunes are frequently reticulate and usually overlie recent clay alluvia. Often concentrated in areas fringing large lakes or flood plains. Soils are reddish-brown, coarse sands, or deep red, earthy to siliceous sands. Ferruginous hardpans are often present. Not a Wetland. (BVG1M: 23a).

Vegetation communities in this regional ecosystem include:
5.6.4a: [RE not in use][2]: This vegetation community is now mapped as 5.6.4. Atalaya hemiglauca +/- Acacia aneura +/- Acacia spp. +/- Corymbia terminalis tall open shrubland on sand dunes. Occurs on low dunes with sloping flanks (less than 3%). The dunes are frequently reticulate and usually overlie recent clay alluvia. Often concentrated in areas fringing large lakes or floodplains. Soils are reddish-brown, coarse sands, or deep red, earthy to siliceous sands. Ferruginous hardpans are often present. Not a Wetland. (BVG1M: 23a).

5.6.5 Variable sparse to open-herbland or Triodia basedowii hummock grassland on dune flanks, crests and sandy interdunes

Regional ecosystem	5.6.5
Vegetation Management Act class	Least concern
Short description	Variable sparse to open-herbland or Triodia basedowii hummock grassland on dune flanks, crests and sandy interdunes
Structure category	Woody grassland
Structure code	Hummock Grassland
Description	Triodia basedowii hummock grassland predominates but where absent Aristida holathera +/- Eragrostis eriopoda may predominate forming a sparse to open tussock grassland, and/or forbs may predominate forming a sparse to open forbland. Isolated trees and tall shrubs are usually present. Usually low shrubs occur and may form a well defined layer in some situations. Fire frequency can affect density of woody species and Triodia basedowii. Occurs on low sloping flanks, non-mobile crests and sandy interdune areas of Quaternary sand dunes. Soils deep to very deep, red, yellow and white earthy sands, occasionally red siliceous sands. Not a Wetland. (BVG1M: 33a). Triodia basedowii hummock grassland predominates but where absent Aristida holathera +/- Eragrostis eriopoda may predominate forming a sparse to open tussock grassland, and/or forbs may predominate forming a sparse to open forbland. Isolated trees and tall shrubs are usually present. Usually low shrubs occur and may form a well defined layer in some situations. Fire frequency can affect density of woody species and Triodia basedowii. Occurs on low sloping flanks, non-mobile crests and sandy interdune areas of

Quaternary sand dunes. Soils deep to very deep, red, yellow and white earthy sands, occasionally red siliceous sands. Not a Wetland. (BVG1M: 33a).
5.6.5b: [RE not in use][2]: This vegetation community has moved to 5.6.2x1. Acacia ramulosa low open woodland. A lower shrub layer is well defined in places with Acacia ligulata common, but in other situations consists only of scattered shrubs. Ground cover is variable and composed of grasses and forbs +/- Triodia basedowii. Fire frequency can affect density of woody species and Triodia basedowii. Occurs on low dunes and sandplains of low relief associated with dunefields. Soils moderately deep red texture contrast soils with sandy loams overlying the sandy clays. Not a Wetland. (BVG1M: 33a).

5.6.8 Zygochloa paradoxa and/or Crotalaria eremaea +/- Triodia basedowii open tussock grassland and herbland on mobile crests and slopes of sand dunes

Regional ecosystem	5.6.8
Vegetation Management Act class	Least concern
Short description	Zygochloa paradoxa and/or Crotalaria eremaea +/- Triodia basedowii open tussock grassland and herbland on mobile crests and slopes of sand dunes
Structure category	Woody grassland
Structure code	Open Tussock Grassland
Description	Zygochloa paradoxa open tussock grassland and/or Crotalaria eremaea sparse herbland usually both with Triodia basedowii. Sparsely scattered low shrubs may be present. The ground between the tussocks/ hummocks and shrubs is usually bare, excepting when ephemeral herbs become seasonally abundant. Occurs on mobile crests and loose sandy slopes of Quaternary sand dunes. Soils very deep, white, yellow and red siliceous sands. Not a Wetland. (BVG1M: 33a). Vegetation communities in this regional ecosystem include: 5.6.8a: Zygochloa paradoxa predominates forming an open tussock grassland. Scattered hummocks of Triodia basedowii may be frequent. Sparsely scattered low shrubs and tall forbs are usually present with Crotalaria cunninghamii, Crotalaria eremaea. Acacia ligulata, Lechenaultia divaricata and Calotis erinacea being the most frequent. The ground between the hummocks and shrubs is variable

in cover and floristics depending on seasonal conditions with Aristida holathera var. holathera, Euphorbia wheeleri and Cullen pallidum common. Occurs on mobile crests and slopes of Quaternary sand dunes. Soils very deep, white, yellow and red siliceous sands. Not a Wetland. (BVG1M: 33a).
5.6.8b: Crotalaria eremaea sparse to open herbland commonly with Eragrostis eriopoda. Cover and floristic composition dependent on seasonal conditions large areas may be devoid of vegetation, includes Tribulus terrestris, Aristida holathera, Eriachne aristidea, Eragrostis basedowii, Glinus lotoides, Blennodia pterosperma, Nicotiana velutina. Occasional scattered trees or shrubs such as Atalaya hemiglauca Grevillea stenobotrya, Acacia ligulata, Acacia murrayana, Acacia tetragonophylla or Clerodendrum floribundum may occur. Occurs on mobile crests and slopes of Quaternary sand dunes. Soils very deep, white, yellow and red siliceous sands. Not a Wetland. (BVG1M: 33a).

5.9.3 Astrebla spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments

Regional ecosystem	5.9.3
Vegetation Management Act class	Least concern
Short description	Astrebla spp. +/- short grasses +/- forbs open tussock grassland to herbland on Cretaceous sediments
Structure category	Grassland
Structure code	Open Tussock Grassland
Description	Astrebla spp. +/- short grasses +/- forbs open tussock grassland to herbland. Astrebla pectinata typically predominates but locally Astrebla lappacea may dominate, a Sclerolaena spp. sparse-forbland may at times predominate, other tussock grasses may be present occupying the spaces between the tussocks of Astrebla spp. Dactyloctenium radulans, Brachyachne convergens and Iseilema spp. may predominate in some areas. Forbs such as Atriplex spp., Sclerolaena spp., Trianthema triquetra, *Portulaca oleracea and Salsola australis occur and in less favourable seasons tend to predominate forming a sparse ground cover (<10%). Isolated shrubs including Senna artemisioides subsp. oligophylla, Senna phyllodinea and Acacia victoriae may be conspicuous, but trees are absent. Occurs on flat to gently undulating plains with slopes usually less than 3%

(sometimes up to 5%). Soils stony, deep to moderately deep, red and brown cracking clays, or rarely desert loams. Occurs on mantled pediments and fresh Cretaceous sediments. Not a Wetland. (BVG1M: 30b).

Vegetation communities in this regional ecosystem include:
5.9.3a: Astrebla lappacea and/or Sclerolaena spp. open tussock grassland/herbland. Either Astrebla lappacea open tussock grassland or an open to sparse-forbland of Sclerolaena bicornis and/or Sclerolaena calcarata and/or Sclerolaena lanicuspis and/or Sclerolaena spp. may be dominant depending on seasonal conditions. Dactyloctenium radulans, Brachyachne convergens and Iseilema spp. may predominate in some areas. Other forbs such as Atriplex spp., Trianthema triquetra, *Portulaca oleracea and Salsola australis are common. Occurs on flat to gently undulating plains with shallow to moderately deep alkaline self mulching cracking clay soils, fresh Cretaceous sediments. Not a Wetland. (BVG1M: 30b).
5.9.3b: Variable herbland on fresh Cretaceous sediments. Dominant species varies considerably depending on seasonal conditions and may include variable combinations of; Astrebla spp., Aristida latifolia, Dactyloctenium radulans, Iseilema vaginiflorum, Atriplex spp., Sclerolaena spp. A large number of forb species may occur, many of them ephemeral and seasonally abundant. In less favourable seasons ground cover can be very sparse with Dactyloctenium radulans and Iseilema vaginiflorum dominating, especially in areas with significant grazing. Occurs on flat to gently undulating plains (< 1%) of fresh Cretaceous sediments. Shallow to moderately deep brown cracking clay soils with self-mulching surface. Not a Wetland. (BVG1M: 30b).
5.9.3c: [RE not in use][2]: This vegetation community is now mapped as 5.3.9x1. Acacia cyperophylla var. cyperophylla low woodland with Acacia cambagei sometimes co-dominant. Scattered Atalaya hemiglauca may be present while in some areas Senna artemisioides subsp. Oligophylla and Eremophila freelingii for a prominent low shrub layer. The ground layer is generally sparse and comprising a variety of grass and forb species such as Eriachne mucronata, Salsola australis or Zygophyllum ammophilum. Occurs on drainage lines within stony plains. Soils are generally deep gravelly massive to weakly structured sandy loams to sandy clay loams. Not a Wetland. (BVG1M: 24a).
5.9.3x1: [RE not in use][2]: This vegetation community is now mapped as 5.9.3b. Astrebla squarrosa usually predominates with Astrebla pectinata being codominant, and together form a tussock grassland. Iseilema vaginiflorum and Aristida latifolia are frequent and abundant in heavily grazed areas. Shrubs are very sparse and infrequent. A number of forbs occur and may become abundant after winter rain. Occurs on flat clay plains of Winton plateau. Associated soils are moderately deep grey cracking clays, strongly self-mulching surface. Not a Wetland. (BVG1M: 30b).
5.9.3x2: Astrebla pectinata and/or Astrebla lappacea and/or Aristida latifolia open herbland. In some areas Dactyloctenium radulans, Brachyachne convergens and Iseilema spp. may be seasonally

common. Forbs such as Atriplex spp. and Sclerolaena spp. occur, and in less favourable seasons tend to predominate. Isolated shrubs of Acacia tetragonophylla or Senna spp. may occur. Occurs on level to gently undulating plains formed by superficial Cainozoic clay deposits overlying a range of geologies. Soils shallow to deep, crusted red and minor brown medium to heavy clays. Small to moderate amounts of ironstone, chalcedony, laterite, and silcrete gravel occur in the profile and on the surface. Not a Wetland. (BVG1M: 30b).
5.9.3x3: Seasonally variable sparse to open tussock grassland/herbland, dominant grasses include Astrebla pectinata, Aristida spp., Enneapogon avenaceus and Sporobolus actinocladus. Annual grasses such as Dactyloctenium radulans, Iseilema vaginiflorum and Brachyachne ciliaris may be seasonally abundant. Forbs such as Atriplex spp., Sclerolaena spp., Osteocarpum acropterum, Maireana spp., *Portulaca oleracea, Salsola australis and Neobassia proceriflora are common and in less favourable seasons tend to predominate forming a sparse ground cover (<10%). Isolated shrubs may be conspicuous, but trees are absent. Occurs on flat to gently undulating plains with abundant ironstone surface gravel cover. Soils moderately deep to deep, may be weakly gilgaied or strongly gilgaied with depressions parallel to the contour, crusted, red cracking clays. Ground cover always sparse, varies with amount of stone cover and seasonal conditions. Not a Wetland. (BVG1M: 30b).

5.9.4 Aristida contorta sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover

Regional ecosystem	5.9.4
Vegetation Management Act class	Least concern
Short description	Aristida contorta sparse tussock grassland on fresh Cretaceous sediments with dense gravel cover
Structure category	Grassland
Structure code	Sparse Tussock Grassland
Description	Aristida contorta usually predominates forming an open to sparse tussock grassland. Other short grasses including Oxychloris scariosa, Enneapogon avenaceus, Sporobolus actinocladus and Tripogon loliiformis are common. Annual grasses such as Brachyachne prostrata and Eriachne pulchella occur frequently, while the perennial Aristida

latifolia and Eragrostis xerophila may be locally common. Forbs such as Gnephosis arachnoidea, Rhodanthe floribunda, Maireana dichoptera and Sclerolaena lanicuspis may predominate after winter rain. Sparsely scattered shrubs may occur in places. Short grasses build up after wet summers, while forbs common after winter rainfall. Occurs on flat to gently undulating plains with abundant surface gravel cover of ironstone, chalcedony, laterite, silcrete or silicified sandstone. Soils shallow to deep, desert loams, with gravelly, sandy clay loams overlying structured medium clays. Ground cover always sparse, varies with amount of stone cover and seasonal conditions. Not a Wetland. (BVG1M: 31b).

Vegetation communities in this regional ecosystem include:
5.9.4x1: Aristida contorta sparse to open tussock grassland +/- Oxychloris scariosa +/- Enneapogon avenaceus +/- Sporobolus actinocladus. Ephemeral forbs may predominate after winter rain. Sparsely scattered shrubs such as Senna spp. And Acacia tetragonophylla may occur in places. Local shallow deposits of windblown sand support ephemeral forbs such as Calotis plumulifera, Gnephosis eriocarpa, Rhodanthe moschata and Polycalymma stuartii, and less commonly isolated patches of Senna spp. Shrubland. Sparsely scattered trees, such as Corymbia terminalis, Hakea eyreana, and Grevillea striata may occur in places. Floristic composition varies with seasonal conditions, density of stone pavement and gilgai micro relief. Occurs on level to gently undulating plains formed by Cainozoic colluvial and residual deposits overlying deeply weathered Cretaceous sediments. Associated soils shallow to deep gravely to sandy desert loams. Not a Wetland. (BVG1M: 31b).
5.9.4x2: Astrebla pectinata sparse to open herbland commonly with Sporobolus actinocladus, Brachyachne ciliaris, Atriplex spp., Sclerolaena spp., Salsola australis and Osteocarpum spp. Mosaic of sparse to open tussock grassland in gilgai depressions dominated by Astrebla pectinata, and sparse herbland on benches and dense gravels dominated by Sporobolus actinocladus, Brachyachne ciliaris, Enneapogon avenaceus, Sclerolaena spp., Atriplex spp., Salsola australis, Osteocarpum spp., *Portulaca oleracea. Occurs on level to gently undulating plains formed by Cainozoic colluvial and residual deposits overlying deeply weathered Cretaceous sediments. Deep stony often gilgaied soils with depressions sometime parallel to contour, soils range from desert loams to moderately deep crusted red-brown cracking clays. Moderate to large amounts of ironstone gravel on surface. Not a Wetland. (BVG1M: 30b).

Appendix 10: Flora List

Family	Species Name	Vernacular Name	PL1125	RE 5.3.22	RE 5.6.4	RE 5.6.5 / RE 5.6.8	RE 5.9.3	RE 5.9.4
			131	59	76	29	36	13
Aizoaceae	*Tetragonia moorei*	New Zealand Spinach	1					
Aizoaceae	*Tetragonia tetragonoides*	New Zealand Spinach	1	1	1			
Aizoaceae	*Trianthema pilosum*	Trianthema	1	1	1			
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	1	1	1		1	
Amaranthaceae	*Amaranthus sp.*	Amaranth	1	1				
Amaranthaceae	*Ptilotus latifolius*	Tangled Mulla Mulla	1		1			
Amaranthaceae	*Ptilotus obovatus*	Silver Tails	1		1			
Amaranthaceae	*Ptilotus polystachyus*	Long Tails	1		1			
Apiaceae	*Daucus glochidiatus*	Native Carrot	1			1		
Asphodelaceae	*Bulbine alata*	Desert Leek-lily	1	1			1	
Asteraceae	*Brachyscome ciliaris*	Variable Daisy	1		1		1	
Asteraceae	*Calocephalus platycephalus*	Yellow Billybuttons	1		1		1	
Asteraceae	*Calotis hispidula*	Bogan Flea	1	1			1	
Asteraceae	*Gnaphalium diamantinense*	Diamantina Cudweed	1	1				
Asteraceae	*Gnephosis arachnoidea*	Spidery Button-flower	1	1				1
Asteraceae	*Leiocarpa websteri*	Narrow Plover-daisy	1					
Asteraceae	*Millotia greevesii*	Woolly Sand Daisy	1	1				
Asteraceae	*Pluchea dunlopii*	Pink Plains-bush	1		1			
Asteraceae	*Polycalymma stuartii*	Poached Egg Daisy	1		1	1		
Asteraceae	*Pterocaulon sphacelatum*	Fruit Salad Plant	1	1	1			

Family	Species Name	Vernacular Name	PL1125	RE 5.3.22	RE 5.6.4	RE 5.6.5 / RE 5.6.8	RE 5.9.3	RE 5.9.4
Asteraceae	*Pycnosorus eremaeus*	Golden Billy-buttons	1	1				1
Asteraceae	*Rhodanthe floribunda*	Large White Sunray	1	1	1	1	1	1
Asteraceae	*Rhodanthe moschata*	Musk Daisy	1		1			
Asteraceae	*Senecio gregorii*	Fleshy Groundsel	1	1				
Asteraceae	*Streptoglossa adscendens*	Desert Daisy	1	1				
Boraginaceae	*Halgania cyanea*	Blue Halgania	1		1			
Boraginaceae	*Trichodesma zeylanicum*	Camel Bush	1		1	1		
Brassicaceae	*Harmsiodoxa blennodioides*	Hairypod Cress	1	1				
Brassicaceae	*Lepidium phlebopetalum*	Veined Peppercress	1		1	1	1	
Campanulaceae	*Wahlenbergia tumidifructa*	Swollen-fruit Bluebell	1		1			
Celastraceae	*Macgregoria racemigera*	Snowflake	1		1			
Chenopodiaceae	*Atriplex holocarpa*	Pop Saltbush	1	1			1	
Chenopodiaceae	*Atriplex spongiosa*	Small Pop Saltbush	1	1	1		1	
Chenopodiaceae	*Atriplex stipitata*	Kidney Saltbush	1	1			1	
Chenopodiaceae	*Chenopodium cristatum*	Crested Goosefoot	1	1	1			
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	1		1			
Chenopodiaceae	*Enchylaena tomentosa*	Ruby Saltbush	1		1			
Chenopodiaceae	*Maireana astrotricha*	Low Bluebush	1		1		1	
Chenopodiaceae	*Maireana coronata*	Crown Fissure-plant	1	1				
Chenopodiaceae	*Maireana georgei*	Satiny Bluebush	1		1			
Chenopodiaceae	*Maireana spongiocarpa*	Spongy-fruit Bluebush	1	1				
Chenopodiaceae	*Rhagodia spinescens*	Hedge Saltbush	1		1			
Chenopodiaceae	*Salsola australis*	Coast Saltwort	1	1	1	1	1	
Chenopodiaceae	*Sclerolaena bicornis*	Bassia Burr	1	1	1		1	

Family	Species Name	Vernacular Name	PL1125	RE 5.3.22	RE 5.6.4	RE 5.6.5 / RE 5.6.8	RE 5.9.3	RE 5.9.4
Chenopodiaceae	*Sclerolaena decurrens*	Green Copper Burr	1		1		1	
Chenopodiaceae	*Sclerolaena diacantha*	Grey Copperburr	1	1	1		1	1
Chenopodiaceae	*Sclerolaena divaricata*	Tangled Bindyi	1	1			1	1
Chenopodiaceae	*Sclerolaena intricata*	Tangled Poverty Bush	1	1				1
Chenopodiaceae	*Sclerolaena lanicuspis*	Woolly Copper Burr	1	1			1	1
Chenopodiaceae	*Sclerolaena patenticuspis*	Spear-fruit Bindyi	1	1				
Chenopodiaceae	*Sclerolaena uniflora*	Small-spine Bindyi	1	1	1	1		
Convolvulaceae	*Convolvulus erubescens*	Blushing Bindweed	1	1	1		1	
Cucurbitaceae	*Citrullus amarus*	Paddy Melon	1		1	1		
Euphorbiaceae	*Euphorbia drummondii*	Mat Spurge	1			1		
Euphorbiaceae	*Euphorbia tannensis*	Bottle Tree Caustic	1	1	1			1
Fabaceae	*Acacia aneura*	Broad-leaf Mulga	1		1			
Fabaceae	*Acacia ligulata*	Small Cooba	1		1	1		
Fabaceae	*Acacia murrayana*	Murray's Wattle	1			1		
Fabaceae	*Acacia tetragonophylla*	Dead Finish	1		1			
Fabaceae	*Acacia victoriae*	Acacia Bush	1		1			
Fabaceae	*Crotalaria novae-hollandiae*	New Holland Rattlepod	1		1			
Fabaceae	*Cullen australasicum*	Native Scurf-pea	1	1				
Fabaceae	*Cullen graveolens*	Native Lucerne	1	1				
Fabaceae	*Cullen pallidum*	Woolly Scurf-pea	1			1		
Fabaceae	*Lotus cruentus*	Pink-flower Tefoil	1	1			1	
Fabaceae	*Senna artemisioides*	Desert Cassia	1		1			
Fabaceae	*Senna phyllodinea*	Silver Cassia	1		1			
Fabaceae	*Senna pleurocarpa*	Chocolate Bush	1			1		
Fabaceae	*Swainsona campylantha*	Gilgai Darling Pea	1	1	1			

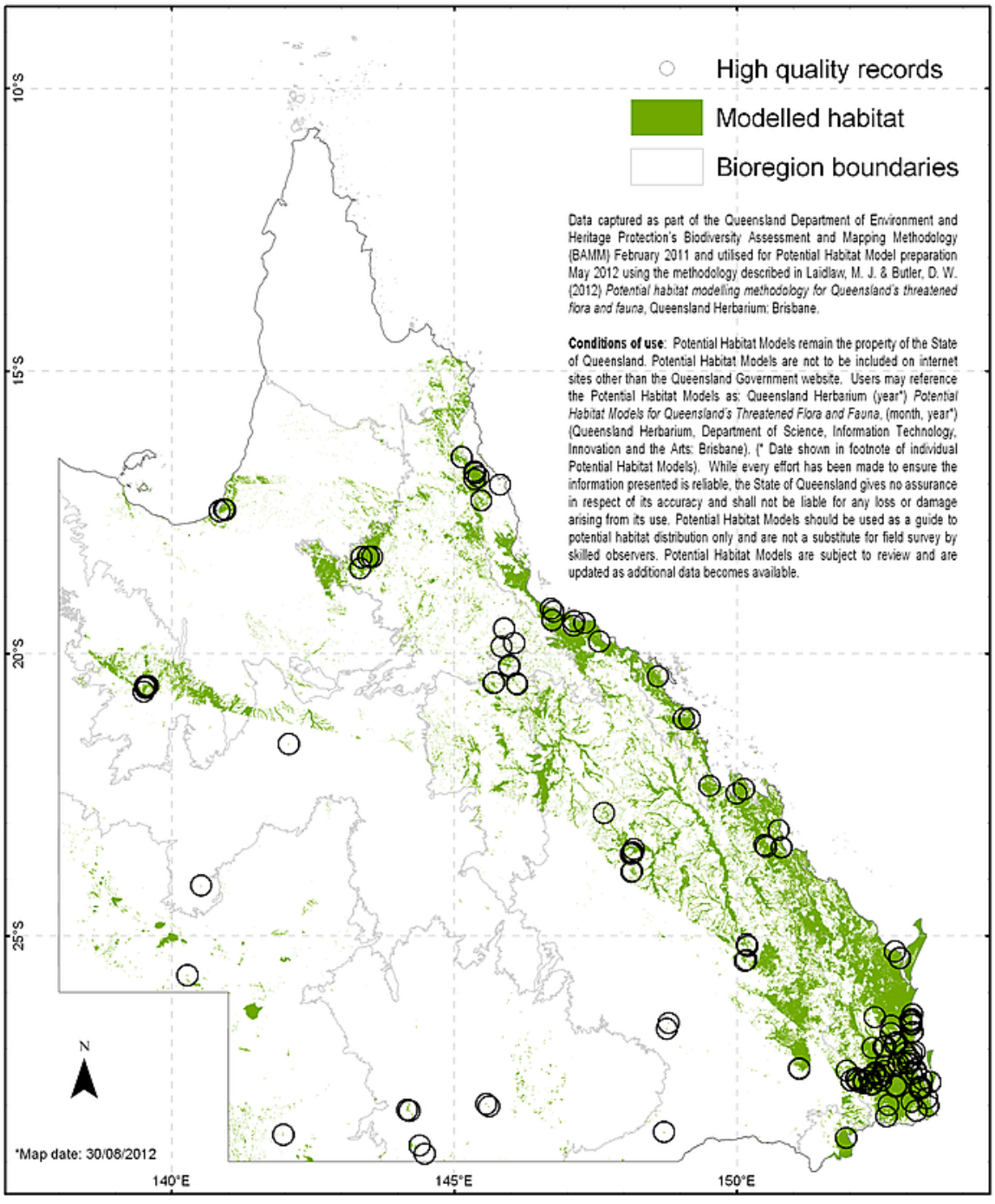
Family	Species Name	Vernacular Name	PL1125	RE 5.3.22	RE 5.6.4	RE 5.6.5 / RE 5.6.8	RE 5.9.3	RE 5.9.4
Fabaceae	*Swainsona phacoides*	Woodland Swainsona	1	1				
Frankeniaceae	*Frankenia serpyllifolia*	Thyme Sea-heath	1	1				
Geraniaceae	*Erodium cygnorum*	Erodium	1	1				
Goodeniaceae	*Goodenia cycloptera*	Serrated Goodenia	1	1				
Goodeniaceae	*Goodenia fascicularis*	Silky Goodenia	1		1		1	
Goodeniaceae	*Lechenaultia divaricata*	Tangled Lechenaultia	1			1		
Goodeniaceae	*Scaevola depauperata*	Skeleton Fanflower	1			1		
Goodeniaceae	*Scaevola spinescens*	Spiny Fanflower	1		1			
Lamiaceae	*Teucrium racemosum*	Grey Germander	1	1				
Loranthaceae	*Amyema maidenii*	Pale-leaf Mistletoe	1		1			
Malvaceae	*Abutilon leucopetalum*	Desert Lantern-bush	1		1			
Malvaceae	*Abutilon otocarpum*	Desert Lantern	1		1	1		
Malvaceae	*Hibiscus brachysiphonius*	Low Hibiscus	1	1				
Malvaceae	*Hibiscus krichauffianus*	Velvet-leaf Hibiscus	1		1	1		
Malvaceae	*Sida ammophila*	Sand Sida	1			1		
Malvaceae	*Sida fibulifera*	Pin Sida	1	1	1		1	
Marsileaceae	*Marsilea drummondii*	Clover Fern	1	1	1			
Meliaceae	*Owenia acidula*	Sour Apple	1		1			
Myrtaceae	*Corymbia terminalis*	Northern Bloodwood	1		1			
Myrtaceae	*Eucalyptus coolabah*	Coolabah	1	1				
Nyctaginaceae	*Boerhavia dominii*	Tar Vine	1		1			
Plantaginaceae	*Plantago drummondii*	Dark Plantain	1	1	1		1	
Plantaginaceae	*Stemodia florulenta*	Blue-rod	1	1	1			
Poaceae	*Aristida anthoxanthoides*	Yellow Three-awn	1	1		1		
Poaceae	*Aristida contorta*	Bunched Kerosene Grass	1	1	1			1

Family	Species Name	Vernacular Name	PL1125	RE 5.3.22	RE 5.6.4	RE 5.6.5 / RE 5.6.8	RE 5.9.3	RE 5.9.4
Poaceae	*Aristida holathera*	Erect Kerosene Grass	1	1	1			1
Poaceae	*Astrebla pectinata*	Barley Mitchell Grass	1		1		1	
Poaceae	*Dactyloctenium radulans*	Button Grass	1			1		
Poaceae	*Digitaria brownii*	Cotton Panic-grass	1				1	
Poaceae	*Enneapogon avenaceus*	Bottlewashers	1	1	1		1	
Poaceae	*Enneapogon polyphyllus*	Leafy Bottle-washers	1		1		1	
Poaceae	*Eragrostis dielsii*	Lovegrass	1		1	1		
Poaceae	*Eragrostis parviflora*	Lovegrass	1				1	
Poaceae	*Eragrostis setifolia*	Lovegrass	1	1	1		1	
Poaceae	*Eriachne aristidea*	Three-awn Wanderrie	1		1	1		
Poaceae	*Eriachne helmsii*	Woollybutt Wanderrie	1	1			1	
Poaceae	*Iseilema membranaceum*	Small Flinders-grass	1	1				
Poaceae	*Iseilema vaginiflorum*	Red Flinders-grass	1				1	1
Poaceae	*Panicum decompositum*	Stargrass	1	1			1	1
Poaceae	*Paractaenum refractum*	Bristle-brush Grass	1			1		
Poaceae	*Sporobolus actinocladus*	Ray Grass	1	1	1		1	1
Poaceae	*Triodia basedowii*	Hard Spinifex	1		1	1		
Poaceae	*Zygochloa paradoxa*	Sandhill Cane-grass	1			1		
Polygonaceae	*Duma florulenta*	Tangled Lignum	1	1				
Portulacaceae	*Calandrinia balonensis*	Broad-leaf Parakeelya	1		1	1		
Portulacaceae	*Portulaca intraterranea*	Buttercup Purslane	1	1				
Portulacaceae	*Portulaca oleracea*	Munyeroo	1	1		1		
Proteaceae	*Grevillea juncifolia*	Honeysuckle Spider Flower	1		1			
Proteaceae	*Grevillea stenobotrya*	Rattle-pod Grevillea	1		1	1		
Proteaceae	*Grevillea striata*	Beefwood	1		1			

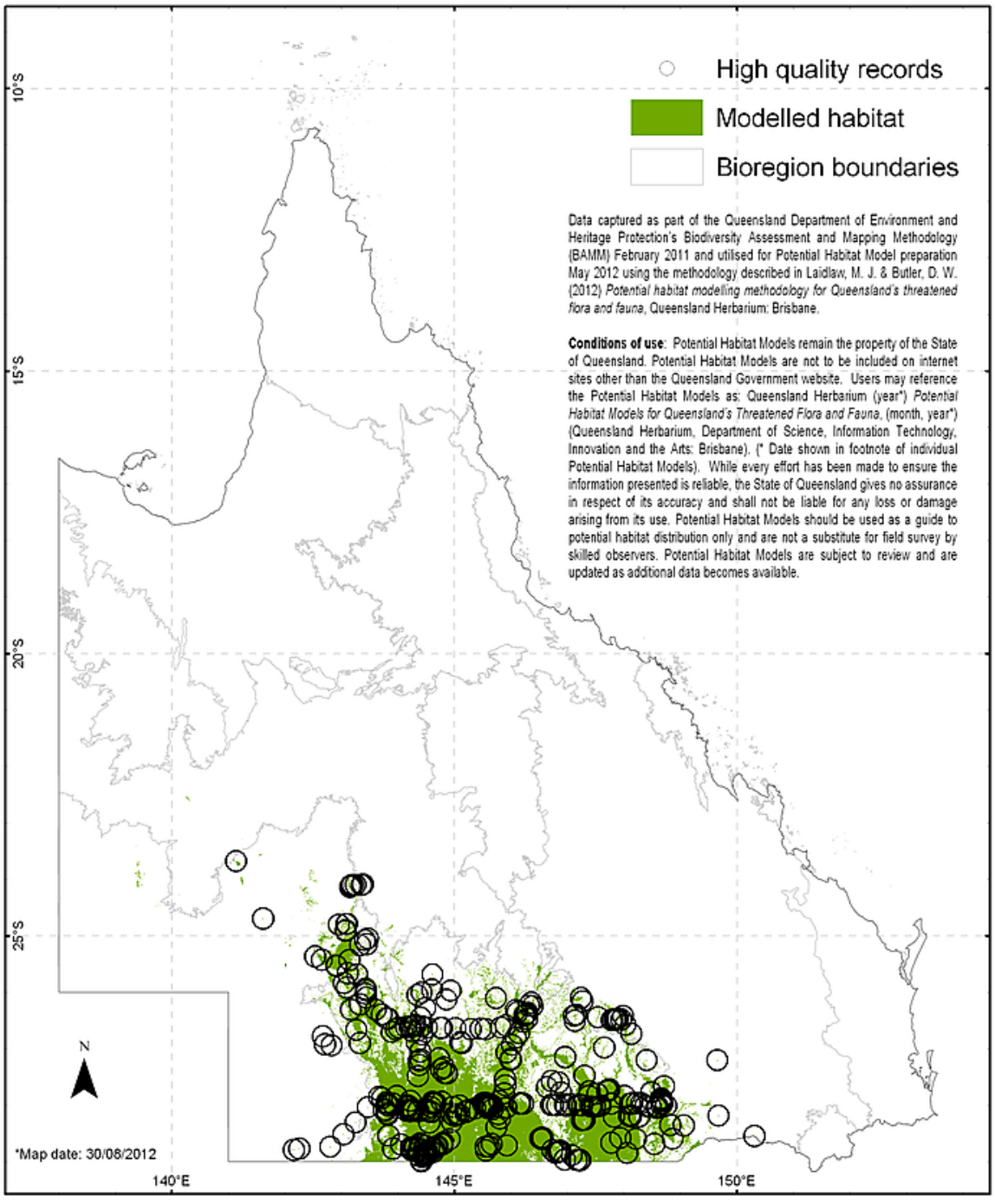
Family	Species Name	Vernacular Name	PL1125	RE 5.3.22	RE 5.6.4	RE 5.6.5 / RE 5.6.8	RE 5.9.3	RE 5.9.4
Proteaceae	*Hakea eyreana*	Fork-leaf Corkwood	1		1			
Proteaceae	*Hakea leucoptera*	Needle Hakea	1		1			
Sapindaceae	*Atalaya hemiglauca*	Whitewood	1		1			
Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush	1		1			
Scrophulariaceae	*Eremophila longifolia*	Dogwood	1		1			
Scrophulariaceae	*Eremophila macgillivrayi*	Dog-bush	1		1			
Scrophulariaceae	*Eremophila obovata*	Eremophila	1		1			
Solanaceae	*Solanum ellipticum*	Potato Bush	1				1	
Thymelaeaceae	*Pimelea simplex*	Pimelea	1				1	
Zygophyllaceae	*Roepera ammophila*	Sand Twinleaf	1		1	1		
Zygophyllaceae	*Roepera howittii*	Clasping Twinleaf	1				1	
Zygophyllaceae	*Roepera similis*	White Twinleaf	1	1			1	

Appendix 11: Listed Species Habitat Models

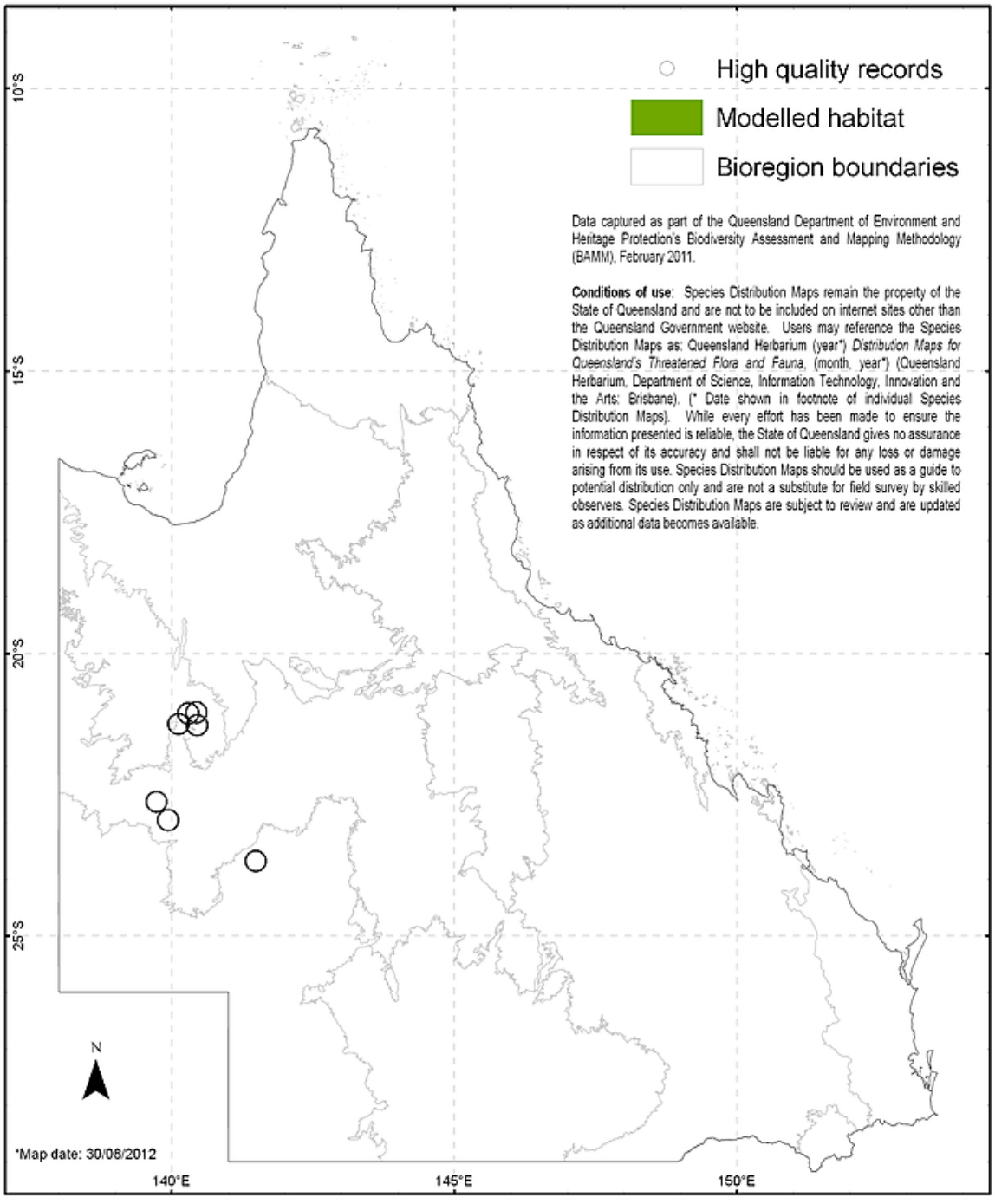
Potential habitat model for *Rostratula australis* Australian painted snipe



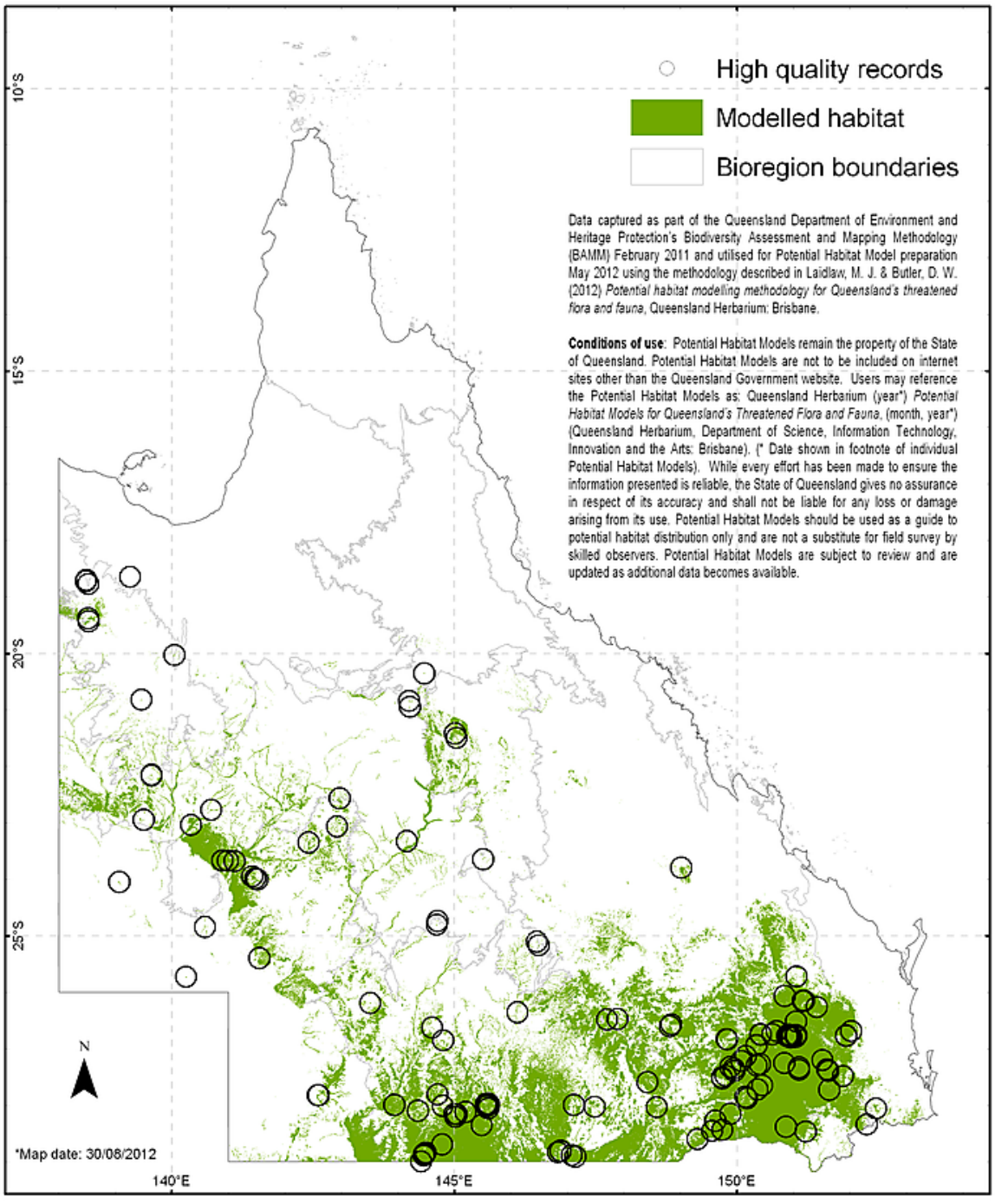
Potential habitat model for *Lophochroa leadbeateri* Major Mitchell's cockatoo



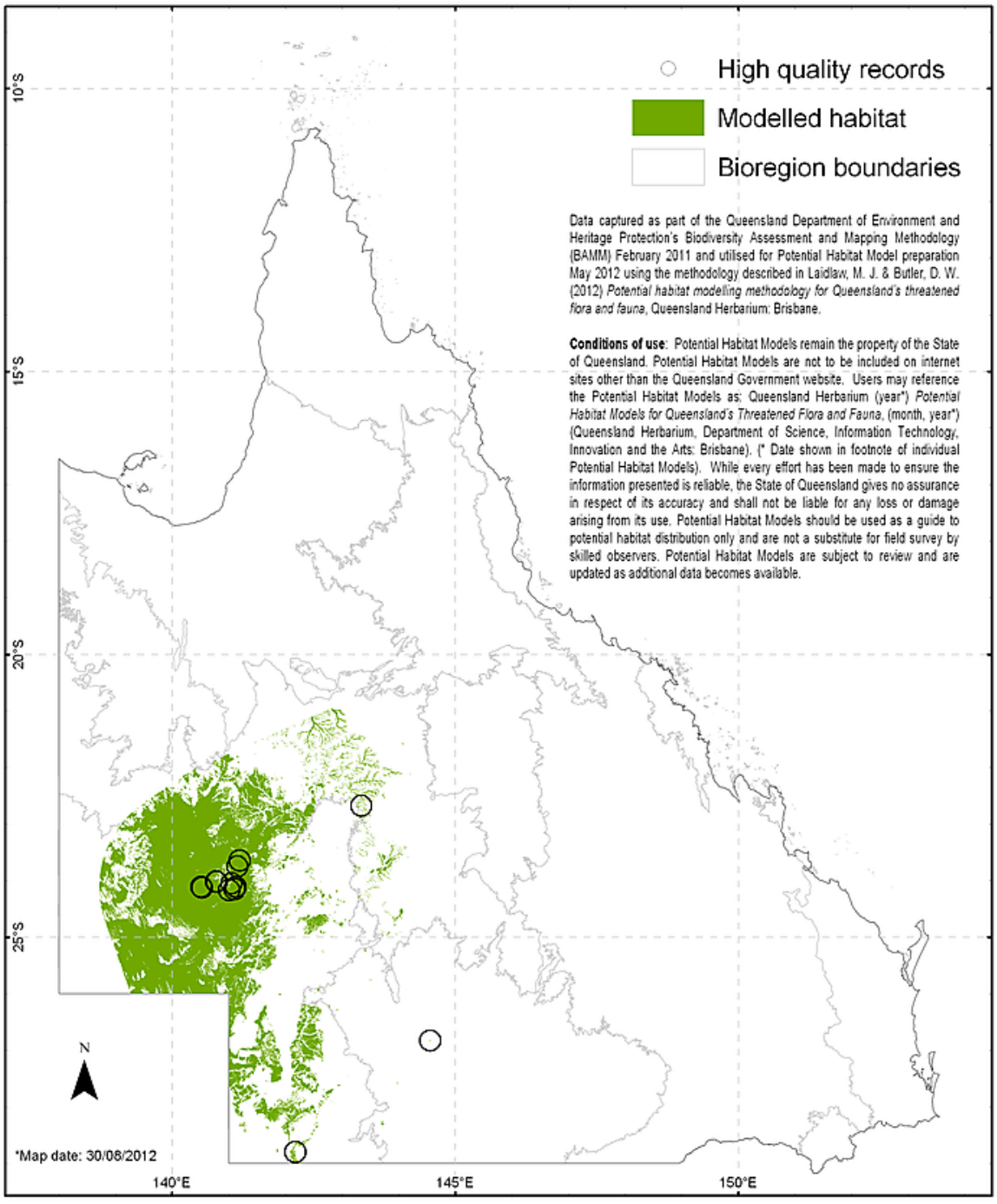
Distribution map for *Pezoporus occidentalis* night parrot



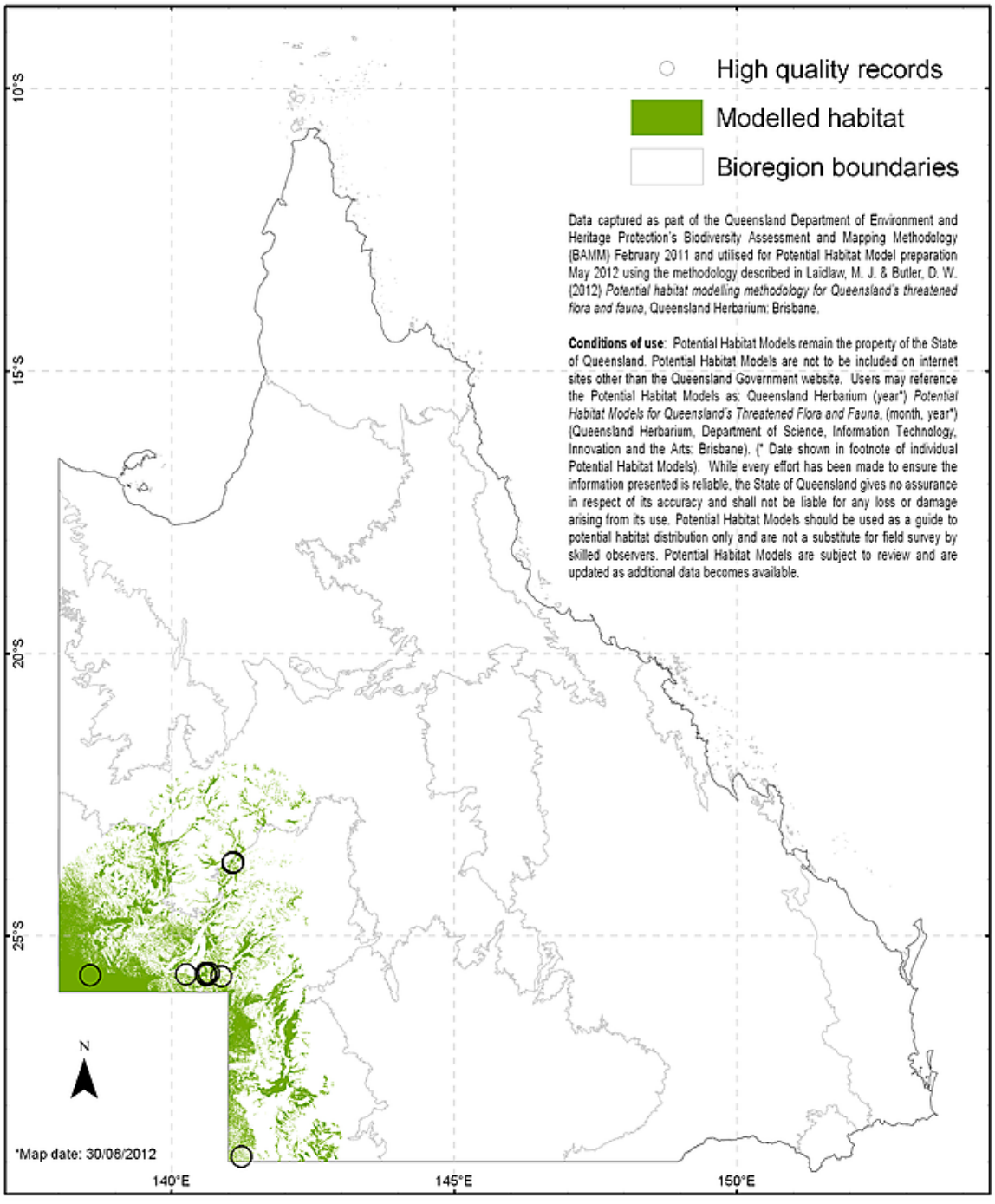
Potential habitat model for *Grantiella picta* painted honeyeater



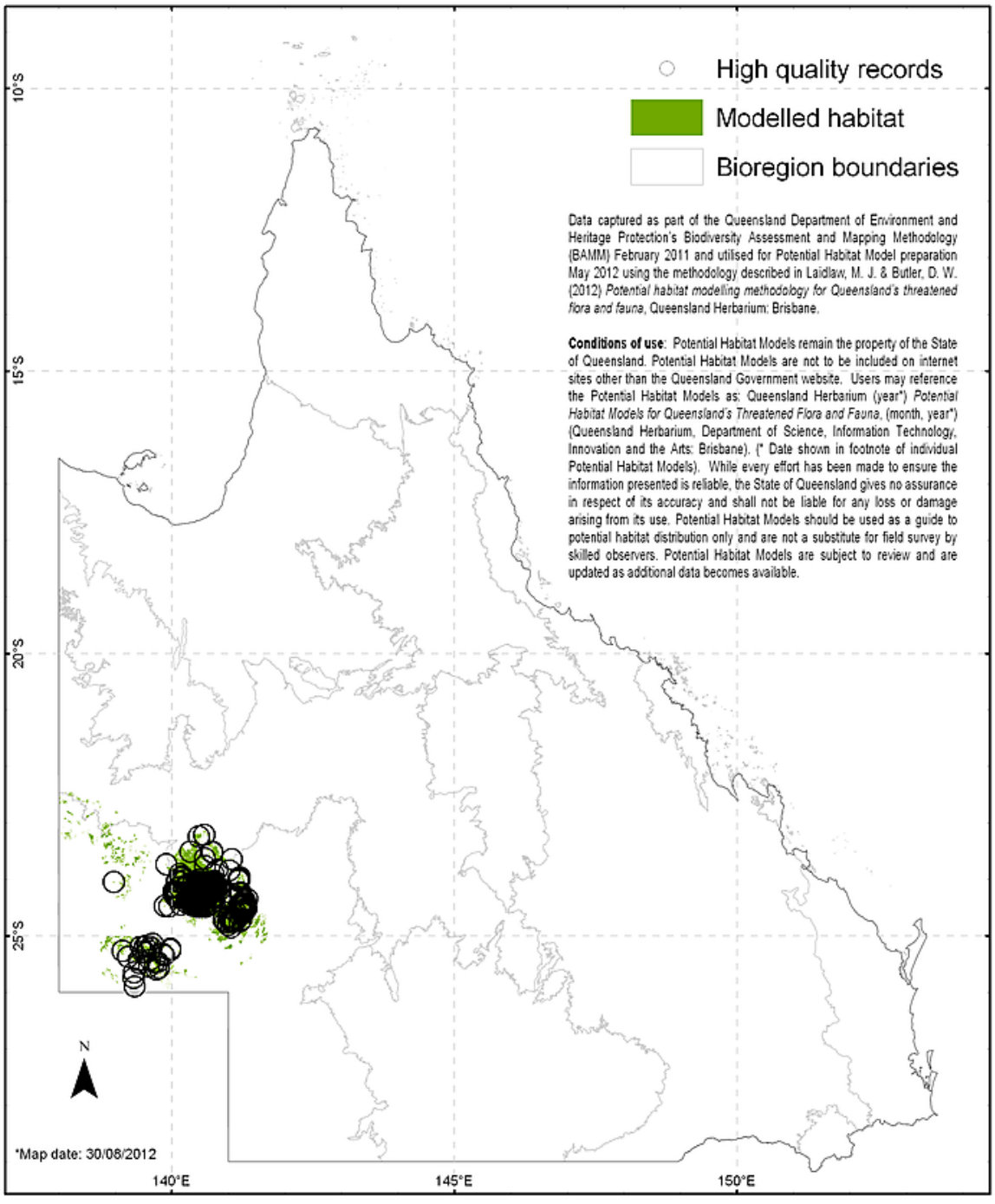
Potential habitat model for *Pedionomus torquatus* plains-wanderer



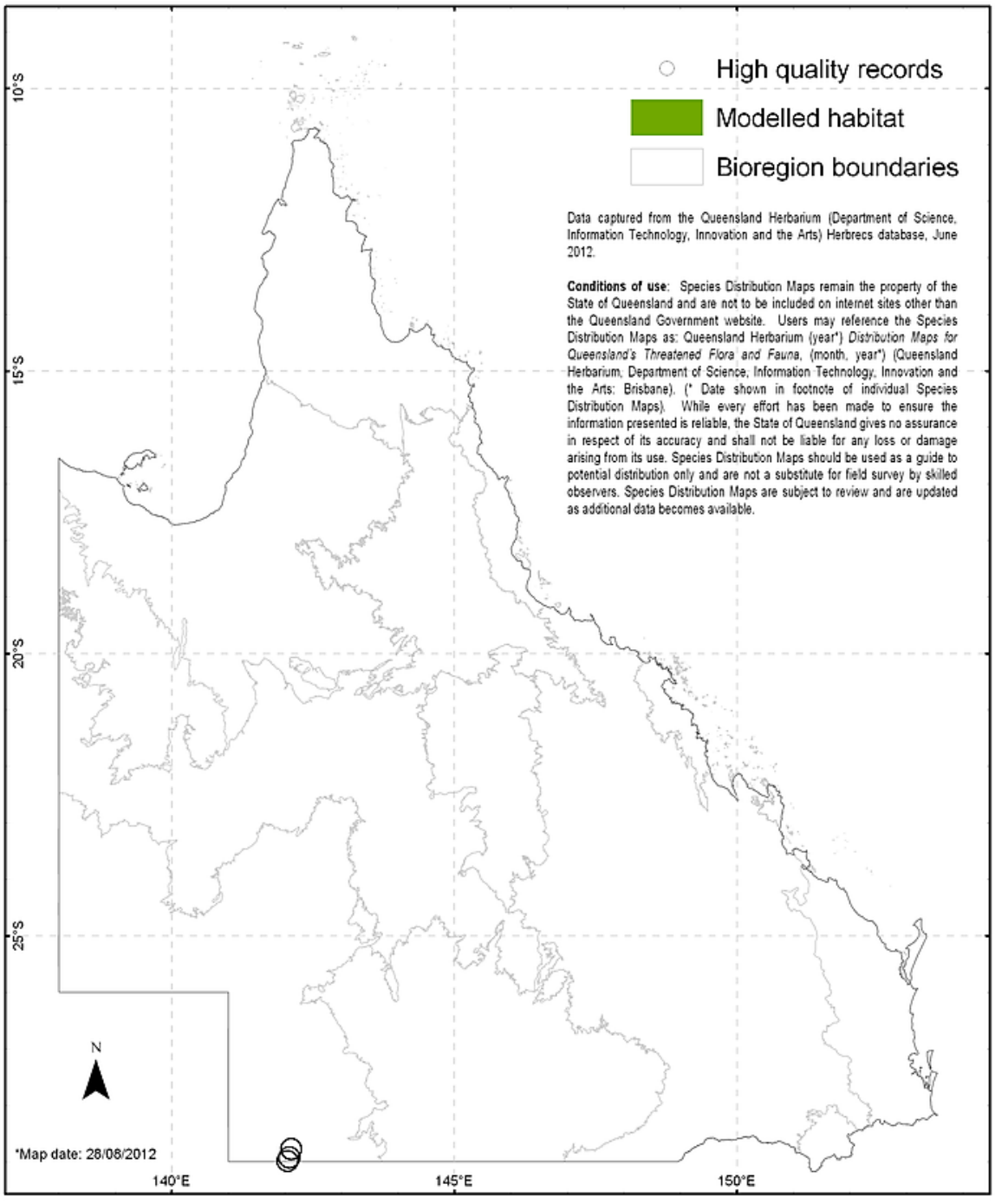
Potential habitat model for *Notomys fuscus* dusky hopping-mouse



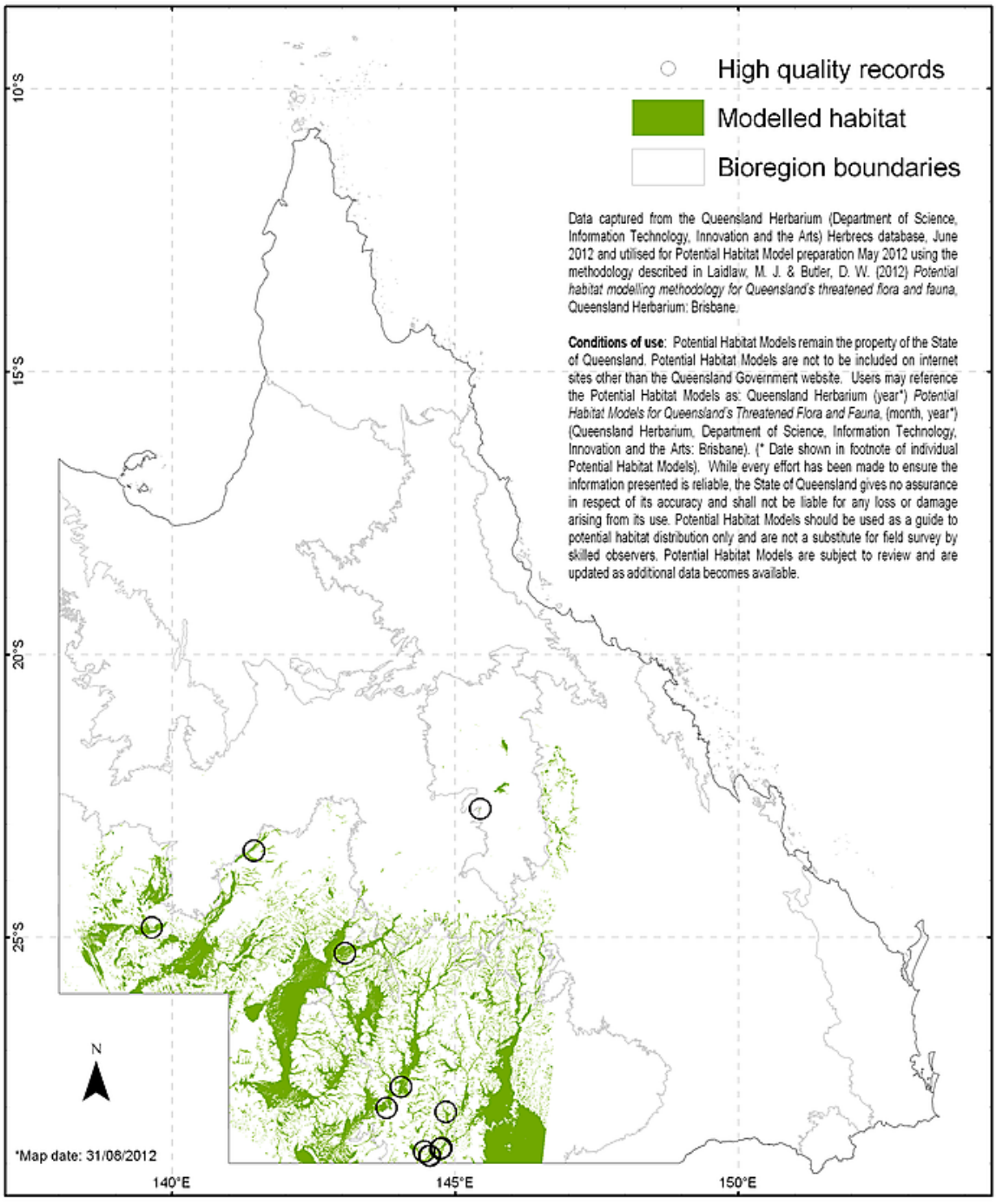
Potential habitat model for *Macrotis lagotis* greater bilby



Distribution map for *Grevillea kennedyana*



Potential habitat model for *Sclerolaena walkeri*



Appendix 12: Significant Residual Impact Assessment Figures

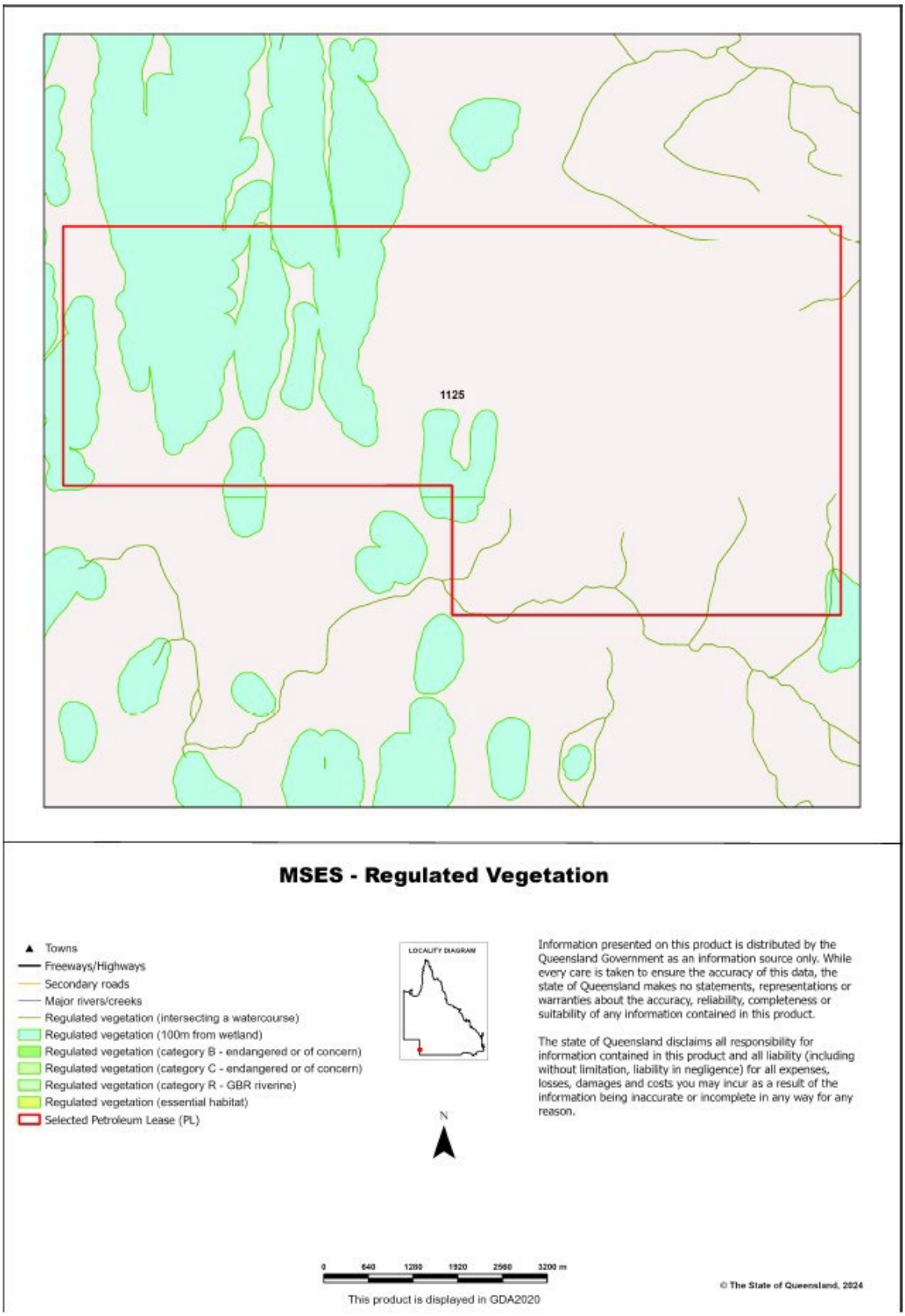


Figure 1. MSES – Regulated Vegetation within PL 1125

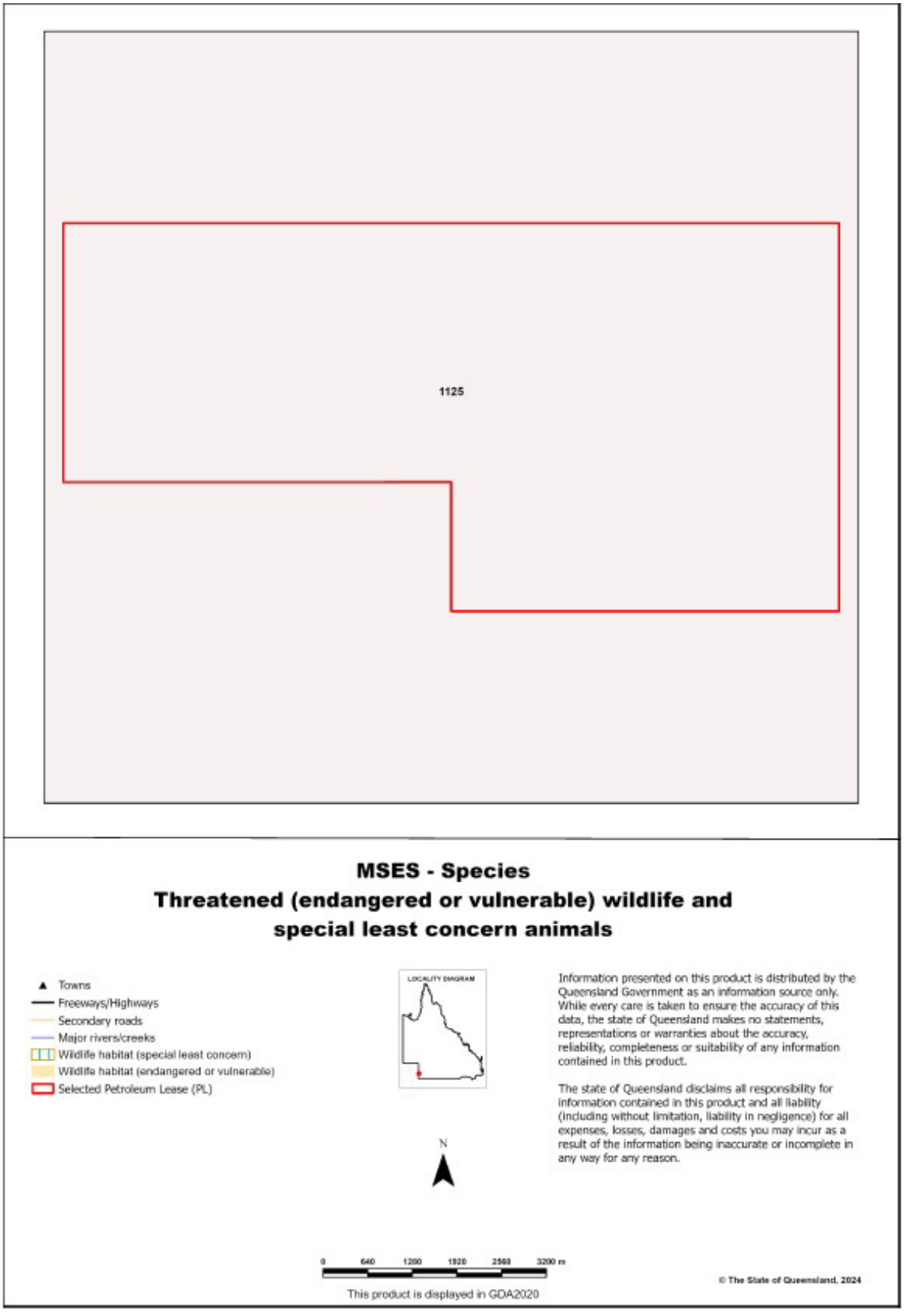


Figure 2. MSES Threatened (endangered and vulnerable) wildlife and special least concern animals within PL 1125

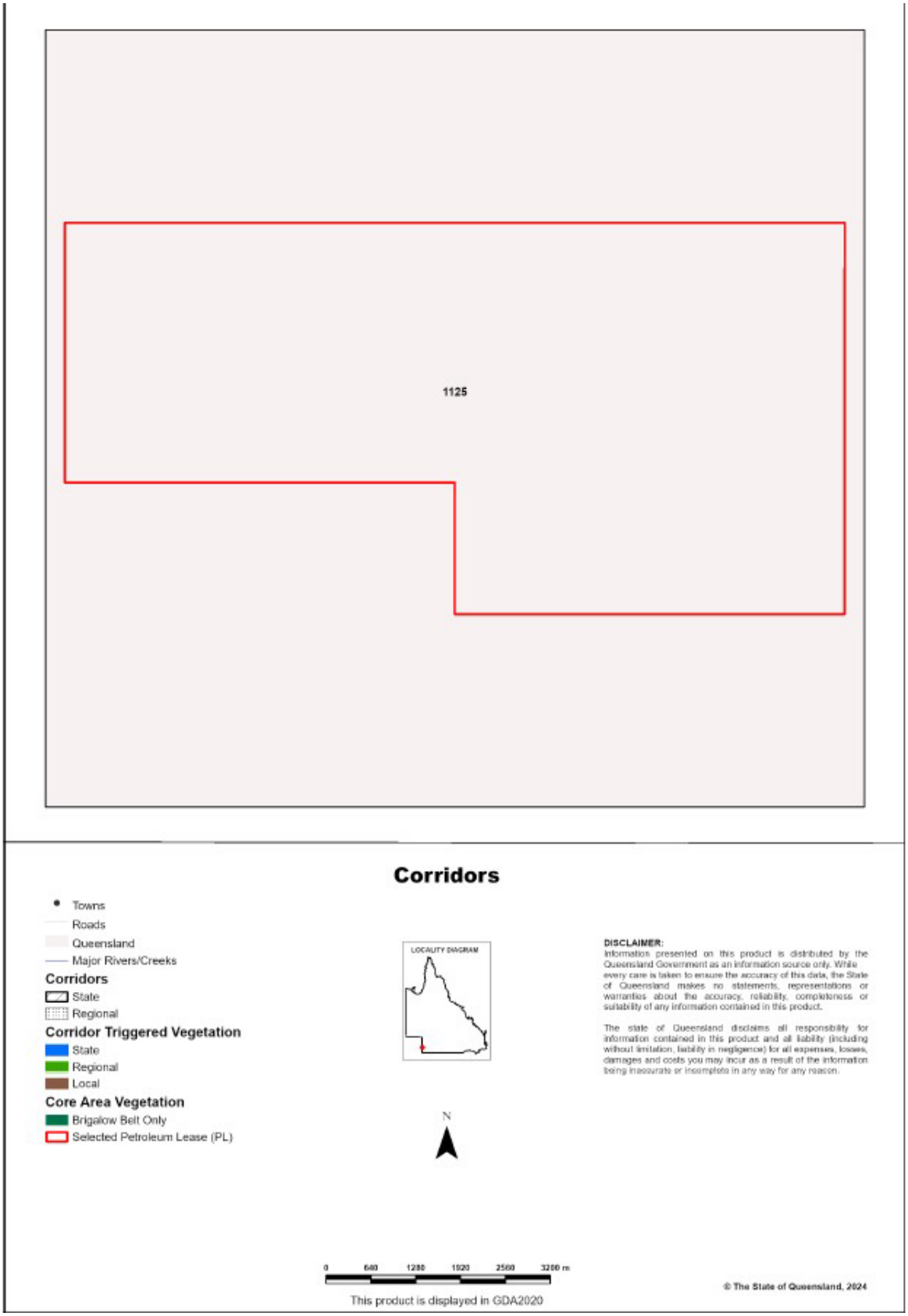


Figure 3. MSES Corridors within PL 1125

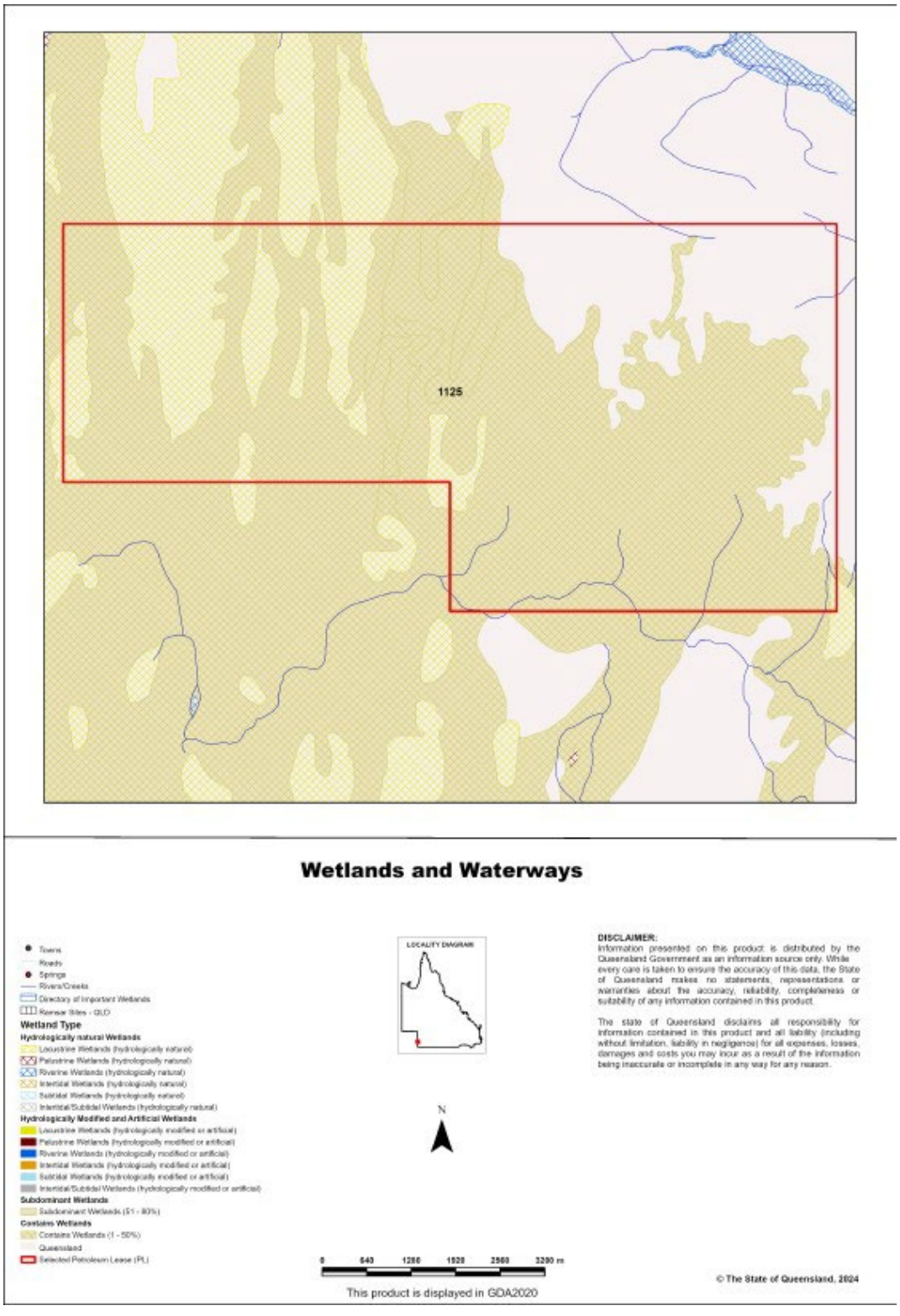


Figure 4. Wetlands and Waterways

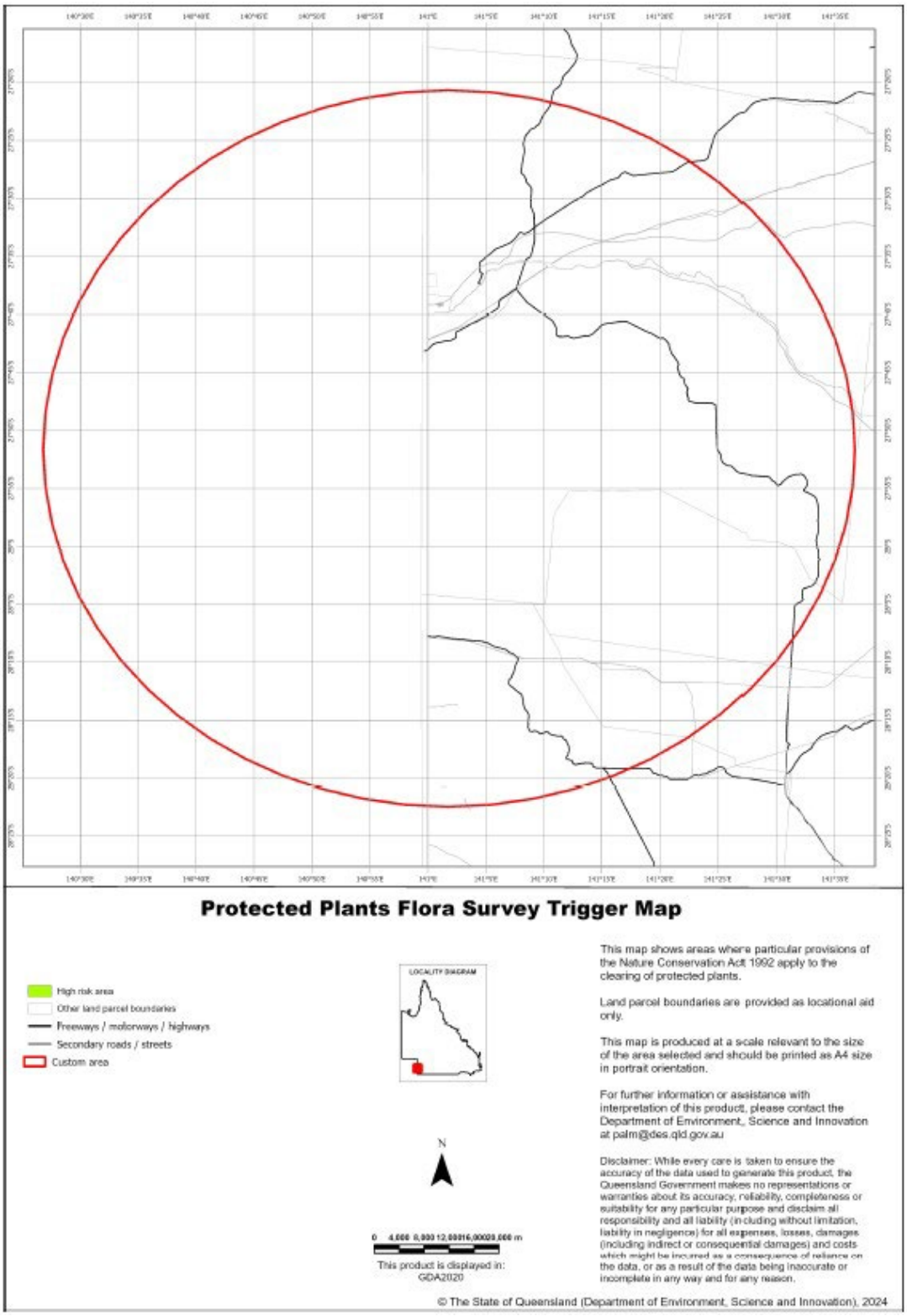


Figure 5. MSES Protected Plants Flora Survey Trigger Map for PL 1125 with 50 km buffer

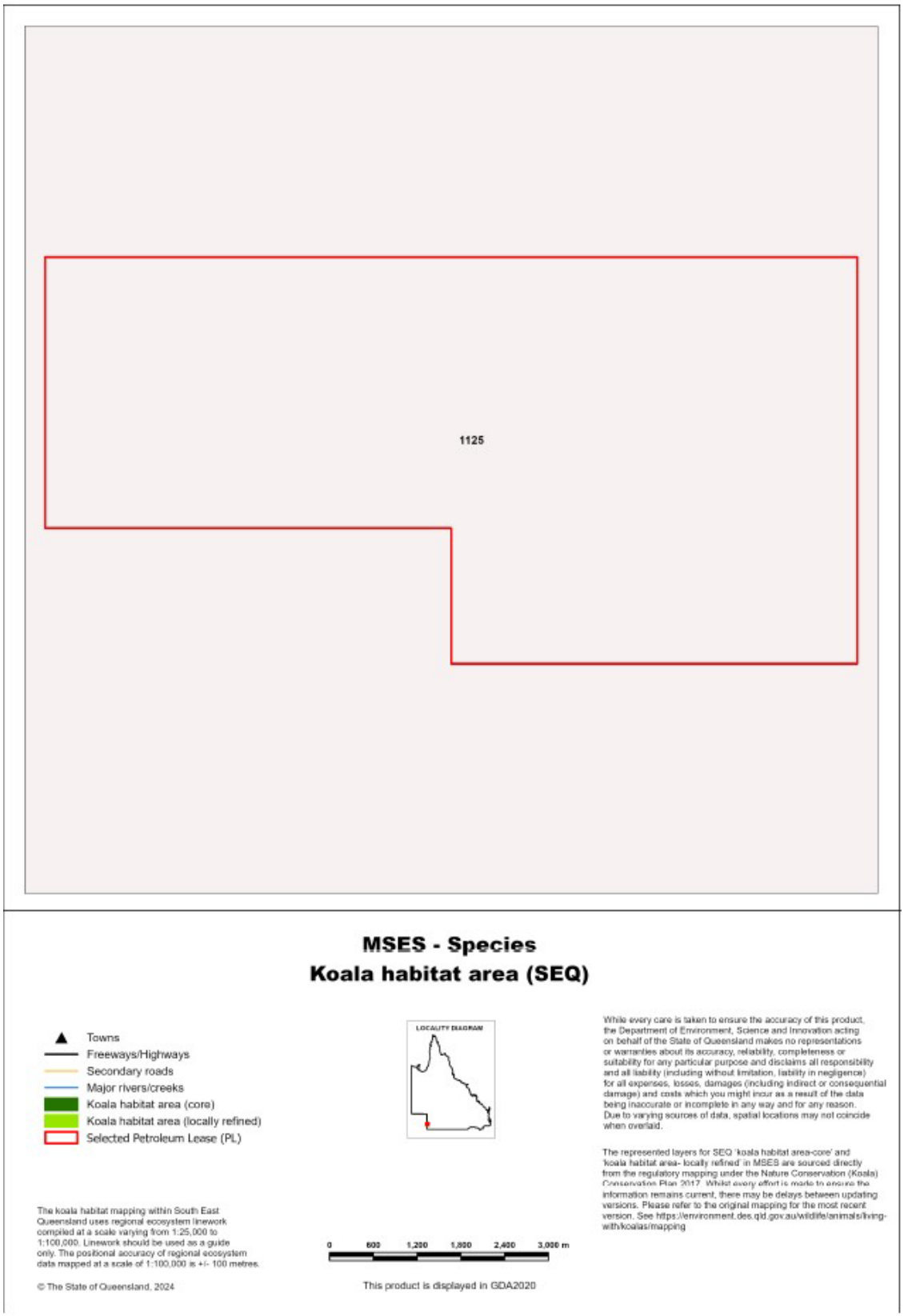


Figure 6. MSES – Koal habitat area within PL 1125

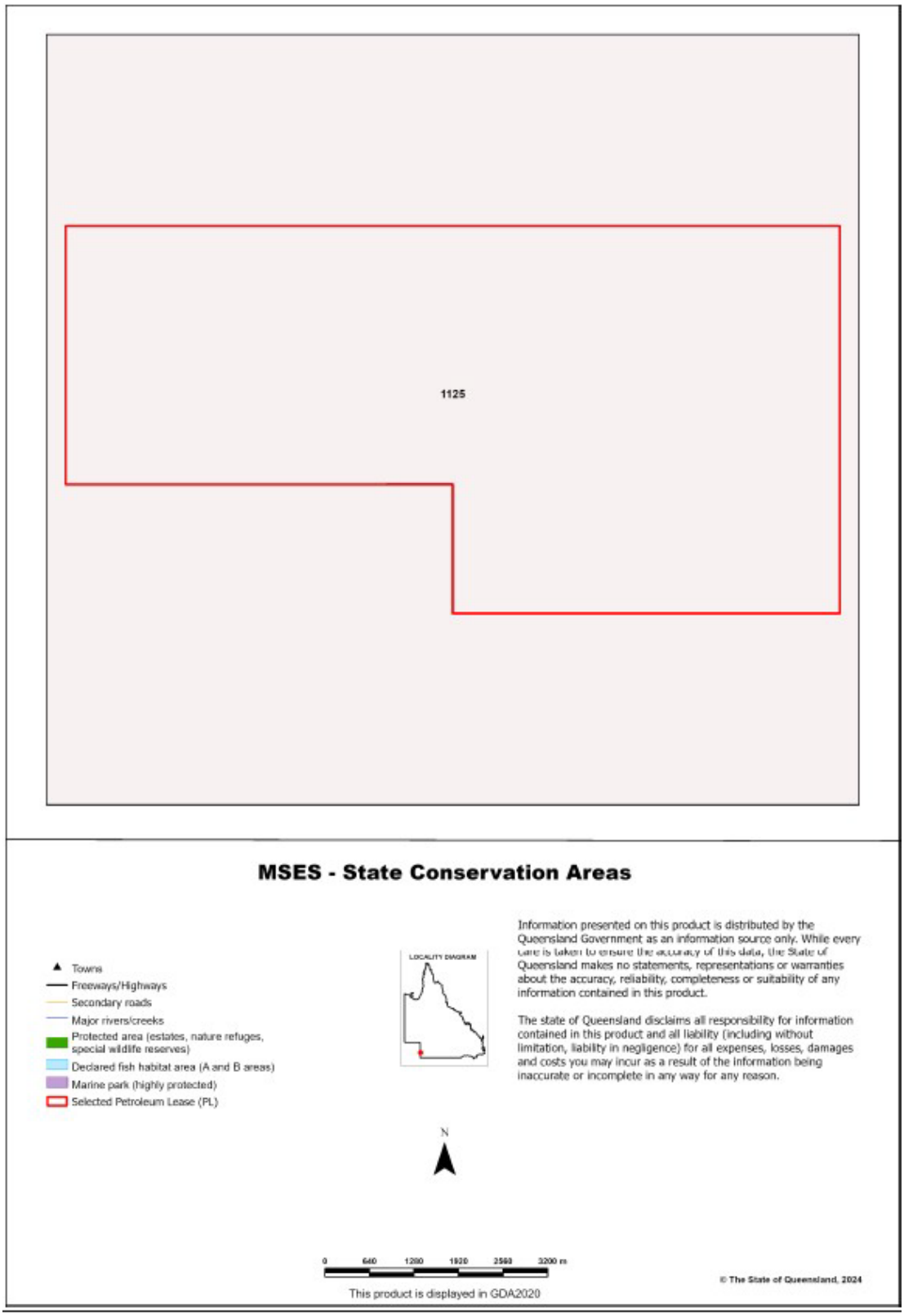


Figure 7. MSES - State Conservation Areas within PL 1125

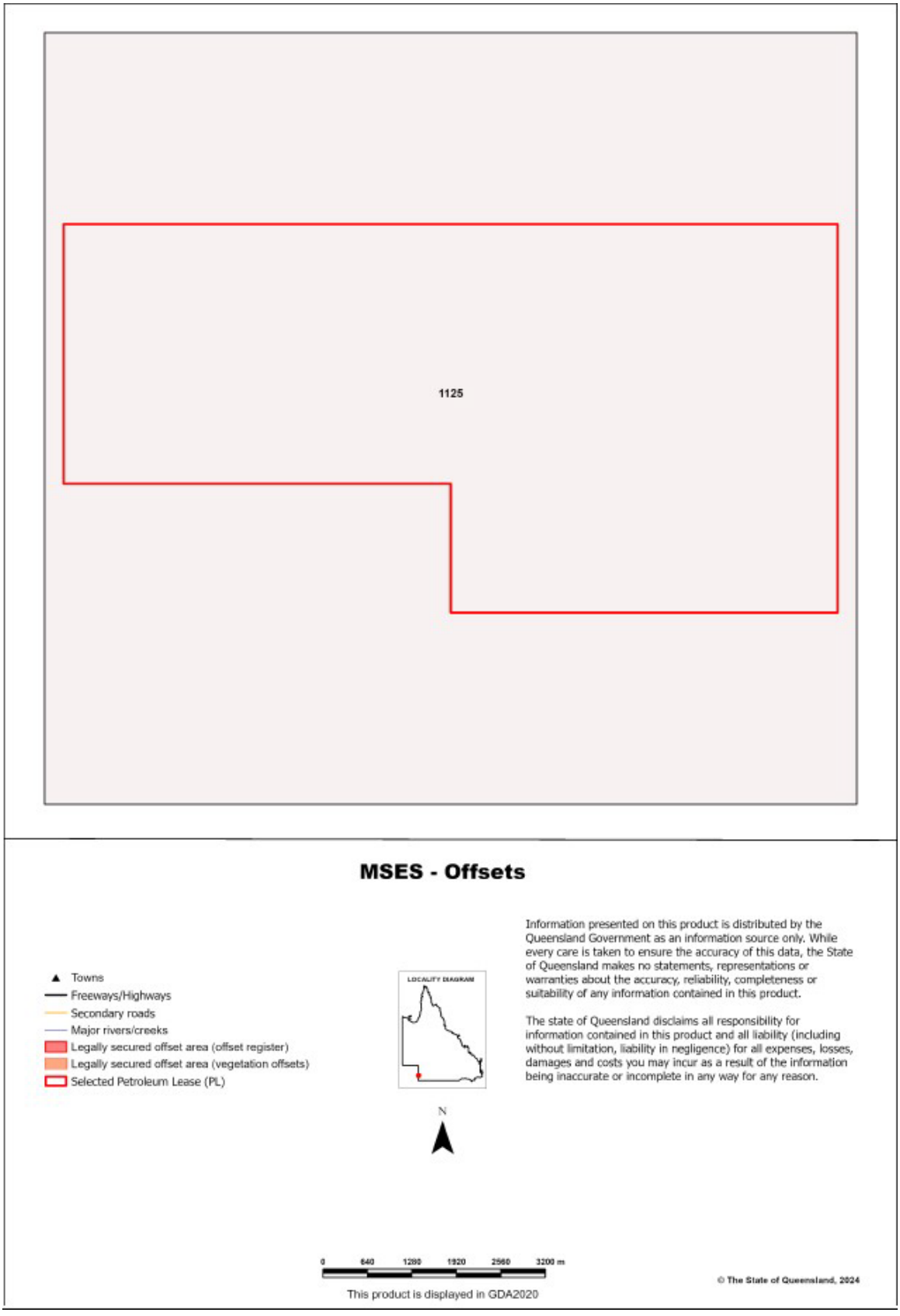


Figure 8. MSES Offsets within PL 1125

Attachment B:
Risk Assessment Approach

Risk Assessment Approach

Impact Identification

Vintage Energy and ERIAS have determined potential environmental and social impacts of the Project based on knowledge of the existing environment, current Project planning, and experience in undertaking similar projects. The impact assessment was a three-step process:

1 Review of all Project activities that could impact on the environment.

2 Assessment of the potential risks or hazards that those activities might pose to the physical, biological or social/cultural environment.

3 Assessment of the potential impacts of those hazards.

Risk Treatments

For each identified potential impact of the Project, specific management measures have been developed to avoid, minimise or mitigate that impact to the maximum extent possible. Risk treatments, hereafter described as mitigation and management measures, are designed to reduce the likelihood and/or consequence of the residual risk.

Likelihood and Consequence

Potential impacts from Project activities were assessed in terms of both their likelihood and the potential consequence if that impact were to occur before and after the implementation of specific management measures.

Tables 1 and 2 contain the descriptors used to classify the likelihood and consequence of impacts. In the context of this risk assessment, likelihood refers not to the probability of a particular impact occurring as a result of Project activities, but rather to the probability of a particular consequence ensuing due to that impact. There are five levels of likelihood, from rare to almost certain. The consequences of potential project impacts are assessed in terms of the following four aspects – environment, health and safety, reputation and financial. For the purposes of this document, impacts to the environment are the key concern. The severity, extent and duration of potential impacts, along with the sensitivity of receptor/s, contribute to five consequence ratings, from minor to critical.

Table 1 – Impact Likelihood Definitions

Likelihood Rating	Description
A. Almost certain	Expected to occur regularly in most circumstances or is of a continuous nature
B. Likely	Will likely occur in most circumstances
C. Possible	Might occur at some point
D. Unlikely	May occur, but is not expected
E. Rare	It is conceivable that this could happen, but it is more likely that it wont

Table 2 – Impact Consequence Definitions

Consequence Rating	Aspect			
	Environment	Health and Safety	Reputational	Financial (AUD)
1. Minor	Possible incidental impact to flora/fauna, no ecological consequence, no contact with aquifer	Near miss / no injury	Isolated complaint	Greater than $100k
2. Moderate	Reduction in biomass in affected environmental setting, contact with aquifer, but no danger to receptors. No changes to biodiversity or exposed ecological system	First aid treatment	Multiple community complaints. Short-term local media coverage. Minimal brand damage	Greater than $0.5 million
3. Significant	Reduction in biomass and/or temporary aquifer contamination. Limited impact to local biodiversity	Medical treatment	Community action possible project delays. Adverse regional media coverage. Short lived but significant brand damage	Greater than $2 million
4. Major	Detrimental impact, eventual partial recovery of ecosystem and/or aquifer possible	Serious injury / lost time injury	Community action severely delays project. Adverse international/ national media coverage. Sustained brand damage	Greater than $5 million
5. Critical	Significant irreversible environmental harm to ecosystem	Major extensive injury (permanent disability) or fatality	Global and long lasting reputational disaster	Greater than market cap

Risk Assessment

This risk assessment approach was adopted from the Australian and New Zealand Standards (AS/NZS) Risk management principles and guidelines (AS/NZS ISO 3100:2018) along with the AS/NZS handbook for Managing environment-related risk (HB 203:2012).

The level of risk for each potential environmental or social/cultural impact was determined by combining likelihood and severity of consequence using the matrix in Table 3:

- Very low (green) and low risks (yellow) are considered minor and acceptable and will be managed by Vintage Energy's standard operating procedures.
- Medium risks (orange) are considered tolerable but require management attention to mitigate the level of risk to as low as reasonably practicable.
- High risks (red) require immediate action and must be mitigated or managed to reduce the risk to tolerable (medium or low) levels.

A pre-mitigation risk rating is determined prior to the implementation of the proposed mitigation measures; with a residual risk rating calculated assuming the effective implementation of these measures.

Table 3 – Risk Assessment Matrix

	Consequence Rating				
Likelihood Rating	**5. Critical**	**4. Major**	**3. Significant**	**2. Moderate**	**1. Minor**
A. Almost Certain	High	High	High	Medium	Medium
B. Likely	High	High	Medium	Medium	Low
C. Possible	High	Medium	Medium	Low	Low
D. Unlikely	Medium	Medium	Low	Low	Very Low
E. Rare	Medium	Low	Low	Very Low	Very Low

Attachment C:
ERCE Emissions Forecast Report

Disclaimer

ERCE has made every effort to ensure that the interpretations, conclusions and recommendations presented in this report are accurate and reliable in accordance with good industry practice. ERCE does not, however, guarantee the correctness of any such interpretations and shall not be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation or recommendation made by any of its officers, agents or employees.

ERCE has used guidance provided by relevant institutions in the preparation of this report, including guidance provided by the GHG Protocol, Australia National and Energy Reporting and API Compendium. ERCE reserves the right to review all calculations referred to or included in this report and to revise the estimates in light of erroneous data supplied or information existing but not made available which becomes known subsequent to the preparation of this report. No site visits were undertaken in the preparation of this report.

ERCE has prepared an emissions forecast based on the current operational strategy, development plans, fuel forecast and historical emissions. Actual emissions are subject to change.

Vali emissions forecast - 14 January 2025

The forecast includes Kyoto Protocol Greenhouse gases typical to the upstream oil and gas industry CO2, CH4 and N2O. The 100-year global warming potentials (GWPs) quoted in IPCC AR5 have been used.

ERCE has prepared an emissions forecast based on the current operational strategy, development plans, fuel forecast and historical emissions. Actual emissions are subject to change.

Asset	Emission Source/ Category	Units	Assumptions	FY										
				2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Vali	Flaring	tCO2e	Zero flaring	0	0	0	0	0	0	0	0	0	0	0
	Venting (new wells)	tCO2e	Water-based mud, 12 days of drilling per well, no hydraulic fracturing, Vali-2 MDT Gas Sample composition, P50 Reserves Development scenario (Vintage internal view for Year-End June 2024 reserves reporting updated 10 Jan 2025)	0	81	162	0	162	0	162	162	0	0	162
	Venting (operational)	tCO2e	Fixed, at FY24 level for Vali-3	30	30	30	30	30	30	30	30	30	30	30
	Fugitive	tCO2e	Vali-2 MDT Gas Sample composition. Emissions from wellheads	9	13	22	22	30	30	35	43	43	39	48
	Combustion - diesel	tCO2e	15,000 litres diesel annually for adhoc use. Additional 35,000 litres diesel per well drilled, Australia National Greenhouse Accounts Factors 2024 for diesel oil	41	135	230	41	230	41	230	230	41	41	230
	Total Scope 1 emissions Vali	tCO2e	Operational Control	80	260	445	93	453	101	458	466	114	110	471
	Vali production	MMscf	P50 Reserves Development scenario (Vintage internal view for Year-End June 2024 reserves reporting updated 10 Jan 2025)	528	1,378	3,087	3,677	3,992	4,320	4,416	6,105	5,971	4,457	4,291
	Vali emissions intensity (Scope 1)	kgCO2e/MMscf	Operational Control	151	189	144	25	114	23	104	76	19	25	110
	Scope 2 emissions	tCO2e	No purchased electricity	0	0	0	0	0	0	0	0	0	0	0
	Scope 3 emissions (use of sold products only)	tCO2e	65 tCO2e/MMscf gas produced assuming all gas is combusted and the combustion efficiency is 98%	34,354	89,714	200,955	239,356	259,881	281,257	287,456	397,465	388,732	290,169	279,352

Inputs

Asset	Metric	Units	FY										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Vali	Wells Online	#	2	3	5	5	7	7	8	10	10	9	11
	New Wells drilled	#		1	2		2		2	2			2
	Total Wells	#	2	3	5	5	7	7	9	11	11	11	13
	Wells taken offline	#						1			1		
	Total Wells offline	#	0	0	0	0	0	0	1	1	1	2	2

Vali - scope 3 emission factor	65	tCO2e/MMscf gas produced

Made by ERCE (ISO 14064-3 certified verifiers and validators) based on data provided by Vintage Energy
Checked and approved by Vintage Energy

Emission Source/ Category	Units	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Flaring	tCO2e	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Venting (new wells)	tCO2e	0	244	0	244	0	0	244	162	0	162	0	162	0	244	0	162	0	0
Venting (operational)	tCO2e	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Fugitive	tCO2e	48	61	61	74	69	61	74	74	74	74	61	69	56	65	52	61	61	48
Combustion - diesel	tCO2e	41	325	41	325	41	41	325	230	41	230	41	230	41	325	41	230	41	41
Total Scope 1 emissions Vali	tCO2e	119	660	132	673	140	132	673	497	145	497	132	492	127	664	123	484	132	119
Vali production	MMscf	4,611	4,524	5,230	4,860	5,432	4,237	4,190	5,411	5,464	4,620	4,329	4,155	3,976	4,181	4,640	4,317	4,256	3,041
Vali emissions intensity (Scope 1)	kgCO2e/MMscf	26	146	25	138	26	31	161	92	26	107	30	118	32	159	26	112	31	39
Scope 2 emissions	tCO2e	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scope 3 emissions (use of sold products only)	tCO2e	300,196	294,488	340,498	316,412	353,608	275,799	272,784	352,232	355,675	300,748	281,809	270,481	258,847	272,159	302,094	281,035	277,058	197,945

Inputs

Asset	Metric	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Vali	Wells Online	11	14	14	17	16	14	17	17	17	17	14	16	13	15	12	14	14	11
	New Wells drilled		3		3			3	2		2		2		3		2		
	Total Wells	13	16	16	19	19	19	22	24	24	26	26	28	28	31	31	33	33	33
	Wells taken offline				1	2		2		2	3		3	1	3			3	2
	Total Wells offline	2	2	2	2	3	5	5	7	7	9	12	12	15	16	19	19	19	22

Emission Source/ Category	Units								
		2054	2055	2056	2057	2058	2059	2060	2061	Cumulative
Flaring	tCO2e	0	0	0	0	0	0	0	0	0
Venting (new wells)	tCO2e	0	0	0	0	0	0	0	0	2,517
Venting (operational)	tCO2e	30	30	30	30	30	30	30	30	1,121
Fugitive	tCO2e	39	39	30	30	22	22	9	9	1,670
Combustion - diesel	tCO2e	41	41	41	41	41	41	41	41	4,444
Total Scope 1 emissions Vali	tCO2e	110	110	101	101	93	93	80	80	9,752
Vali production	MMscf	2,272	1,811	1,344	1,087	763	589	266	187	132,014
Vali emissions intensity (Scope 1)	kgCO2e/MMscf	48	61	75	93	121	157	299	426	
Scope 2 emissions	tCO2e	0	0	0	0	0	0	0	0	0
Scope 3 emissions (use of sold products only)	tCO2e	147,878	117,901	87,482	70,757	49,690	38,368	17,301	12,153	8,594,087

Inputs

Asset	Metric								
		2054	2055	2056	2057	2058	2059	2060	2061
Vali	Wells Online	9	9	7	7	5	5	2	2
	New Wells drilled								
	Total Wells	33	33	33	33	33	33	33	33
	Wells taken offline		2		2		3		2
	Total Wells offline	24	24	26	26	28	28	31	31

Vali Field

Emissions Classification	Emission source/category	*Total Emissions (tonnes CO2e)*			
		CO_2e	CO_2	CH_4	N_2O
Direct GHG Emissions Scope 1	Flaring	-	-	-	-
	Venting	81.2	1.9	79.3	-
	Fugitive	4.3	0.1	4.2	-
	Combustion - diesel (drilling)	94.8	94.4	0.1	0.3
	Combustion - diesel (miscellaneous)	40.6	40.5	0.1	0.12
	Total Scope 1 (tonnes)	221.0	136.9	83.7	0.4

Inputs	
Diesel consumption (litres)	35,000
Petrol consumption (litres)	0
Total flared volume (MMSCF)	0.00
No. of dilling days	12
No. of wells drilled	1
Mud degassing volume (MMSCF)	0.034
Well drilling vent volume (MMSCF)	0.003
Well testing vent volume (MMSCF)	0.047
Well completion vent volume (MMSCF)	0.111
Operational vent volume (MMSCF)	0.000
Total vented volume (MMSCF)	0.20
Total fuel gas volume (MMSCF)	0

Component	Composition Gas fraction	Carbon Count	Molecular Weight	GWP
H_2	0.000%	0	2.0	
H_2S	0.000%	0	34.1	
Nitrogen	0.270%	0	28.0	
Methane	75.440%	1	16.0	28
Ethane	4.330%	2	30.1	
Propane	0.780%	3	44.1	
i-Butane	0.150%	4	58.1	
n-Butane	0.160%	4	58.1	
i-Pentane	0.060%	5	72.1	
n-Pentane	0.050%	5	72.1	
C6*	0.070%	6	86.2	
C7*	0.130%	7	100.2	
C8*	0.080%	8	114.2	
C9*	0.050%	9	128.3	
C10*	0.020%	10	142.3	
C11*	0.010%	11	156.3	
C12+*	0.020%	12	170.3	

CO_2	18.380%	1	44.0	1
Total	100.000%			

Conversion (using n=PV/RT)	1.197	mol/scf

Venting - Gas	
Methodology: API GHG Compendium 2021	
g of CH_4 per scf of gas vented	14.491
g of CO_2 per scf of gas vented	9.685

Emission source	Comments	Gas Wellheads	Equipment Hours	*Total Emissions (tonnes CO_2e)*			
		No.	Hrs	CO_2e	CO_2	CH_4	N_2O
Fugitive Emissions							
Onshore natural gas wellheads	Using Australia National Greenhouse and Energy Reporting (Measurement) Determination 2008 , 3.73B Method 2	1	8,760	4.3	0.101	4.2	-
				4.3	0.1	4.2	-

Emission source	Volume (litres)	*Emissions (tonnes CO2e)*			
		CO_2e	CO_2	CH_4	N_2O
Diesel consumption - drilling	35,000	94.8	94.4	0.1	0.3
Diesel consumption - miscellaneous	15,000	40.6	40.5	0.1	0.1

Notes

1. Flare gas and vent gas volumes provided by Vintage.
2. ERCE has used the Vali-2 MDT Gas Sample composition and applied the relative conversion factors to calculate emissions produced from the total flare and vent gas volumes. This is in accordance with the API GHG Compendium.
3. There was no diesel or petrol consumed during this period.
4. Fugitive emissions are estimated using the method described in Section 3.73B of the National Greenhouse and Energy Reporting (Measurement) Determination 2008.
5. The 100-year global warming potentials (GWPs) quoted in IPCC AR5 have been used.

References

Australia National and Energy Reporting (Measurement) Determination 2008 — Federal Register of Legislation - National Greenhouse and Energy Reporting (Measurement) Determination 2008

Australia National Greenhouse Accounts Factors 2024 — National Greenhouse Accounts Factors: 2024 - DCCEEW

Fuel	Source of Factor	Unit	kg CO2e	kg CO2e of CO2 per unit	kg CO2e of CH4 per unit	kg CO2e of N2O per unit
Diesel oil	Australia National Greenhouse Accounts Factors 2024	litres	2.70972	2.69814	0.00386	0.00772

Fuel combusted	Energy Content factor	Scope 1 Emission Factor	Scope 1 Emission Factor	Scope 1 Emission Factor	Scope 1 Emission Factor	Scope 3 Emission Factor
	(GJ per unit of fuel)	(kg CO_2-e/GJ)	(kg CO2-e/GJ)	(kg CO2-e/GJ)	(kg CO2-e/GJ)	(kg CO2-e /GJ)
	GJ/kL	CO2	CH4	N2O	Combined gases	
Diesel oil	38.6	69.9	0.1	0.2	70.2	17.3

Fugitive - gas

Equipment	Source of Factor	Unit		kg CO2	kg CH4	kg N2O
Gas Wellheads	Australia National and Energy Reporting (Measurement) Determination 2008 3.73B Method 2	kg CO2e / component / equipment-hour		0.00125	0.504	0

Onshore mud degassing

Mud type	Whole gas emissions factor
	scf/drilling day
Water-based mud	2,857

Natural gas well drilling

Vented emissions source	Whole gas emissions factor
	scf/well
Gas well drilling	3,353

Well testing

Source	Whole gas emissions factor
	scf/well
Gas Well Testing – Vented to Atmosphere	46,625

Onshore well completions

Source	Whole gas emissions factor
	scf/completion
Gas Well Completions without Hydraulic Fracturing: Vented	111,173

Production Forecast for Vali Field

Revised 10/1/2025 Forecast is based on P50 Reserves Development scenario (Vintage internal view for Year-End June 2024 reserves reporting)

Month commencing	Production this month with Composition 1 (raw MMscf)	Production this month with Composition 2 (raw MMscf)	Production this month with Composition 3 (raw MMscf)	Ave Daily Raw Gas Production Rate (MMscfd)	Net production Sales Gas (TJ)	Net production Ethane (TJ)	Net production LPG (T)	Net production Condensate (bbl)	Wells online	Financial Year	Total production MMscf
1/7/2024	0	39.74715594	0	1.306	26.716	1.615	10.328	146.793	1	2025	40
1/8/2024	0	36.91855344	0	1.213	24.815	1.500	9.593	136.347	1	2025	37
1/9/2024	0	24.24279833	0	0.796	16.295	0.985	6.299	89.533	2	2025	24
1/10/2024	0	35.009	0	1.150	23.531	1.423	9.097	129.294	2	2025	35
1/11/2024	0	28.5	0	0.936	19.156	1.158	7.405	105.255	1	2025	29
1/12/2024	0	27.6	0	0.907	18.551	1.122	7.172	101.932	1	2025	28
1/1/2025	0	26.6	0	0.874	17.879	1.081	6.912	98.238	1	2025	27
1/2/2025	0	23	0	0.756	15.459	0.935	5.976	84.943	1	2025	23
1/3/2025	0	72.99390625	0	2.398	49.063	2.967	18.967	269.579	2	2025	73
1/4/2025	0	72.80832724	0	2.392	48.938	2.959	18.919	268.894	2	2025	73
1/5/2025	0	71.45710076	0	2.348	48.030	2.904	18.567	263.904	2	2025	71
1/6/2025	0	68.83899618	0	2.262	46.270	2.798	17.887	254.234	2	2025	69
1/7/2025	0	67.45283539	0	2.216	45.338	2.742	17.527	249.115	2	2026	67
1/8/2025	0	65.49749021	0	2.152	44.024	2.662	17.019	241.894	2	2026	65
1/9/2025	0	63.27187992	0	2.079	42.528	2.572	16.441	233.674	2	2026	63
1/10/2025	0	62.07496896	0	2.039	41.724	2.523	16.130	229.254	2	2026	62
1/11/2025	0	59.90576473	0	1.968	40.266	2.435	15.566	221.242	2	2026	60
1/12/2025	0	58.86331551	0	1.934	39.565	2.392	15.295	217.393	2	2026	59
1/1/2026	0	59.04670854	0	1.940	39.688	2.400	15.343	218.070	2	2026	59
1/2/2026	0	200.4331931	0	6.585	134.721	8.146	52.081	740.235	3	2026	200
1/3/2026	0	195.1424656	0	6.411	131.165	7.931	50.706	720.695	3	2026	195
1/4/2026	0	187.9745735	0	6.176	126.347	7.640	48.843	694.223	3	2026	188
1/5/2026	0	182.407086	0	5.993	122.605	7.414	47.397	673.661	3	2026	182
1/6/2026	0	176.0195251	0	5.783	118.312	7.154	45.737	650.071	3	2026	176
1/7/2026	0	170.7931637	0	5.611	114.799	6.942	44.379	630.769	3	2027	171
1/8/2026	0	165.6108465	0	5.441	111.315	6.731	43.032	611.630	3	2027	166
1/9/2026	0	160.0568331	0	5.259	107.582	6.505	41.589	591.118	3	2027	160

1/10/2026	0	155.6166584	0	5.113	104.598	6.325	40.435	574.720	3	2027	156
1/11/2026	0	150.5770093	0	4.947	101.210	6.120	39.126	556.107	3	2027	151
1/12/2026	0	146.5256151	0	4.814	98.487	5.955	38.073	541.145	3	2027	147
1/1/2027	0	142.3511499	0	4.677	95.681	5.786	36.988	525.728	3	2027	142
1/2/2027	0	426.4993953	0	14.012	286.672	17.334	110.822	1575.137	5	2027	426
1/3/2027	0	412.5017364	0	13.552	277.263	16.765	107.184	1523.441	5	2027	413
1/4/2027	0	398.3509037	0	13.088	267.752	16.190	103.507	1471.180	5	2027	398
1/5/2027	0	385.5952544	0	12.668	259.178	15.672	100.193	1424.071	5	2027	386
1/6/2027	0	372.3875825	0	12.234	250.300	15.135	96.761	1375.293	5	2027	372
1/7/2027	0	360.7846662	0	11.853	242.502	14.664	93.746	1332.441	5	2028	361
1/8/2027	0	349.2468678	0	11.474	234.746	14.195	90.748	1289.830	5	2028	349
1/9/2027	0	338.237781	0	11.113	227.347	13.747	87.888	1249.171	5	2028	338
1/10/2027	0	327.8239171	0	10.770	220.347	13.324	85.182	1210.711	5	2028	328
1/11/2027	0	318.074427	0	10.450	213.794	12.928	82.648	1174.705	5	2028	318
1/12/2027	0	308.5608538	0	10.138	207.399	12.541	80.176	1139.569	5	2028	309
1/1/2028	0	299.6569118	0	9.845	201.415	12.179	77.863	1106.685	5	2028	300
1/2/2028	0	290.3382891	0	9.539	195.151	11.800	75.441	1072.270	5	2028	290
1/3/2028	0	282.8824716	0	9.294	190.140	11.497	73.504	1044.735	5	2028	283
1/4/2028	0	274.3685841	0	9.014	184.417	11.151	71.292	1013.291	5	2028	274
1/5/2028	0	267.2772484	0	8.781	179.651	10.863	69.449	987.102	5	2028	267
1/6/2028	0	259.4904553	0	8.525	174.417	10.547	67.426	958.344	5	2028	259
1/7/2028	0	252.9914493	0	8.312	170.048	10.282	65.737	934.342	5	2029	253
1/8/2028	0	246.0646245	0	8.084	165.392	10.001	63.937	908.760	5	2029	246
1/9/2028	0	239.6954305	0	7.875	161.111	9.742	62.282	885.237	5	2029	240
1/10/2028	0	233.4702873	0	7.670	156.927	9.489	60.665	862.247	5	2029	233
1/11/2028	0	227.4765081	0	7.474	152.898	9.245	59.107	840.111	5	2029	227
1/12/2028	0	221.602229	0	7.281	148.950	9.007	57.581	818.416	5	2029	222
1/1/2029	0	217.4363455	0	7.144	146.150	8.837	56.499	803.031	5	2029	217
1/2/2029	0	500.8247044	0	15.000	306.879	18.556	118.633	1686.165	7	2029	501
1/3/2029	0	485.2986238	0	15.000	306.879	18.556	118.633	1686.165	7	2029	485
1/4/2029	0	469.9506578	0	15.000	306.879	18.556	118.633	1686.165	7	2029	470
1/5/2029	0	455.6288946	0	15.000	306.879	18.556	118.633	1686.165	7	2029	456
1/6/2029	0	441.5857831	0	15.000	306.879	18.556	118.633	1686.165	7	2029	442
1/7/2029	0	428.0870229	0	15.000	306.879	18.556	118.633	1686.165	7	2030	428

1/8/2029	0	407.0135299	0	14.752	301.805	18.249	116.672	1658.288	7	2030	407
1/9/2029	0	395.3883606	0	12.990	265.760	16.070	102.738	1460.238	7	2030	395
1/10/2029	0	383.7847185	0	12.609	257.961	15.598	99.723	1417.384	7	2030	384
1/11/2029	0	373.0712537	0	12.257	250.760	15.163	96.939	1377.818	7	2030	373
1/12/2029	0	362.6189876	0	11.914	243.735	14.738	94.223	1339.215	7	2030	363
1/1/2030	0	352.8010977	0	11.591	237.135	14.339	91.672	1302.956	7	2030	353
1/2/2030	0	342.5927245	0	11.256	230.274	13.924	89.019	1265.255	7	2030	343
1/3/2030	0	334.0707992	0	10.976	224.546	13.578	86.805	1233.782	7	2030	334
1/4/2030	0	325.0138886	0	10.678	218.458	13.210	84.452	1200.333	7	2030	325
1/5/2030	0	316.2354298	0	10.390	212.558	12.853	82.171	1167.913	7	2030	316
1/6/2030	0	299.7084824	0	9.847	201.449	12.181	77.876	1106.876	7	2030	300
1/7/2030	0	292.2803367	0	9.603	196.456	11.879	75.946	1079.442	7	2031	292
1/8/2030	0	284.9420601	0	9.362	191.524	11.581	74.039	1052.341	7	2031	285
1/9/2030	0	277.5786445	0	9.120	186.575	11.282	72.126	1025.147	7	2031	278
1/10/2030	0	270.8760579	0	8.899	182.069	11.009	70.384	1000.393	7	2031	271
1/11/2030	0	264.2211673	0	8.681	177.596	10.739	68.655	975.815	7	2031	264
1/12/2030	0	258.0016703	0	8.476	173.416	10.486	67.039	952.845	7	2031	258
1/1/2031	0	251.7060316	0	8.270	169.184	10.230	65.403	929.594	7	2031	252
1/2/2031	0	534.8796756	0	15.000	306.879	18.556	118.633	1686.165	9	2031	535
1/3/2031	0	518.3535071	0	15.000	306.879	18.556	118.633	1686.165	9	2031	518
1/4/2031	0	502.4196757	0	15.000	306.879	18.556	118.633	1686.165	9	2031	502
1/5/2031	0	487.1258749	0	15.000	306.879	18.556	118.633	1686.165	9	2031	487
1/6/2031	0	473.2241684	0	15.000	306.879	18.556	118.633	1686.165	9	2031	473
1/7/2031	0	459.070551	0	15.000	306.879	18.556	118.633	1686.165	9	2032	459
1/8/2031	0	446.0245605	0	15.000	306.879	18.556	118.633	1686.165	9	2032	446
1/9/2031	0	433.8489341	0	15.000	306.879	18.556	118.633	1686.165	9	2032	434
1/10/2031	0	421.7093039	0	15.000	306.879	18.556	118.633	1686.165	9	2032	422
1/11/2031	0	410.3739257	0	15.000	306.879	18.556	118.633	1686.165	9	2032	410
1/12/2031	0	399.5134377	0	15.000	306.879	18.556	118.633	1686.165	9	2032	400
1/1/2032	0	389.1006448	0	14.898	304.791	18.430	117.826	1674.695	9	2032	389
1/2/2032	0	668.1665759	0	15.000	306.879	18.556	118.633	1686.165	11	2032	668
1/3/2032	0	647.7288841	0	15.000	306.879	18.556	118.633	1686.165	11	2032	648
1/4/2032	0	628.1675038	0	15.000	306.879	18.556	118.633	1686.165	11	2032	628
1/5/2032	0	609.7188541	0	15.000	306.879	18.556	118.633	1686.165	11	2032	610

1/6/2032	0	592.0245796	0	15.000	306.879	18.556	118.633	1686.165	11	2032	592
1/7/2032	0	575.1310344	0	15.000	306.879	18.556	118.633	1686.165	11	2033	575
1/8/2032	0	558.9888254	0	15.000	306.879	18.556	118.633	1686.165	11	2033	559
1/9/2032	0	543.5524069	0	15.000	306.879	18.556	118.633	1686.165	11	2033	544
1/10/2032	0	528.6797202	0	15.000	306.879	18.556	118.633	1686.165	11	2033	529
1/11/2032	0	514.6318725	0	15.000	306.879	18.556	118.633	1686.165	11	2033	515
1/12/2032	0	500.9728504	0	15.000	306.879	18.556	118.633	1686.165	11	2033	501
1/1/2033	0	487.869263	0	15.000	306.879	18.556	118.633	1686.165	11	2033	488
1/2/2033	0	475.3901122	0	15.000	306.879	18.556	118.633	1686.165	11	2033	475
1/3/2033	0	463.4065862	0	15.000	306.879	18.556	118.633	1686.165	11	2033	463
1/4/2033	0	451.8918739	0	15.000	306.879	18.556	118.633	1686.165	11	2033	452
1/5/2033	0	440.7209976	0	15.000	306.879	18.556	118.633	1686.165	11	2033	441
1/6/2033	0	430.0706617	0	15.000	306.879	18.556	118.633	1686.165	11	2033	430
1/7/2033	0	419.8191166	0	15.000	306.879	18.556	118.633	1686.165	11	2034	420
1/8/2033	0	409.9460346	0	15.000	306.879	18.556	118.633	1686.165	11	2034	410
1/9/2033	0	400.4323983	0	15.000	306.879	18.556	118.633	1686.165	11	2034	400
1/10/2033	0	391.2603985	0	15.000	306.879	18.556	118.633	1686.165	11	2034	391
1/11/2033	0	382.4133417	0	15.000	306.879	18.556	118.633	1686.165	11	2034	382
1/12/2033	0	373.875566	0	15.000	306.879	18.556	118.633	1686.165	11	2034	374
1/1/2034	0	365.6323639	0	15.000	306.879	18.556	118.633	1686.165	11	2034	366
1/2/2034	0	357.6699125	0	15.000	306.879	18.556	118.633	1686.165	11	2034	358
1/3/2034	0	349.975209	0	15.000	306.879	18.556	118.633	1686.165	11	2034	350
1/4/2034	0	342.5360123	0	15.000	306.879	18.556	118.633	1686.165	11	2034	343
1/5/2034	0	335.3407889	0	15.000	306.879	18.556	118.633	1686.165	11	2034	335
1/6/2034	0	328.3786638	0	15.000	306.879	18.556	118.633	1686.165	11	2034	328
1/7/2034	0	321.6393748	0	15.000	306.879	18.556	118.633	1686.165	11	2035	322
1/8/2034	0	315.1132313	0	15.000	306.879	18.556	118.633	1686.165	11	2035	315
1/9/2034	0	308.7910753	0	12.041	246.342	14.896	95.231	1353.544	11	2035	309
1/10/2034	0	302.6642465	0	9.944	203.436	12.301	78.644	1117.792	11	2035	303
1/11/2034	0	296.7245496	0	9.749	199.444	12.060	77.101	1095.856	11	2035	297
1/12/2034	0	290.964224	0	9.559	195.572	11.826	75.604	1074.582	11	2035	291
1/1/2035	0	285.375916	0	9.376	191.816	11.599	74.152	1053.943	11	2035	285
1/2/2035	0	279.9526532	167.5310198	15.000	306.389	14.688	82.818	1518.567	13	2035	447
1/3/2035	0	274.6878203	165.8423448	14.766	301.620	14.495	81.857	1496.446	13	2035	441

1/4/2035	0	269.5751375	164.2019141	14.342	292.949	14.112	79.813	1454.857	13	2035	434
1/5/2035	0	264.6086394	162.6077777	13.999	285.965	13.807	78.204	1421.532	13	2035	427
1/6/2035	0	259.7826566	161.0580846	13.671	279.251	13.513	76.646	1389.448	13	2035	421
1/7/2035	0	255.0917973	159.5510763	13.354	272.792	13.229	75.139	1358.538	13	2036	415
1/8/2035	0	250.5309314	158.0850821	13.050	266.575	12.954	73.678	1328.743	13	2036	409
1/9/2035	0	246.0951751	156.6585134	12.756	260.587	12.689	72.263	1300.004	13	2036	403
1/10/2035	0	241.7798763	155.2698593	12.474	254.816	12.433	70.891	1272.270	13	2036	397
1/11/2035	0	237.5806015	153.917682	12.201	249.250	12.185	69.560	1245.489	13	2036	391
1/12/2035	0	233.4931237	152.6006129	11.938	243.881	11.945	68.268	1219.617	13	2036	386
1/1/2036	0	229.5134102	151.3173483	11.684	238.697	11.712	67.015	1194.609	13	2036	381
1/2/2036	0	225.6376124	150.0666459	11.439	233.690	11.487	65.798	1170.424	13	2036	376
1/3/2036	0	221.862055	148.8473214	11.202	228.852	11.268	64.616	1147.026	13	2036	371
1/4/2036	0	218.1832273	147.6582455	10.973	224.174	11.056	63.467	1124.376	13	2036	366
1/5/2036	0	214.5977738	146.4983403	10.751	219.649	10.851	62.351	1102.443	13	2036	361
1/6/2036	0	211.102486	145.3665772	10.537	215.270	10.652	61.265	1081.193	13	2036	356
1/7/2036	0	207.6942947	144.2619738	10.329	211.030	10.458	60.210	1060.597	13	2037	352
1/8/2036	0	204.3702628	143.1835915	10.128	206.924	10.270	59.182	1040.627	13	2037	348
1/9/2036	0	201.1275781	140.7216142	9.933	202.945	10.088	58.182	1021.256	13	2037	342
1/10/2036	0	197.9635471	98.63497507	9.745	199.088	9.910	57.209	1002.459	13	2037	297
1/11/2036	0	194.8755892	96.14754277	9.561	195.347	9.738	56.261	984.212	13	2037	291
1/12/2036	0	191.8612305	93.75303178	9.384	191.718	9.570	55.338	966.492	13	2037	286
1/1/2037	0	188.9180986	91.44687083	9.211	188.196	9.407	54.438	949.278	13	2037	280
1/2/2037	0	186.0439178	288.7404067	15.000	306.053	12.028	58.186	1403.301	16	2037	475
1/3/2037	0	183.2365043	286.9237923	15.000	306.058	12.066	58.530	1404.912	16	2037	470
1/4/2037	0	180.4937613	285.142676	15.000	306.062	12.102	58.868	1406.492	16	2037	466
1/5/2037	0	177.8136756	283.3961375	15.000	306.067	12.138	59.199	1408.042	16	2037	461
1/6/2037	0	175.1943126	281.6832817	15.000	306.071	12.173	59.524	1409.563	16	2037	457
1/7/2037	0	172.6338134	280.0032386	15.000	306.076	12.207	59.843	1411.055	16	2038	453
1/8/2037	0	170.1303909	278.3551626	15.000	306.080	12.241	60.156	1412.518	16	2038	448
1/9/2037	0	167.6823264	279.5424996	15.000	306.084	12.274	60.463	1413.955	16	2038	447
1/10/2037	0	165.2879666	280.7809706	15.000	306.088	12.307	60.764	1415.365	15	2038	446
1/11/2037	0	162.9457203	279.2644448	15.000	306.092	12.339	61.060	1416.749	15	2038	442
1/12/2037	0	160.6540561	277.77581	15.000	306.096	12.370	61.350	1418.108	15	2038	438
1/1/2038	0	158.4114991	276.3143635	15.000	306.100	12.401	61.635	1419.443	15	2038	435

1/2/2038	0	156.2166288	274.8794231	15.000	306.104	12.431	61.915	1420.753	15	2038	431
1/3/2038	0	154.0680765	273.4703266	15.000	306.108	12.461	62.190	1422.040	15	2038	428
1/4/2038	0	151.9645231	272.0864309	15.000	306.111	12.490	62.461	1423.304	15	2038	424
1/5/2038	0	149.9046968	270.7271119	14.554	297.010	12.146	60.860	1382.173	15	2038	421
1/6/2038	0	147.8873712	269.3917636	12.312	251.252	10.298	51.697	1170.222	15	2038	417
1/7/2038	0	145.9113633	268.0797979	12.062	246.159	10.111	50.855	1147.453	15	2039	414
1/8/2038	0	143.9755314	261.3183242	11.820	241.233	9.930	50.035	1125.408	15	2039	405
1/9/2038	0	137.2961083	210.5897738	11.430	233.252	9.560	47.994	1086.391	15	2039	348
1/10/2038	0	130.876256	205.563236	11.053	225.573	9.204	46.032	1048.853	13	2039	336
1/11/2038	0	129.145512	200.7167443	10.837	221.165	9.042	45.299	1029.129	13	2039	330
1/12/2038	0	127.4494358	196.0417134	10.628	216.896	8.885	44.585	1010.004	13	2039	323
1/1/2039	0	125.7870946	191.5300678	10.425	212.758	8.732	43.889	991.453	13	2039	317
1/2/2039	0	124.1575867	358.7238902	15.000	305.892	10.756	46.408	1348.185	16	2039	483
1/3/2039	0	122.560041	357.4433031	15.000	305.896	10.784	46.666	1349.391	16	2039	480
1/4/2039	0	120.9936154	356.1814075	15.000	305.899	10.812	46.920	1350.580	16	2039	477
1/5/2039	0	119.4574955	354.9378591	15.000	305.902	10.839	47.170	1351.752	16	2039	474
1/6/2039	0	117.9508939	353.7123182	15.000	305.906	10.865	47.417	1352.906	16	2039	472
1/7/2039	0	116.4730489	352.5044505	15.000	305.909	10.892	47.660	1354.044	16	2040	469
1/8/2039	0	115.0232233	351.3139265	15.000	305.912	10.917	47.900	1355.166	16	2040	466
1/9/2039	0	104.0353725	357.1501533	15.000	305.896	10.791	46.725	1349.667	16	2040	461
1/10/2039	0	93.51725759	363.2383585	15.000	305.880	10.658	45.499	1343.931	14	2040	457
1/11/2039	0	92.32933897	362.2455815	15.000	305.882	10.680	45.699	1344.867	14	2040	455
1/12/2039	0	91.164073	361.2666887	15.000	305.885	10.701	45.896	1345.789	14	2040	452
1/1/2040	0	90.02088361	360.3014221	15.000	305.888	10.722	46.090	1346.698	14	2040	450
1/2/2040	0	88.899213	359.3495282	15.000	305.890	10.743	46.282	1347.595	14	2040	448
1/3/2040	0	87.79852103	358.4107586	15.000	305.893	10.763	46.471	1348.480	14	2040	446
1/4/2040	0	86.71828445	357.4848697	15.000	305.895	10.783	46.657	1349.352	14	2040	444
1/5/2040	0	85.65799635	356.5716226	15.000	305.898	10.803	46.841	1350.212	14	2040	442
1/6/2040	0	84.61716551	355.6707829	15.000	305.900	10.823	47.022	1351.061	14	2040	440
1/7/2040	0	83.5953158	354.7821214	15.000	305.903	10.842	47.201	1351.898	14	2041	438
1/8/2040	0	82.59198569	353.9054131	15.000	305.905	10.861	47.378	1352.724	14	2041	436
1/9/2040	0	81.60672764	338.3592721	14.376	293.187	10.428	45.575	1297.253	14	2041	420
1/10/2040	0	80.63910762	272.0948715	11.589	236.342	8.420	36.871	1046.347	14	2041	353
1/11/2040	0	79.68870464	266.0980195	11.361	231.689	8.268	36.273	1026.340	14	2041	346

1/12/2040	0	78.75511026	260.3025257	11.139	227.182	8.121	35.691	1006.949	14	2041	339
1/1/2041	0	77.83792815	254.6992767	10.925	222.814	7.977	35.125	988.147	14	2041	333
1/2/2041	0	76.93677363	249.279678	10.718	218.581	7.838	34.574	969.909	14	2041	326
1/3/2041	0	76.05127332	244.0356187	10.516	214.475	7.703	34.037	952.213	14	2041	320
1/4/2041	0	75.18106468	238.9594385	10.321	210.492	7.572	33.514	935.034	14	2041	314
1/5/2041	0	74.32579567	234.0438976	10.131	206.627	7.444	33.004	918.353	14	2041	308
1/6/2041	0	73.48512438	229.2821489	9.947	202.875	7.320	32.507	902.149	14	2041	303
1/7/2041	0	72.65871865	224.6677125	9.768	199.230	7.199	32.023	886.402	14	2042	297
1/8/2041	0	71.8462558	220.194452	9.595	195.690	7.082	31.550	871.096	14	2042	292
1/9/2041	0	61.48209092	215.8565523	9.112	185.820	6.579	28.603	820.886	14	2042	277
1/10/2041	0	51.57437071	211.6484997	8.648	176.343	6.096	25.783	772.718	12	2042	263
1/11/2041	0	50.98392797	207.565063	8.494	173.213	5.995	25.390	759.304	12	2042	259
1/12/2041	0	50.40357848	203.6012759	8.345	170.169	5.897	25.008	746.256	12	2042	254
1/1/2042	0	49.83309323	199.7524211	8.200	167.210	5.801	24.634	733.561	12	2042	250
1/2/2042	0	49.27224968	412.7394594	15.000	305.743	9.582	35.532	1297.292	13	2042	462
1/3/2042	0	48.72083153	412.0841874	15.000	305.745	9.596	35.664	1297.910	13	2042	461
1/4/2042	0	48.17862855	411.4366761	15.000	305.747	9.610	35.795	1298.520	13	2042	460
1/5/2042	0	47.6454363	410.7968187	15.000	305.749	9.624	35.923	1299.123	13	2042	458
1/6/2042	0	47.12105602	410.1645081	15.000	305.751	9.638	36.051	1299.718	13	2042	457
1/7/2042	0	46.60529439	409.5396372	15.000	305.752	9.651	36.176	1300.307	13	2043	456
1/8/2042	0	46.09796336	408.9220991	15.000	305.754	9.665	36.301	1300.889	13	2043	455
1/9/2042	0	45.59888002	408.3117872	15.000	305.756	9.678	36.424	1301.464	13	2043	454
1/10/2042	0	45.10786635	407.7085958	15.000	305.757	9.691	36.545	1302.032	13	2043	453
1/11/2042	0	44.62474915	407.1124194	15.000	305.759	9.704	36.665	1302.594	13	2043	452
1/12/2042	0	44.14935983	388.5778138	14.338	292.263	9.288	35.160	1245.624	13	2043	433
1/1/2043	0	43.68153428	350.2860558	12.943	263.842	8.396	31.842	1124.960	13	2043	394
1/2/2043	0	43.22111274	421.5827157	15.000	305.719	9.390	33.752	1288.961	13	2043	465
1/3/2043	0	42.76793964	421.0518065	15.000	305.721	9.401	33.859	1289.461	13	2043	464
1/4/2043	0	42.32186347	420.5260477	15.000	305.722	9.413	33.964	1289.956	13	2043	463
1/5/2043	0	41.88273669	420.005393	15.000	305.723	9.424	34.069	1290.447	13	2043	462
1/6/2043	0	41.45041553	419.4897949	15.000	305.725	9.435	34.173	1290.932	13	2043	461
1/7/2043	0	41.02475998	418.9792053	15.000	305.726	9.446	34.276	1291.413	13	2044	460
1/8/2043	0	40.60563357	418.4735748	15.000	305.728	9.457	34.378	1291.890	13	2044	459
1/9/2043	0	30.627572	426.5529902	15.000	305.705	9.282	32.751	1284.278	13	2044	457

1/10/2043	0	21.09889715	434.9669555	15.000	305.682	9.099	31.057	1276.350	11	2044	456
1/11/2043	0	20.88061174	434.6900991	15.000	305.683	9.105	31.113	1276.611	11	2044	456
1/12/2043	0	20.6656964	434.4157741	15.000	305.684	9.111	31.168	1276.870	11	2044	455
1/1/2044	0	20.45408211	434.1439556	15.000	305.685	9.116	31.223	1277.126	11	2044	455
1/2/2044	0	20.24570162	433.8746186	15.000	305.685	9.122	31.277	1277.379	11	2044	454
1/3/2044	0	20.04048937	433.6077378	15.000	305.686	9.128	31.331	1277.631	11	2044	454
1/4/2044	0	19.83838145	433.3432879	15.000	305.687	9.134	31.384	1277.880	11	2044	453
1/5/2044	0	19.63931557	433.0812434	15.000	305.688	9.140	31.437	1278.127	11	2044	453
1/6/2044	0	19.44323098	432.821579	15.000	305.688	9.145	31.489	1278.372	11	2044	452
1/7/2044	0	19.25006844	394.0005603	13.663	278.436	8.335	28.729	1164.624	11	2045	413
1/8/2044	0	19.05977019	339.7371037	11.788	240.231	7.196	24.827	1005.008	11	2045	359
1/9/2044	0	9.306948543	332.7320135	11.237	228.986	6.667	21.883	949.718	11	2045	342
1/10/2044	0	0	325.9534662	10.709	218.193	6.161	19.068	896.698	9	2045	326
1/11/2044	0	0	319.3914041	10.493	213.801	6.036	18.684	878.646	9	2045	319
1/12/2044	0	0	313.036337	10.285	209.547	5.916	18.313	861.163	9	2045	313
1/1/2045	0	0	306.8793039	10.082	205.425	5.800	17.952	844.225	9	2045	307
1/2/2045	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	9	2045	457
1/3/2045	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	9	2045	457
1/4/2045	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	9	2045	457
1/5/2045	0	0	453.715638	14.906	303.717	8.575	26.542	1248.172	7	2045	454
1/6/2045	0	0	417.0352257	13.701	279.163	7.882	24.397	1147.264	7	2045	417
1/7/2045	0	0	407.1624617	13.377	272.555	7.695	23.819	1120.104	7	2046	407
1/8/2045	0	0	397.6643052	13.065	266.196	7.516	23.263	1093.975	7	2046	398
1/9/2045	0	0	388.5209098	12.765	260.076	7.343	22.728	1068.821	7	2046	389
1/10/2045	0	0	379.7137816	12.475	254.180	7.177	22.213	1044.593	7	2046	380
1/11/2045	0	0	371.2256671	12.196	248.498	7.016	21.717	1021.242	7	2046	371
1/12/2045	0	0	363.0404518	11.927	243.019	6.861	21.238	998.724	7	2046	363
1/1/2046	0	0	355.1430686	11.668	237.733	6.712	20.776	976.999	7	2046	355
1/2/2046	0	0	347.5194145	11.417	232.629	6.568	20.330	956.026	7	2046	348
1/3/2046	0	0	340.1562753	11.176	227.701	6.429	19.899	935.770	7	2046	340
1/4/2046	0	0	333.0412576	10.942	222.938	6.294	19.483	916.196	7	2046	333
1/5/2046	0	0	326.1627263	10.716	218.333	6.164	19.081	897.274	7	2046	326
1/6/2046	0	0	319.5097481	10.497	213.880	6.039	18.691	878.971	7	2046	320
1/7/2046	0	0	313.0720396	10.286	209.570	5.917	18.315	861.261	7	2047	313

1/8/2046	0	0	306.8399204	10.081	205.399	5.799	17.950	844.117	7	2047	307
1/9/2046	0	0	300.8042698	9.883	201.358	5.685	17.597	827.513	7	2047	301
1/10/2046	0	0	294.9564874	9.691	197.444	5.575	17.255	811.425	7	2047	295
1/11/2046	0	0	289.2884565	9.504	193.650	5.468	16.923	795.833	7	2047	289
1/12/2046	0	0	283.7925114	9.324	189.971	5.364	16.602	780.713	7	2047	284
1/1/2047	0	0	278.4614063	9.149	186.402	5.263	16.290	766.047	7	2047	278
1/2/2047	0	0	451.9868501	14.850	302.560	8.543	26.441	1243.416	7	2047	452
1/3/2047	0	0	440.9390853	14.487	295.165	8.334	25.795	1213.023	7	2047	441
1/4/2047	0	0	418.6820875	13.755	280.266	7.913	24.493	1151.794	7	2047	419
1/5/2047	0	0	392.7562956	12.904	262.911	7.423	22.976	1080.473	4	2047	393
1/6/2047	0	0	383.2701666	12.592	256.561	7.244	22.421	1054.376	4	2047	383
1/7/2047	0	0	374.1535275	12.293	250.458	7.072	21.888	1029.296	4	2048	374
1/8/2047	0	0	365.3862251	12.004	244.590	6.906	21.375	1005.178	4	2048	365
1/9/2047	0	0	356.94952	11.727	238.942	6.746	20.882	981.968	4	2048	357
1/10/2047	0	0	348.8259665	11.460	233.504	6.593	20.406	959.620	4	2048	349
1/11/2047	0	0	340.9993035	11.203	228.265	6.445	19.948	938.089	4	2048	341
1/12/2047	0	0	333.4543566	10.955	223.214	6.302	19.507	917.333	4	2048	333
1/1/2048	0	0	326.1769499	10.716	218.343	6.165	19.081	897.313	4	2048	326
1/2/2048	0	0	319.1538255	10.486	213.642	6.032	18.670	877.992	4	2048	319
1/3/2048	0	0	312.3725715	10.263	209.102	5.904	18.274	859.337	4	2048	312
1/4/2048	0	0	305.8215559	10.048	204.717	5.780	17.891	841.315	4	2048	306
1/5/2048	0	0	299.4898669	9.840	200.479	5.660	17.520	823.897	4	2048	299
1/6/2048	0	0	293.3672585	9.638	196.380	5.545	17.162	807.053	4	2048	293
1/7/2048	0	0	287.444101	9.444	192.415	5.433	16.815	790.759	4	2049	287
1/8/2048	0	0	281.7113357	9.255	188.578	5.324	16.480	774.988	4	2049	282
1/9/2048	0	0	276.1604336	9.073	184.862	5.219	16.155	759.717	4	2049	276
1/10/2048	0	0	270.7833575	8.896	181.262	5.118	15.841	744.925	4	2049	271
1/11/2048	0	0	265.5725276	8.725	177.774	5.019	15.536	730.590	4	2049	266
1/12/2048	0	0	260.5207893	8.559	174.393	4.924	15.240	716.693	4	2049	261
1/1/2049	0	0	255.6213846	8.398	171.113	4.831	14.954	703.214	4	2049	256
1/2/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	4	2049	457
1/3/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	4	2049	457
1/4/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	4	2049	457
1/5/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	1	2049	457

1/6/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	1	2049	457
1/7/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	1	2050	457
1/8/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	1	2050	457
1/9/2049	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	1	2050	457
1/10/2049	0	0	399.5905944	13.128	267.486	7.552	23.376	1099.274	1	2050	400
1/11/2049	0	0	388.7771553	12.773	260.247	7.348	22.743	1069.526	1	2050	389
1/12/2049	0	0	379.5941791	12.471	254.100	7.174	22.206	1044.264	1	2050	380
1/1/2050	0	0	370.7554144	12.181	248.184	7.007	21.689	1019.948	1	2050	371
1/2/2050	0	0	362.2430521	11.901	242.485	6.846	21.191	996.531	1	2050	362
1/3/2050	0	0	354.0404557	11.632	236.995	6.691	20.711	973.965	1	2050	354
1/4/2050	0	0	346.1320682	11.372	231.701	6.542	20.249	952.209	1	2050	346
1/5/2050	0	0	338.5033273	11.121	226.594	6.398	19.802	931.223	1	2050	339
1/6/2050	0	0	331.1405886	10.879	221.666	6.259	19.372	910.968	1	2050	331
1/7/2050	0	0	324.0310556	10.646	216.906	6.124	18.956	891.409	1	2051	324
1/8/2050	0	0	317.162716	10.420	212.309	5.994	18.554	872.515	1	2051	317
1/9/2050	0	0	310.5242836	10.202	207.865	5.869	18.166	854.252	1	2051	311
1/10/2050	0	0	304.1051449	9.991	203.568	5.748	17.790	836.593	1	2051	304
1/11/2050	0	0	297.8953111	9.787	199.411	5.630	17.427	819.510	1	2051	298
1/12/2050	0	0	291.8853731	9.590	195.388	5.517	17.075	802.977	1	2051	292
1/1/2051	0	0	286.0664609	9.398	191.493	5.407	16.735	786.969	1	2051	286
1/2/2051	0	0	456.5625	15.000	305.623	8.629	26.709	1256.003	1	2051	457
1/3/2051	0	0	450.2073948	14.791	301.369	8.509	26.337	1238.521	1	2051	450
1/4/2051	0	0	436.6205376	14.345	292.274	8.252	25.542	1201.143	1	2051	437
1/5/2051	0	0	426.0403879	13.997	285.191	8.052	24.923	1172.037	1	2051	426
1/6/2051	0	0	415.8760102	13.663	278.387	7.860	24.329	1144.075	1	2051	416
1/7/2051	0	0	406.1045134	13.342	271.846	7.675	23.757	1117.194	1	2052	406
1/8/2051	0	0	396.7046268	13.033	265.554	7.498	23.207	1091.334	1	2052	397
1/9/2051	0	0	387.65656	12.736	259.497	7.327	22.678	1066.443	1	2052	388
1/10/2051	0	0	378.941878	12.450	253.664	7.162	22.168	1042.469	1	2052	379
1/11/2051	0	0	370.5433881	12.174	248.042	7.003	21.677	1019.365	1	2052	371
1/12/2051	0	0	362.4450379	11.908	242.621	6.850	21.203	997.086	1	2052	362
1/1/2052	0	0	354.6318235	11.651	237.391	6.703	20.746	975.592	1	2052	355
1/2/2052	0	0	347.0897056	11.403	232.342	6.560	20.305	954.844	1	2052	347
1/3/2052	0	0	339.8055342	11.164	227.466	6.422	19.879	934.805	1	2052	340

1/4/2052	0	0	321.1126309	10.550	214.953	6.069	18.785	883.381	1	2052	321
1/5/2052	0	0	298.5652458	9.809	199.860	5.643	17.466	821.353	0	2052	299
1/6/2052	0	0	292.2844793	9.603	195.655	5.524	17.099	804.075	0	2052	292
1/7/2052	0	0	286.21175	9.403	191.590	5.409	16.743	787.369	0	2053	286
1/8/2052	0	0	280.3375464	9.210	187.658	5.298	16.400	771.209	0	2053	280
1/9/2052	0	0	274.6529136	9.024	183.853	5.191	16.067	755.570	0	2053	275
1/10/2052	0	0	269.1494125	8.843	180.169	5.087	15.745	740.430	0	2053	269
1/11/2052	0	0	263.8190849	8.668	176.600	4.986	15.433	725.766	0	2053	264
1/12/2052	0	0	258.6544191	8.498	173.143	4.889	15.131	711.558	0	2053	259
1/1/2053	0	0	253.6483202	8.333	169.792	4.794	14.838	697.787	0	2053	254
1/2/2053	0	0	248.7940817	8.174	166.543	4.702	14.554	684.433	0	2053	249
1/3/2053	0	0	244.0853593	8.019	163.391	4.613	14.279	671.479	0	2053	244
1/4/2053	0	0	231.7465815	7.614	155.131	4.380	13.557	637.535	0	2053	232
1/5/2053	0	0	216.8159405	7.123	145.137	4.098	12.684	596.461	0	2053	217
1/6/2053	0	0	212.7093572	6.988	142.388	4.020	12.443	585.163	0	2053	213
1/7/2053	0	0	208.7228095	6.857	139.719	3.945	12.210	574.196	0	2054	209
1/8/2053	0	0	204.8515137	6.730	137.128	3.872	11.984	563.547	0	2054	205
1/9/2053	0	0	201.0909288	6.607	134.610	3.801	11.764	553.201	0	2054	201
1/10/2053	0	0	197.4367406	6.487	132.164	3.732	11.550	543.148	0	2054	197
1/11/2053	0	0	193.8848489	6.370	129.787	3.664	11.342	533.377	0	2054	194
1/12/2053	0	0	190.4313536	6.256	127.475	3.599	11.140	523.877	0	2054	190
1/1/2054	0	0	187.0725439	6.146	125.226	3.536	10.944	514.637	0	2054	187
1/2/2054	0	0	183.8048863	6.039	123.039	3.474	10.753	505.647	0	2054	184
1/3/2054	0	0	180.6250149	5.934	120.910	3.414	10.567	496.899	0	2054	181
1/4/2054	0	0	177.5297215	5.833	118.838	3.355	10.385	488.384	0	2054	178
1/5/2054	0	0	174.5159466	5.734	116.821	3.298	10.209	480.093	0	2054	175
1/6/2054	0	0	171.5807712	5.637	114.856	3.243	10.037	472.019	0	2054	172
1/7/2054	0	0	168.7214089	5.543	112.942	3.189	9.870	464.153	0	2055	169
1/8/2054	0	0	165.9351985	5.452	111.077	3.136	9.707	456.488	0	2055	166
1/9/2054	0	0	163.2195975	5.362	109.259	3.085	9.548	449.017	0	2055	163
1/10/2054	0	0	160.5721752	5.275	107.487	3.035	9.393	441.734	0	2055	161
1/11/2054	0	0	157.9906071	5.191	105.759	2.986	9.242	434.632	0	2055	158
1/12/2054	0	0	155.4726692	5.108	104.073	2.938	9.095	427.705	0	2055	155
1/1/2055	0	0	153.0162327	5.027	102.429	2.892	8.951	420.948	0	2055	153

1/2/2055	0	0	150.619259	4.948	100.825	2.847	8.811	414.354	0	2055	151
1/3/2055	0	0	148.2797952	4.872	99.258	2.802	8.674	407.918	0	2055	148
1/4/2055	0	0	138.2264036	4.541	92.529	2.612	8.086	380.261	0	2055	138
1/5/2055	0	0	125.5011704	4.123	84.010	2.372	7.342	345.254	0	2055	126
1/6/2055	0	0	123.5236879	4.058	82.687	2.335	7.226	339.814	0	2055	124
1/7/2055	0	0	121.5933971	3.995	81.395	2.298	7.113	334.503	0	2056	122
1/8/2055	0	0	119.708784	3.933	80.133	2.262	7.003	329.319	0	2056	120
1/9/2055	0	0	117.8683956	3.872	78.901	2.228	6.895	324.256	0	2056	118
1/10/2055	0	0	116.0708372	3.813	77.698	2.194	6.790	319.311	0	2056	116
1/11/2055	0	0	114.3147692	3.756	76.522	2.161	6.687	314.480	0	2056	114
1/12/2055	0	0	112.598905	3.699	75.374	2.128	6.587	309.760	0	2056	113
1/1/2056	0	0	110.9220081	3.644	74.251	2.096	6.489	305.146	0	2056	111
1/2/2056	0	0	109.2828896	3.590	73.154	2.065	6.393	300.637	0	2056	109
1/3/2056	0	0	107.6804065	3.538	72.081	2.035	6.299	296.229	0	2056	108
1/4/2056	0	0	106.1134592	3.486	71.032	2.006	6.208	291.918	0	2056	106
1/5/2056	0	0	104.5809895	3.436	70.007	1.977	6.118	287.702	0	2056	105
1/6/2056	0	0	103.0819789	3.387	69.003	1.948	6.030	283.579	0	2056	103
1/7/2056	0	0	101.6154468	3.338	68.021	1.921	5.945	279.544	0	2057	102
1/8/2056	0	0	100.1804486	3.291	67.061	1.893	5.861	275.596	0	2057	100
1/9/2056	0	0	98.77607427	3.245	66.121	1.867	5.778	271.733	0	2057	99
1/10/2056	0	0	97.40144676	3.200	65.201	1.841	5.698	267.951	0	2057	97
1/11/2056	0	0	96.05572063	3.156	64.300	1.815	5.619	264.249	0	2057	96
1/12/2056	0	0	94.73808062	3.113	63.418	1.791	5.542	260.624	0	2057	95
1/1/2057	0	0	93.44774035	3.070	62.554	1.766	5.467	257.075	0	2057	93
1/2/2057	0	0	92.18394113	3.029	61.708	1.742	5.393	253.598	0	2057	92
1/3/2057	0	0	90.94595074	2.988	60.879	1.719	5.320	250.192	0	2057	91
1/4/2057	0	0	81.96349618	2.693	54.866	1.549	4.795	225.482	0	2057	82
1/5/2057	0	0	70.27977579	2.309	47.045	1.328	4.111	193.340	0	2057	70
1/6/2057	0	0	69.31544372	2.277	46.400	1.310	4.055	190.687	0	2057	69
1/7/2057	0	0	68.37095563	2.246	45.768	1.292	4.000	188.088	0	2058	68
1/8/2057	0	0	67.44576725	2.216	45.148	1.275	3.946	185.543	0	2058	67
1/9/2057	0	0	66.53935297	2.186	44.541	1.258	3.893	183.050	0	2058	67
1/10/2057	0	0	65.65120507	2.157	43.947	1.241	3.841	180.606	0	2058	66
1/11/2057	0	0	64.78083296	2.128	43.364	1.224	3.790	178.212	0	2058	65

1/12/2057	0	0	63.92776252	2.100	42.793	1.208	3.740	175.865	0	2058	64
1/1/2058	0	0	63.09153544	2.073	42.233	1.192	3.691	173.565	0	2058	63
1/2/2058	0	0	62.27170854	2.046	41.685	1.177	3.643	171.309	0	2058	62
1/3/2058	0	0	61.46785323	2.019	41.147	1.162	3.596	169.098	0	2058	61
1/4/2058	0	0	60.67955491	1.994	40.619	1.147	3.550	166.929	0	2058	61
1/5/2058	0	0	59.9064124	1.968	40.101	1.132	3.505	164.803	0	2058	60
1/6/2058	0	0	59.14803748	1.943	39.594	1.118	3.460	162.716	0	2058	59
1/7/2058	0	0	58.4040543	1.919	39.096	1.104	3.417	160.670	0	2059	58
1/8/2058	0	0	57.67409899	1.895	38.607	1.090	3.374	158.661	0	2059	58
1/9/2058	0	0	56.95781917	1.871	38.128	1.077	3.332	156.691	0	2059	57
1/10/2058	0	0	56.25487349	1.848	37.657	1.063	3.291	154.757	0	2059	56
1/11/2058	0	0	55.56493127	1.826	37.195	1.050	3.251	152.859	0	2059	56
1/12/2058	0	0	54.88767204	1.803	36.742	1.037	3.211	150.996	0	2059	55
1/1/2059	0	0	54.22278522	1.781	36.297	1.025	3.172	149.167	0	2059	54
1/2/2059	0	0	53.56996972	1.760	35.860	1.012	3.134	147.371	0	2059	54
1/3/2059	0	0	52.92893358	1.739	35.431	1.000	3.096	145.607	0	2059	53
1/4/2059	0	0	40.64504447	1.335	27.208	0.768	2.378	111.815	0	2059	41
1/5/2059	0	0	24.28384902	0.798	16.256	0.459	1.421	66.805	0	2059	24
1/6/2059	0	0	23.97705088	0.788	16.050	0.453	1.403	65.961	0	2059	24
1/7/2059	0	0	23.67603027	0.778	15.849	0.447	1.385	65.133	0	2060	24
1/8/2059	0	0	23.38064305	0.768	15.651	0.442	1.368	64.320	0	2060	23
1/9/2059	0	0	23.0907495	0.759	15.457	0.436	1.351	63.523	0	2060	23
1/10/2059	0	0	22.80621425	0.749	15.266	0.431	1.334	62.740	0	2060	23
1/11/2059	0	0	22.52690605	0.740	15.080	0.426	1.318	61.972	0	2060	23
1/12/2059	0	0	22.25269764	0.731	14.896	0.421	1.302	61.217	0	2060	22
1/1/2060	0	0	21.98346563	0.722	14.716	0.415	1.286	60.477	0	2060	22
1/2/2060	0	0	21.71909032	0.714	14.539	0.410	1.271	59.749	0	2060	22
1/3/2060	0	0	21.45945559	0.705	14.365	0.406	1.255	59.035	0	2060	21
1/4/2060	0	0	21.20444878	0.697	14.194	0.401	1.240	58.333	0	2060	21
1/5/2060	0	0	20.95396055	0.688	14.027	0.396	1.226	57.644	0	2060	21
1/6/2060	0	0	20.70788478	0.680	13.862	0.391	1.211	56.967	0	2060	21
1/7/2060	0	0	20.46611843	0.672	13.700	0.387	1.197	56.302	0	2061	20
1/8/2060	0	0	20.22856146	0.665	13.541	0.382	1.183	55.649	0	2061	20
1/9/2060	0	0	19.99511671	0.657	13.385	0.378	1.170	55.007	0	2061	20

1/10/2060	0	0	19.76568982	0.649	13.231	0.374	1.156	54.375	0	2061	20
1/11/2060	0	0	19.54018911	0.642	13.080	0.369	1.143	53.755	0	2061	20
1/12/2060	0	0	19.31852551	0.635	12.932	0.365	1.130	53.145	0	2061	19
1/1/2061	0	0	19.10061245	0.628	12.786	0.361	1.117	52.546	0	2061	19
1/2/2061	0	0	18.88636578	0.620	12.643	0.357	1.105	51.956	0	2061	19
1/3/2061	0	0	18.67570373	0.614	12.502	0.353	1.093	51.377	0	2061	19
1/4/2061	0	0	10.69898063	0.352	7.162	0.202	0.626	29.433	0	2061	11
1/5/2061	0	0	0	0.000	0.000	0.000	0.000	0.000	0	2061	0
1/6/2061	0	0	0	0.000	0.000	0.000	0.000	0.000	0	2061	0

Attachment D: Contaminated Land Register Search Results

Department of Environment, Science and Innovation (DESI)
ABN 46 640 294 485
GPO Box 2454, Brisbane QLD 4001, AUSTRALIA
www.des.qld.gov.au

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Andrew Todd-Weckmann
Suite 9
13/25 Church St
Hawthorn VIC 3122

Transaction ID: 50957862 EMR Site Id: 02 September 2024
Cheque Number:
Client Reference:

This response relates to a search request received for the site:
Lot: 450 Plan: SP274333
18376 INNAMINCKA RD
DURHAM

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
The EMR/CLR does NOT include:-

1. land which is contaminated land (or a complete list of contamination) if DESI has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DESI has not been notified

If you have any queries in relation to this search please email emr.clr.registry@des.qld.gov.au

Administering Authority

Attachment E:
Vali Gas Field Underground Water Impact Report

Australasian Groundwater & Environmental Consultants

Report on

Vali Gas Field Underground Water Impact Report

Prepared for
ERIAS Group

Project No. VGF5000.002
October 2025

ageconsultants.com.au

ABN 64 080 238 642

Document details and history

Document details

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Document status and review

Edition	Comments	Author	Authorised by	Date
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v01.02	Draft report-internal review completed	AL	KP	21/06/2024
v02.01	Final report _discussion about the monitoring strategy	AL	DH	29/08/2024
v02.02	Final Report_external review	AL	DH	23/10/2024
v03.03	Final Report	AL	AL	29/10/2024
v04.01	Final Report addressing DETSI comments	AL/DH	DH	11/06/2025
v05.01	Report addressing EA application comments	AL/SF	DH	15/10/2025
v06.01	Final Report	AL	DH	17/10/2025

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Vali Gas Field Underground Water Impact Report

1 Introduction

ERIAS Group (ERIAS) is supporting Vintage Energy (Vintage) in converting Authority to Prospect (ATP) 2021 into Petroleum Lease (PL) 1125 for the Vali Gas Project. This transition necessitates compliance with the Water Act 2000, specifically the preparation and submission of an Underground Water Impact Report (UWIR).

To meet this requirement, ERIAS engaged Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) to prepare the UWIR, which was submitted to the Department of Environment, Tourism, Science and Innovation (DETSI) on 17 February 2025. On 19 May 2025, Vintage received a notice from DETSI requesting modifications to the UWIR, as summarised in Section 1.3.3.

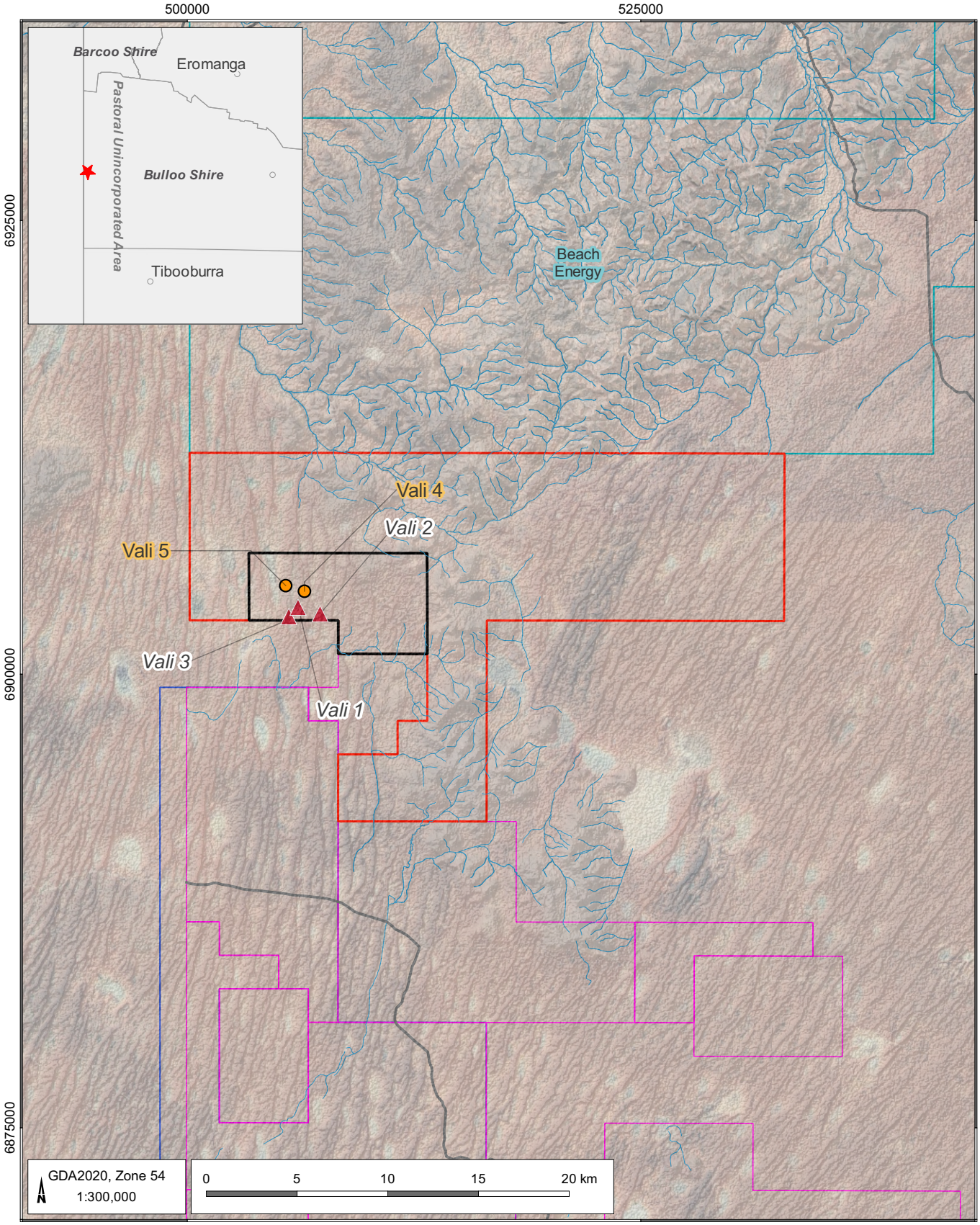
In parallel, a site-specific Environmental Authority (EA) application was submitted to DETSI. On 9 June 2025, Vintage received a response notice identifying a key issue under Item 11: the omission of Vali 4 and Vali 5 wells from the UWIR. As these wells are included in the scope of the EA application, DETSI requested either an updated UWIR incorporating these wells or a separate response addressing the requirements under section 126A(2)(c–f) of the *Environmental Protection Act 1994* (refer to Section 1.3.4).

This UWIR has been updated to address the feedback provided by DETSI in relation to both the UWIR and EA applications.

1.1 Project area

The Project is within ATP2021 in the Shire of Bulloo in Queensland. The Vali gas field comprises three production wells, Vali-1, Vali-2 and Vali-3, located on separate pads, between 700 and 1,700 metres apart. A production uplift program is currently being undertaken, including Vali-3 extracting from the Patchawarra Formation in 2026, and the development of two new production wells, Vali-4 and Vali-5, in 2027. Figure 1.1 shows the extent of the Project area, the associated PL area (PL1125) and the location of the existing and proposed production wells.

The broader Project includes a second gas field named Odin located across Queensland and South Australia. The production well Odin 1 is located approximately six kilometres west of Vali-3, in South Australia. The Odin gas field Project is excluded from this UWIR.



LEGEND

- Place names
- Vali production wells
- Vali production wells - proposed
- Watercourse
- Roads
- Authority to Prospect (ATP 2021)
- Authority to Prospect (ATPs)
- Petroleum Lease 1125
- Santos Petroleum Leases
- Santos Exploration Permits for Petroleum
- Local government region

Vali Gas Field UWIR 2025 (VGF5000.002)

Project location

AGE

DATE 14/10/2025

FIGURE No: **1.1**

©2025 Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) - www.ageconsultants.com.au
Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011.; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.;
G:\Projects\VGF5000.002 Vali Gas Field UWIR 2025\3_GIS\Workspaces\001_UWIR update\01.01_VGF5000_Project location.qgz

1.2 DETSI information requests

Table 1.1 and Table 1.2 outlines the location of the information requested by the Department of the Environment, Tourism, Science and Innovation (DETSI).

Table 1.1 Direction to modify underground water impact report – 19 May 2025

Item number	Notice description	Location of information
2	***Modifications***	
a)	The chief executive considers the report is inadequate in a material particular to s. 370 of the Water Act 2000 (Water Act), a responsible entity must give the chief executive an underground water impact report (UWIR) that complies with the requirements under Division 4, Requirements for underground water impact reports and final reports. The following requirements have not been sufficiently addressed within the submitted UWIR:	This report
a)i	The UWIR must describe the impacts on environmental values (EVs) that have occurred, or are likely to occur, because of any previous exercise of underground water rights as per s. 376(1)(da) of the Water Act. Section 5 provides a description of the impacts on EVs; however, it is not clear if this is relating to the previous or proposed exercise of underground water rights.	Section 5
a)ii	The UWIR must include a program for conducting an annual review of the accuracy of each map prepared under paragraph (b)(iv) (IAA) and (v) (LTAA) as per s. 376(1)(e)(i) of the Water Act.	Section 8
a)iii	The UWIR must include a program for giving the chief executive a summary of the outcome of each review, including a statement of whether there has been a material change in the information or predictions used to prepare the maps as per s. 376(1)(e)(ii) of the Water Act.	Section 6
a)iv	The UWIR must include a water monitoring strategy (WMS) as per s. 376(1)(f) of the Water Act, and the WMS must include the rationale for the WMS as per s. 378(1)(b) of the Water Act. Whilst the statement presented in section 6.2 addresses some aspects of the required rationale, it does not clearly provide direction against the rationale requirements presented in the UWIR guideline (ESR/2016/2000). The monitoring rationale should address the below (but not be restricted to): a) an assessment of changes in water levels and water quality because of the exercise of relevant underground water rights; b) supplementation of existing monitoring programs to fill any critical gaps in data; and c) an explanation about how it will improve the understanding about the impacts of underground water extractions on aquifers.	Section 6
a)v	The WMS must include a timetable for implementing the WMS strategy as per s. 378(1)(c) of the Water Act. The UWIR proposes that groundwater monitoring will be conducted on a biannual and annual basis, however the UWIR does not meet guideline requirements and include the sub-block of the tenure in which the monitoring bore(s) are located or the date(s) for the proposed monitoring	Section 6
The report must be modified as follows:		
a	Pursuant to s. 376(1)(da) of the Water Act, describe the impacts on EVs that have occurred, or are likely to occur, because of any previous exercise of underground water rights.	Section 5
b	Pursuant to s. 376(1)(e)(i) of the Water Act, provide a program for conducting an annual review of the accuracy of each map prepared under paragraph (b)(iv) (IAA) and (v) (LTAA).	Section 8
c	Pursuant to s. 376(1)(e)(ii) of the Water Act, provide a program for giving the chief executive a summary of the outcome of each review, including a statement of whether there has been a material change in the information or predictions used to prepare the maps.	Section 6

Item number	Notice description	Location of information
d	Pursuant to s. 378(1)(b) of the Water Act, include a rationale that clearly addresses the requirements presented in the UWIR guideline (ESR/2016/2000): • an assessment of changes in water levels and water quality because of the exercise of relevant underground water rights; • supplementation of existing monitoring programs to fill any critical gaps in data; and • an explanation about how it will improve the understanding about the impacts of underground water extractions on aquifers.	Section 6
e	Pursuant to s. 378(1)(c) of the Water Act, include a timetable for implementing the WMS strategy that includes the following as per the guideline Underground water impact reports and final reports (ESR/2016/2000): • a table listing: the bores to be monitored (with a unique identifier for each bore); the tenure in which the bore is located (where possible including the block and sub-block in which the bore is located); the date(s) for proposed monitoring and the parameters that will be monitored.	Table 6.1

Table 1.2 EA application notice ESR/2016/3447 - 9 June 2025

Item number	Notice description	Location of information
11	***Vali 4 and Vali 5 underground water impacts*** *Issue* *The application included an Underground Water Impact Report (UWIR) as supporting information on the groundwater drawdown and groundwater quality impacts presented by the Vali gas field project. However, it is noted that Vali 4 and Vali 5 wells were not included in UWIR. As these wells are included in the scope of this site-specific environmental authority application, it is expected that the groundwater impacts of these wells are accordingly presented.* *Action required* *Provide an updated UWIR report that includes Vali 4 and Vali 5 wells. Alternatively, for the Vali 4 and Vali 5 wells, provide a response that addresses the information requirements under s126A(2)(c-f) under the Environmental Protection Act 1994."*	Sections 22.2, 3, 4, 5, 6, 7 and 8

1.3 Legislation and guidelines

The primary legislative requirements related to the extraction of groundwater from deep aquifers and management of produced water for Vali Gas Field activities are summarised below.

1.3.1 Petroleum and Gas (Production and Safety) Act 2004 (QLD)

Under the Petroleum and Gas (Production and Safety) Act 2004 (Qld), the petroleum tenure holder may take or interfere with underground water in the area of the tenure if this happens during the course of, or results from, the carrying out of another authorised activity for the tenure. The Act also requires tenure holders to comply with underground water obligations specified in the Water Act 2000 (Qld).

1.3.2 Water Act 2000 (QLD)

Management of underground water impacts as a result of the exercise of underground water rights by petroleum tenure holders for petroleum or CSG projects is detailed in Chapter 3 of the Water Act 2000. The Act provides a framework that requires the petroleum tenure holder to prepare an Underground Water Impact Report (UWIR) which establishes obligations for monitoring and managing impacts on aquifers and springs. More specifically it also provides for trigger levels for establishing the significance of impact on an aquifer in the event of a decline in water levels. These trigger thresholds are:

- a 5 m decline in water levels within a consolidated aquifer;
- a 2 m decline in water levels within an unconsolidated aquifer; and
- a 0.2 m decline in water levels associated with active springs.

Areas where the expected decline in groundwater levels exceeds the relevant trigger level, within the next three years are defined as Immediately Affected Areas (or IAA). Areas where the expected declines in groundwater level exceed the trigger threshold in the longer term (i.e. sometime after three years) are defined as Long-term Affected Areas (or LTAA).

1.3.3 Underground Water Impact Report (UWIR)

The overall purpose of an Underground Water Impact Report (UWIR) is to provide a summary of the predicted groundwater impacts of a Project and set out how these expected impacts are to be monitored and managed. The underground water impact report and final reports guideline (Queensland government, 2025) recommends specific methods for making predictions about the impacts of underground water extractions and for the preparation of UWIRs.

A UWIR must contain the following information:

- Part A: Information about underground water extractions resulting from the exercise of underground water rights.
- Part B: Information about aquifers affected, or likely to be affected.
- Part C: Maps showing the area of the affected aquifer(s) where underground water levels are expected to decline.
- Part D: An assessment of the impacts to the environmental values from the exercise of underground water rights.
- Part E: A water monitoring strategy.
- Part F: A spring impact management strategy.

1.3.4 Environmental Protection Act 1994 (QLD)

The Environmental Protection Act 1994 and the related Environmental Protection (Water) Policy (EPP Water) provides a framework to protect and/or enhance the suitability of Queensland waters for various beneficial uses.

Surface waters are managed under the Cooper Creek water plan which is a component of the Lake Eyre Basin. The Lake Eyre Basin extends across Queensland, South Australia, New South Wales and the Northern Territory and the governments are signatories of the Lake Eyre Basin Intergovernmental Agreement (IGA).

Groundwater resources in the Project area are managed under the Great Artesian Basin and Other Regional Aquifer (GABORA) Water Plan (Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017). The Water Plan is divided into groundwater units listed in Schedule 2 of the Water Plan and the geological formations are listed in Schedule 3 of the Water Plan. Although the geological formations of the Eromanga Basin are listed in Schedule 3 of the Water Plan, the groundwater resources from the Cooper Basin are not mentioned in the Water Plan. Therefore, there are no environmental values and water quality objectives listed in Schedule 1 of the Water Plan for the groundwater resources extracted from Vali Gas production wells.

1.4 Report structure

The structure of this UWIR is in accordance with requirements of the Environmental Protection Act 1994 (section 126A and 227AA) and Water Act 2000 (section 376) and with associated Queensland Government guidelines (Queensland Government, 2025), and includes the following sections:

- Part A: Information about underground water extractions resulting from the exercise of underground water rights (Section 2).
- Part B: Information about aquifers affected, or likely to be affected; underground water flow description (Section 3).
- Part C: Predicted changes to water levels in the affected aquifer(s) (Section 4).
- Part D: An assessment of the impacts on environmental values from the exercise of underground water rights (Section 5).
- Part E: A water monitoring strategy (Section 6).
- Part F: A spring impact management strategy (Section 7).

2 Underground water extraction (Part A)

This section presents information regarding underground water extraction carried out under existing underground water rights. Water extraction is currently or planned to occur from the following wells:

- Vali-1 (Patchawarra Formation): Predicted to remain online until 2030.
- Vali-2 (Dual Screen – Toolachee and Patchawarra Formations): Predicted to remain online until 2033.
- Vali-3 (Toolachee Formation): Predicted to extract from the Toolachee Formation until 2026.

Vintage has also indicated plans to expand production capacity with the Vali-3 well and addition of new wells Vali-4 and Vali-5 with the following schedule:

- Vali-3 (Patchawarra Formation): Scheduled to be online in 2026, with operations expected to continue until 2039.
- Vali-4 (Patchawarra Formation): Expected to come online in 2027 and remain operational until 2040.
- Vali-5 (Patchawarra Formation): Expected to come online in 2027 and remain operational until 2040.

The following sections will provide details on the volume of water already extracted (Section 2.1) and projections of future water extractions, including contributions from proposed future wells (Vali-4 and Vali-5) at the time of this UWIR (Section 2.2).

2.1 Quantity of water already extracted

There are three existing production wells located within ATP2021, which include the Vali-1 well which was completed in 2020 and the Vali-2 and Vali-3 wells which were both completed in 2021.

As summarised in Table 2.1, production testing at Vali Gas Project started in Q1 2023 from the Patchawarra and Toolachee Formations, with Vali-1 being the main testing well with 135 days of production from late February 2023 to July 2023. Information on the stratigraphic units screened by each of these three wells is provided in Table 2.1.

Table 2.1 Production wells, production dates and stratigraphy

Bore name	Start of production	Stratigraphic unit(s)	Comments
Vali-1	21 February 2023	Patchawarra Formation	135 days of testing production
Vali-2	March 2023	Toolachee and Patchawarra Formations	16 days of testing production. Well flowing from Patchawarra only from 4 May 2023
Vali-3	March 2023	Toolachee Formation	11 days of testing production

The most productive period was between 21 February and 31 July 2023 with a total 3,259 kL of water extracted from the three wells. The metred cumulated water extraction to facility and to flare/vent/blowdown is shown in Table 2.2.

Table 2.2 Water already extracted February 2023 to June 2024

Months	Water extraction[1] (kL)				
	Vali-1 (Patchawarra)	Vali-2[2] (Patchawarra)	Vali-2 (Toolachee)	Vali-3 (Toolachee)	Total
February 2023	161.30	0.00	0.00	0.00	161.30
March 2023	379.67	0.00	96.82	211.69	688.18
April 2023	275.99	0.00	99.36	193.79	569.15
May 2023	198.39	530.38	12.08	0.00	740.85
June 2023	231.65	541.98	0.00	0.00	773.62
July 2023	263.99	62.00	0.00	0.00	325.99
August 2023 - June 2024	NA	NA	NA	NA	NA
Total	-	-	-	-	**3,259.09 kL**

Notes: [1] Estimated based on metred cumulated water extraction to facility and to flare/vent/blowdown.
[2] Well flowing from Patchawarra only from 4 May 2023.

2.2 Quantity of water to be extracted in the next three years

Table 2.3 presents the projected total water extraction rates over the three next years (July 2024 to July 2027) for both existing production wells (Vali-1, Vali-2, Vali-3) and proposed production wells (Vali-4 and Vali-5). Groundwater extraction from the proposed wells Vali-4 and Vali-5 is predicted to commence after June 2027 and therefore does not contribute to the projected water extraction rates reported for the next three years.

Proposed water extraction activities are scheduled to continue until June 2040 (Long Term Affected Area - LTAA) and predicted water extraction for the duration of the LTAA is provided in Section 4.

Table 2.3 Total predicted water extraction rates for the next three years (July 2024-June 2027)

Year	Date	Production wells online	Vali 1 (kL/y)	Vali 2 (kL/y)	Vali 3 (kL/y)	Vali 4 (kL/y)	Vali 5 (kL/y)	Total (kL/y)
2024/2025	1 July 2024 to 30 June 2025	Vali-1, Vali-2, Vali-3 (Toolachee)	3,867	3,867	3,867	0	0	11,600
2025/2026	1 July 2025 to 30 June 2026	Vali-1, Vali-2, Vali-3 (Toolachee)	3,867	3,867	3,867	0	0	11,600
2026/2027	1 July 2026 to 30 June 2027	Vali-1, Vali-2, Vali-3 (Patchawarra)	3,867	3,867	3,867	0	0	11,600

3 Existing environment and aquifer information (Part B)

3.1 Climate

The Scientific Information for Landowners (SILO) database provides interpolated rainfall and evaporation data from available climate stations for a selected location. The monthly patched point SILO rainfall data for the Project site (longitude 141.13, latitude -28.01) were obtained from the Long Paddock website on 9 January 2024 (Queensland Government, 2024). Interpolated climatic information was obtained for the period January 2000 and December 2023.

According to the Köppen major classification system (BOM, 2005) the Project area experiences a desert climate. Figure 3.1 summarises observed monthly average temperature ranges and precipitation between 2000 and 2023. As shown monthly precipitation is limited, typically less than 10 mm/month in winter rising slightly in the summer to up to 26 mm on average in January. Average annual rainfall over the period analysed was 174 mm. Average maximum temperature in January is 39ºC falling to 20ºC on average in July.

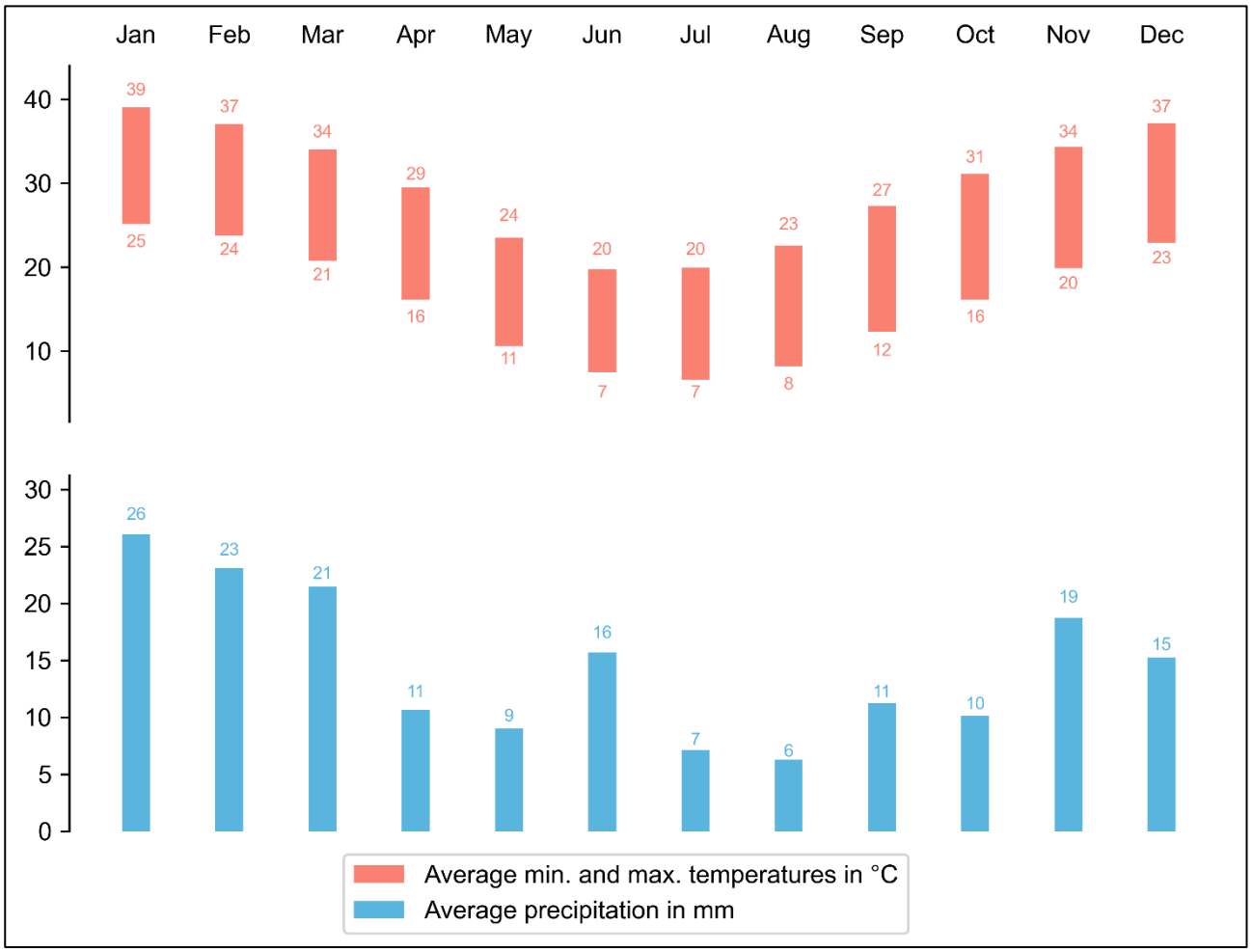


Figure 3.1 Average temperatures and precipitations between 2000 and 2023

The monthly Cumulative Rainfall Departure (CRD) was calculated for the period January 2000 to January 2024 and shows the area has experienced distinct cycles of above and below-average rainfall (Figure 3.2). The CRD method (Weber and Stewart, 2004) represents a summation of the monthly departure of rainfall from the long-term average monthly rainfall. A rising trend in the CRD plot therefore indicates periods of above-average rainfall, whilst a negative slope indicates periods of below-average rainfall.

The first part of the graph shows the millennium drought until 2010, then a wet period between 2010 and 2012. Between 2013 and 2020 rainfall totals were below average for the most part, with relatively short periods of above average rainfall. Since 2020 rainfall has been close to average.

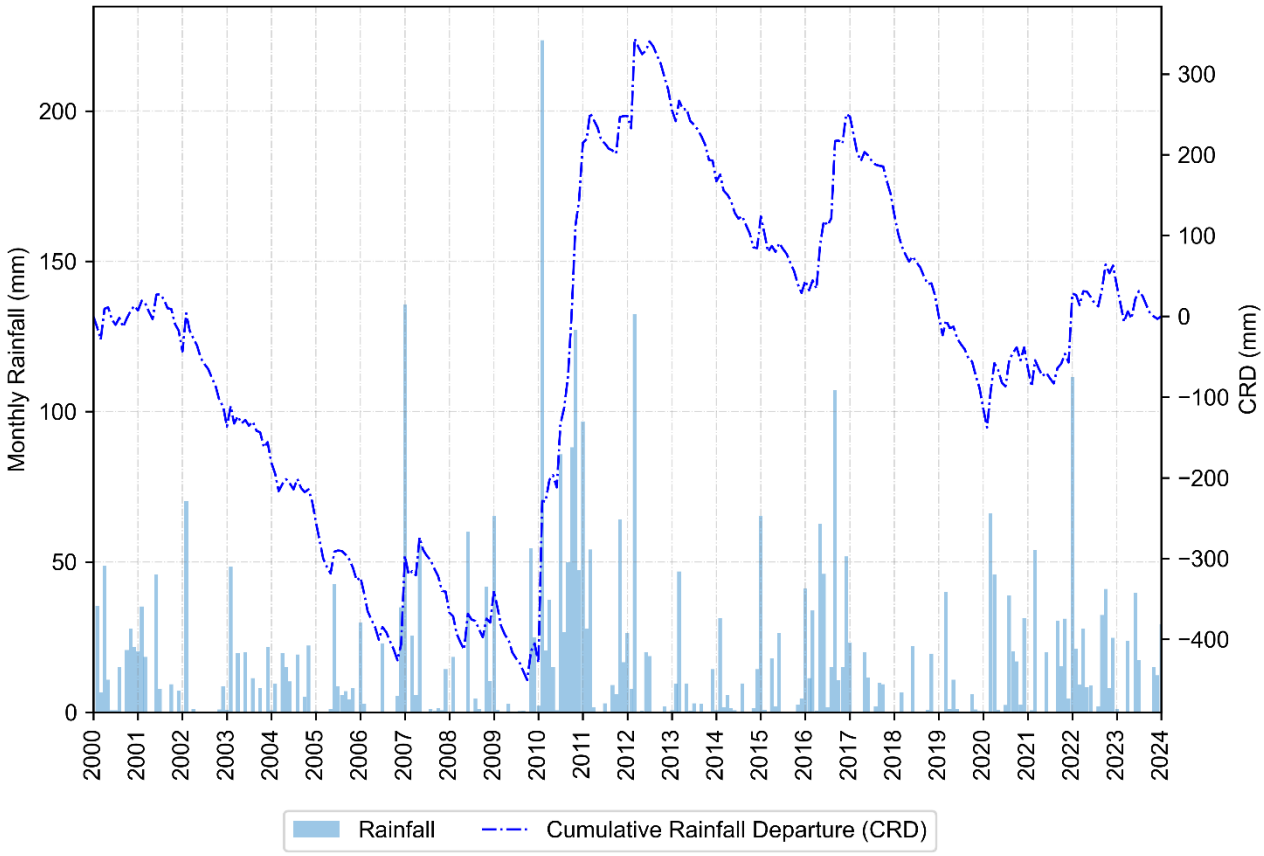


Figure 3.2 Monthly SILO rainfall and CRD (2000-2024)

3.2 Topography and drainage

Figure 3.3 shows the topography and drainage of the Project area.

3.2.1 Topography

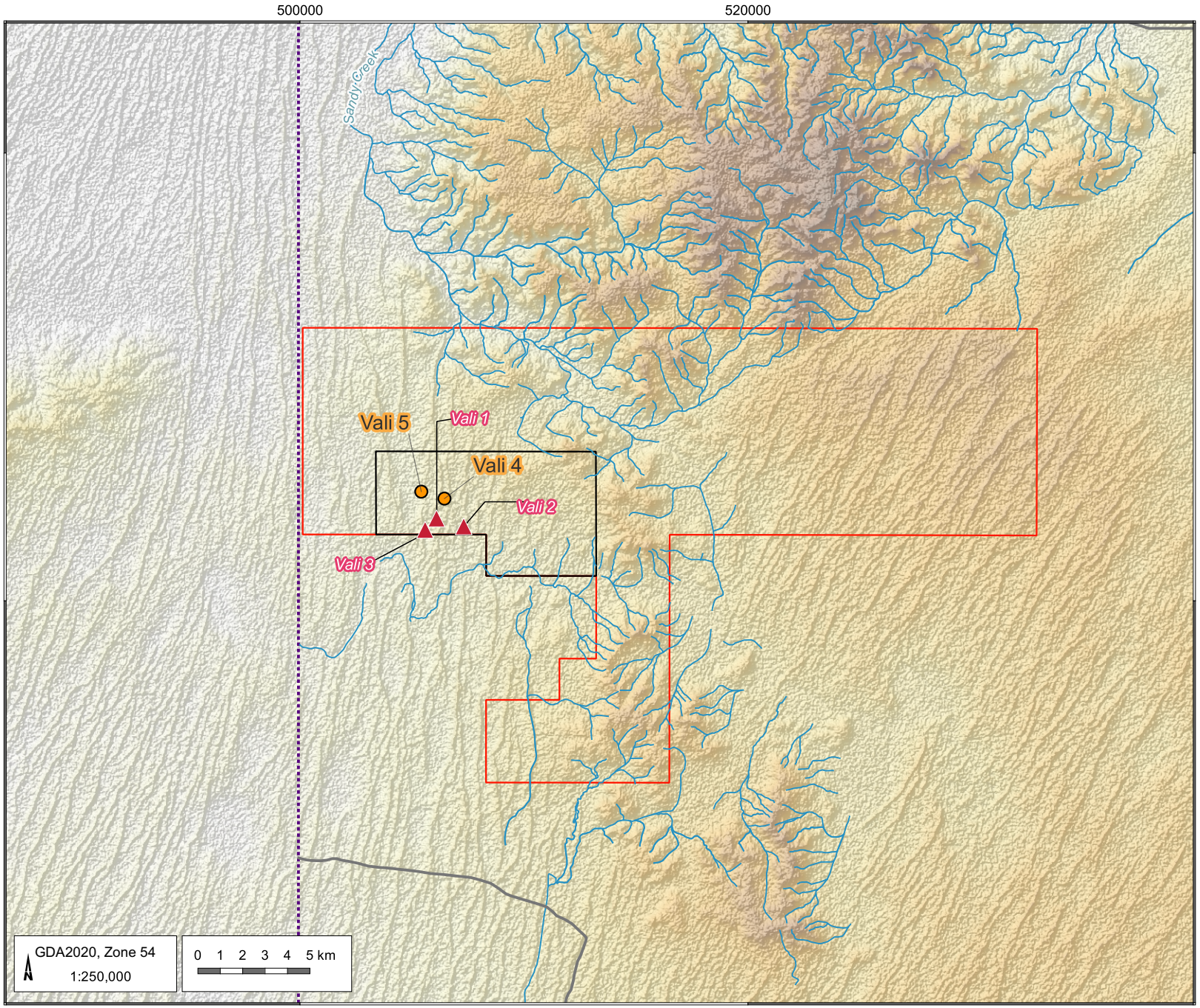
The Vali gas field site is located between the Simpson, Strzelecki and Sturt Stony deserts. The terrain in the area is dominated by undulating dune fields. It also comprises flat gibber plains, sand plains and flood plains.

Ground elevation at the Vali-1 well site is between 102 and 105 metres Australian Height Datum (mAHD). It is adjacent to a clay depression and a dune. Ground elevation at the Vali-2 pad is approximately 107 mAHD and 103 mAHD at the Vali-3 well pad. Since Vali-4 and Vali-5 have not yet been drilled, ground elevation data is currently unavailable for these wells.

3.2.2 Drainage

The site is located in a sub-basin of the Cooper Creek. Local drainage lines flow towards Lake Eyre, which is located approximately 370 km to the west of the Project area.

There are no springs from the Queensland Springs Database mapped within or near the Project area. The nearest mapped spring is approximately 300 km to the east of the Project area. The closest Great Artesian Basin springs in South Australia are approximately 100 km south west of the Project area.



LEGEND

- Vali wells
- Vali wells - proposed
- Watercourse
- Roads
- State border
- Authority to Prospect (ATP 2021)
- Petroleum Lease 1125

Elevation (mAHD)

- 75
- 100
- 120
- 140
- 160
- 180
- 200

Vali Gas Field UWIR 2025 (VGF5000.002)

Topography and drainage

DATE
03/10/2025

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FIGURE No:
3.3

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3.3 Geology

A review of the geological and hydrogeological features that occur beneath ATP2021 are described below and have been used to develop the hydrogeological conceptualisation of the groundwater regime beneath the Project area and surrounds. This understanding forms the basis for the analytical groundwater flow model. As mentioned previously the targets for gas production at PL1125 comprise the Toolachee and the Patchawarra Formations within the Cooper Basin. There are no regional faults mapped in the Project area.

Figure 3.4 summarises the stratigraphy of the project area.

3.3.1 Surface deposits

Figure 3.5 shows the surface geology at the Vali Gas field which is dominated by Quaternary sands. The older Tertiary age Glendower Formation outcrops to the east of the PL1125 and the Winton Formation (Cretaceous) outcrops to the northeast of ATP2021. The Glendower Formation is a fluvial deposit comprising sandstone, siltstone, conglomerate and mudstone. The Winton formation comprises interbedded, fine to coarse sandstone, siltstone, shale and coal seams deposited in fluvio-lacustrine environments. The total average thickness of the surface deposits (Quaternary, Tertiary and Cretaceous) is 850 metres.

3.3.2 Eromanga Basin

The Winton Formation is underlain by a series of sedimentary deposits with comprise the Eromanga Basin which represents the largest sub-basin within the Great Artesian Basin (GAB). The total sedimentary thickness of the Eromanga Basin at the site is approximately 1,050 metres. It comprises several stacked formations. The Hutton Sandstone is one of the major sandstone formations of the GAB and is present at the base of the Eromanga Basin in the Project area with a thickness averaging 105 metres. The base of the Eromanga Basin is approximately 2,000 metres below ground level (mbgl) at the Project area. A major unconformity at the base of the Eromanga Basin separates it from the underlying Cooper Basin.

3.3.3 Cooper Basin

The Eromanga Basin unconformably overlies the Cooper Basin. The Cooper Basin is a non-marine sedimentary pile and can be subdivided into three major geological groups:

- Triassic Nappamerri Group: which comprises the Tinchoo Formation (interbedded siltstone and sandstone, minor coal seams and intraclast conglomerate) and the Arraburry Formation (mudstone, siltstone and fine-grained sandstone). The total thickness of the Nappamerri Group is approximately 350 metres in the Project area.
- Permian Gilgealpa Group: which includes the two target formations for the Vali gas field (i.e. the Toolachee and the Patchawarra Formations).
  - The Toolachee Formation comprises interbedded fine to coarse-grained sandstone, siltstone and carbonaceous shale. It is approximately 160 metres thick in the Project area (between 2,400 and 2,550 metres below ground level) and unconformably overlies the mudstones and siltstones of the Daralingie Formation.
  - The Daralingie Formation, The Roseneath Shale, Epsilon Formation and Murteree Shale overlie the Patchawarra Formation. The cumulative thickness of these deposits in the Project area is around 350 metres which predominantly comprises interbedded mudstone, siltstone and shale.
  - The Patchawarra Formation predominantly comprises interbedded sandstone, siltstone, shale and coal. It is approximately 310 metres thick at the three existing production wells. Depths are approximately between 2,800 and 3,110 metres below ground level.
  - The underlying Tirrawarra Sandstone predominantly comprises fine to coarse-grained sandstone interbedded with conglomerate and minor carbonaceous siltstone, shale and coal.
- Late Carboniferous Group: which includes the Merrimelia Formation, it is of glacial origin.

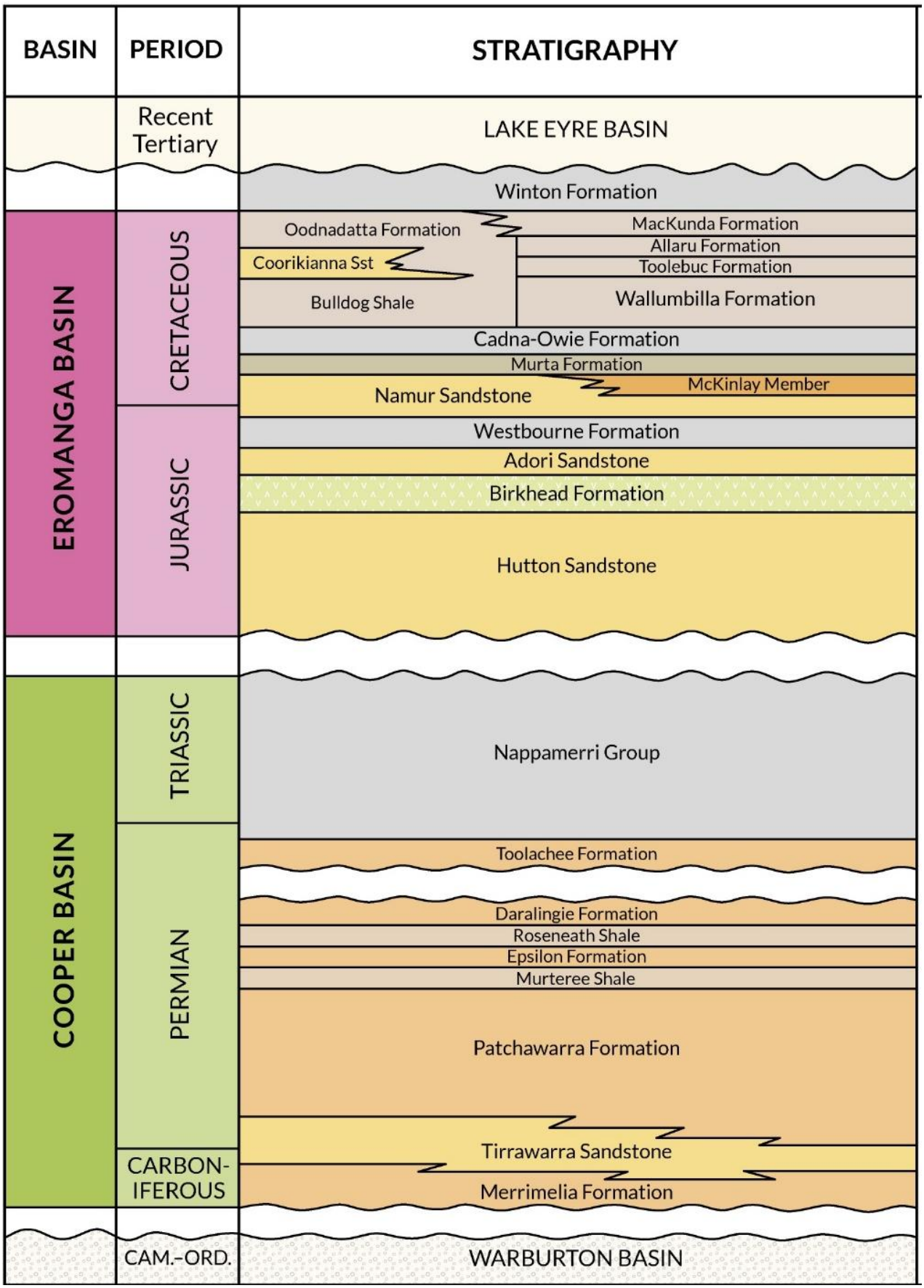
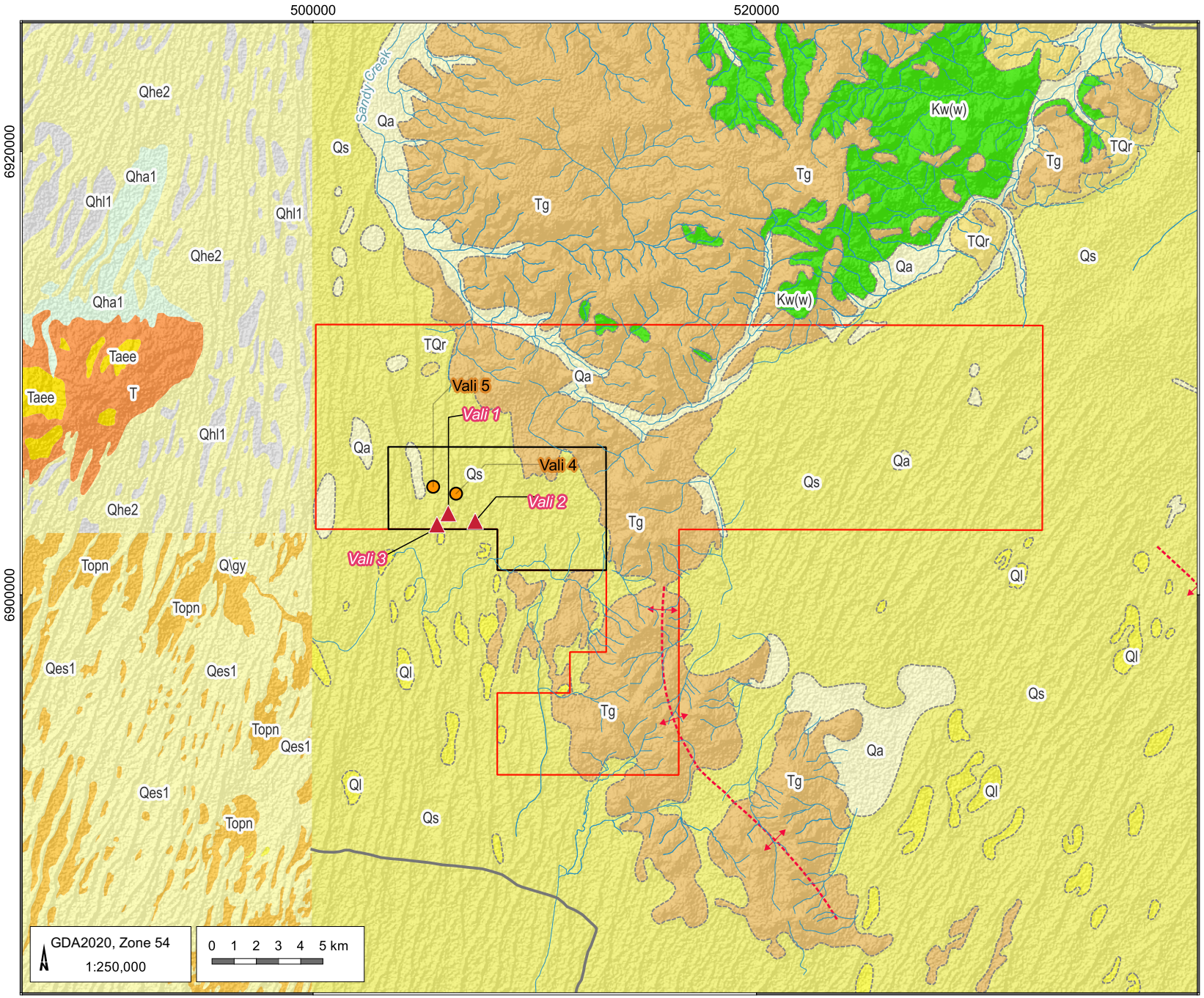


Figure 3.4 Stratigraphy of the Eromanga and Cooper basins



LEGEND

- Vali wells
- Vali wells - proposed
- Watercourse
- Roads
- Detailed Folds
- Detailed Geological Boundaries
- Authority to Prospect (ATP 2021)
- Petroleum Lease 1125

QLD Detailed surface geology (100k)

- Quaternary alluvium (Qa)
- Quaternary mud (Ql)
- Quaternary sand (Qs)
- Colluvium (TQr)
- Glendower Formation (Tg)
- Winton Formation(w) (Kw(w))

South Australia Surface geology (100k)

- Quaternary gypcrete (Q\gy)
- Holocene alluvial/fluvial unit 1 (Qha1)
- Holocene lacustrine/playa unit 1 (Qhl1)
- Holocene aeolian unit 2 (Qhe2)
- Eyre Formation (Taee)
- Simpson Sand unit 1 (Qes1)
- Namba Formation (Topn)
- Namba Formation (Topn)
- Tertiary rocks (T)

Vali Gas Field UWIR 2025 (VGF5000.002)

Surface geology

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FIGURE No:
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3.4 Hydrogeology

As would be expected significant groundwater resources are generally only consistently intersected in those stratigraphic units which are sandstone dominated. Other units which are dominated by siltstone, mudstone and shale formations tend to act as aquitards. The main aquifers for water extraction include the following:

- Shallow Quaternary and Tertiary sediments.
- The Winton Formation.
- The Great Artesian Basin (GAB) aquifers of the Eromanga Basin which include: Mackunda Formation, Wallumbilla Formation, Cadna-Owie Formation, Hooray and Hutton Sandstones.
- Other Cooper Basin aquifers including: Toolachee Formation, Epsilon Formation, Patchawarra Formation and Tirrawarra Sandstone.

The Winton and Mackunda aquifers are the primary targets for groundwater extraction in the project area because they are relatively shallow. Groundwater from Cadna-Owie, Hooray systems and other Eromanga Basin aquifers are rarely targeted for extraction locally due to drilling depths exceeding 1,000 metres. Petroleum exploration bores that intersect these deeper aquifers are sometimes repurposed for water supply purposes, however as discussed in Section 5.1, the deepest existing water supply bore within 15 km of the Project Area is less than 300 m deep. The aquifers of the Cooper Basin are present at ever greater depth (base of the Toolachee is approximately 2,550 mbgl and base of the Patchawarra is 3,110 mbgl) and only accessed for gas production.

It is considered unlikely that the impact of water extraction in the Cooper Basin could extend far beyond the top of the Cooper Basin into the overlying Eromanga Basin due to the geological discontinuity between the two basins, the thickness and the anticipated low permeability of the Tinchoo Formation, which sits immediately below the base of the Eromanga Basin. Based on this conceptualisation, the aquifers which could be impacted by the three Vali project production wells include:

- Hutton Sandstone: typically, comprises fine to coarse-grained quartzose porous sandstones interbedded with minor finer-grained siltstones. It lies unconformably over the Cooper Basin. Thickness is approximately 105 metres (between 1,900 and 2,000 mbgl). Estimated hydraulic conductivities are between 9.8 x 10^{-3} and 3.5x10^{-1} m/d (Santos, 2019) and storativity is estimated at 1 x 10^{-4}.
- Toolachee Formation: typically comprises porous sandstones interbedded with finer-grained siltstones, mudstones and shales with thin coal seams and some conglomerates. It unconformably overlies older formations across the whole Cooper Basin. Thickness is around 160 metres (between 2,380 and 2,540 mbgl in Vali-1). Estimated hydraulic conductivities are between 2 x 10^{-3} and 4.3 x 10^{-3} m/d (Santos, 2019) and storativity is 5.5 x 10^{-5}.
- Epsilon Formation: predominantly siltstone with minor coal and sandstones. The thickness averages 50 metres. There are no hydraulic properties estimated in the surrounding existing UWIR (Beach Energy, 2020 and Santos, 2019).
- Patchawarra Formation: consisting of variable porous sandstone interbedded with siltstone, mudstone and shale with thin coal seams. The thickness is 310 m at the project area (between 2,805 and 3,115 mbgl at Vali-1). Estimated hydraulic conductivities are between 3.3 x 10^{-4} and 3.5 x 10^{-3} m/d (Santos, 2019) and storativity is 1.1 x 10^{-4}.
- The Tirrawarra Sandstone: consisting of fine to coarse-grained and pebbly sandstone interbedded with conglomerate, minor carbonaceous siltstone, shale and coal. The Tirrawarra Sandstone thickness is on average approximately 80 metres. No estimated hydraulic conductivities were provided in other UWIR reports (Beach Energy, 2020 and Santos, 2019).

3.5 Groundwater quality

Single groundwater results are available for four locations within the project area: two mixed samples from Vali-1, Vali-2 and Vali-3 production bores (taken from two different locations within the gas/water collection network) and samples from two landowner bores (the Watties and Christmas bores) collected during baseline assessment data collation activities. Table 3.1 summaries the formations screen in each bore as well as sampling dates.

Table 3.1 Water sample information

Sample name	Date	Lithology
Top Pond (mixed sample from Vali-1, 2 and 3)	22/09/2023	Toolachee and Patchawarra Formations
Overflow Pond (mixed sample from Vali-1, 2 and 3)	22/09/2023	Toolachee and Patchawarra Formations
Watties Bore	05/04/2022	Glendower or Winton Formations
Christmas Bore	05/04/2022	Glendower or Winton Formations

Salinity can be described by total dissolved solid (TDS) concentrations or electrical conductivity (EC[1]). TDS concentrations are commonly classified on a scale ranging from fresh to extremely saline. The Queensland Government released Science Note – Measuring Salinity (Queensland Government, 2018) provides an overview of the typical salinity characteristics of water (Table 3.2).

Table 3.2 Guide to typical salinity limits for waters (Queensland Government, science notes L137)

Type	EC (µS/cm)	TDS (mg/l)
Distilled water	1	0.67
Rainfall	30	20
Freshwater	0 to 1500	0 to 1000
Great Artesian Basin Water	700 to 1000	470 to 670
Brackish water	1500 to 15000	1000 to 10050
Upper limit recommended for drinking	1600	1070
Seawater	55000	36850
Tolerances of livestock to salinity in drinking water (at these values, animals may have an initial reluctance to drink, but stock should adapt without loss of production)		
• Beef cattle	5970 to 7460	4000 to 5000
• Dairy cattle	3730 to 5970	2500 to 4000
• Sheep	7460 to 14925	5000 to 10000
• Horses	5970 to 8955	4000 to 6000
• Poultry	2985 to 4475	2000 to 3000
General limits for irrigation		
• Salt sensitive crops	650	435
• Moderately salt sensitive crops	1300	870
• Salt tolerant crops	5200	3485
• Generally, too saline for crops	8100	5430

[1] Electrical conductivity is a measure of the saltiness of the water and is measured on a scale from 0 to 50,000 µS/cm. Electrical conductivity is measured in micro siemens per centimetre (µS/cm).

The samples taken from the Watties and Christmas bores suggest that groundwater is brackish with electrical conductivity ranging between 2,220 and 7,560 µS/cm (i.e. towards the upper end of the limits for stock watering and irrigation uses (Table 3.2). Given the depth of the Toolachee and Patchawarra units in the Project area, data for the gas production bores points are highly saline conditions with EC ranging between 10,000 and 19,000 µS/cm and well above the upper limits for drinking, stock watering or irrigation (Table 3.2).

A piper plot (Figure 3.6) and a Durov diagram (Figure 3.7) were generated for the four water samples collected. As shown in Figure 3.6, all boreholes can be classified as a sodium-chloride water type. As would be expected, given the higher salinity values discussed above water drawn from the production bores is characterised by substantially higher chloride concentrations (between 3,300 and 7,200 mg/L) than the groundwater drawn from the local water supply bores (between 810 and 1,800 mg/L).

The pH is close to neutral for three samples, ranging between 6.8 and 7.5 (Figure 3.7) while water sampled from the overflow pond is basic with a pH of 8.5. This may be related to chemical changes occurring within the pond.

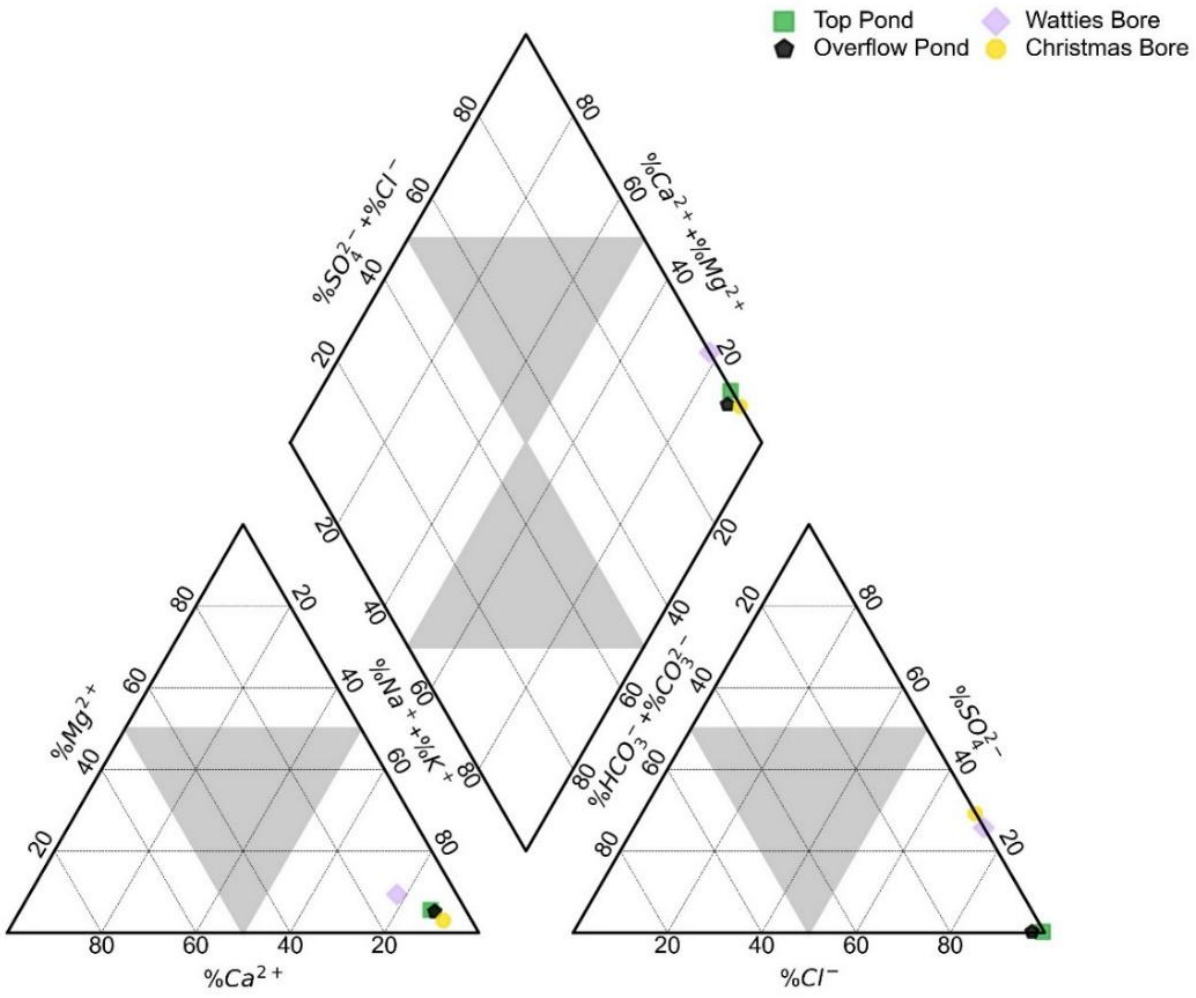


Figure 3.6 Piper plot

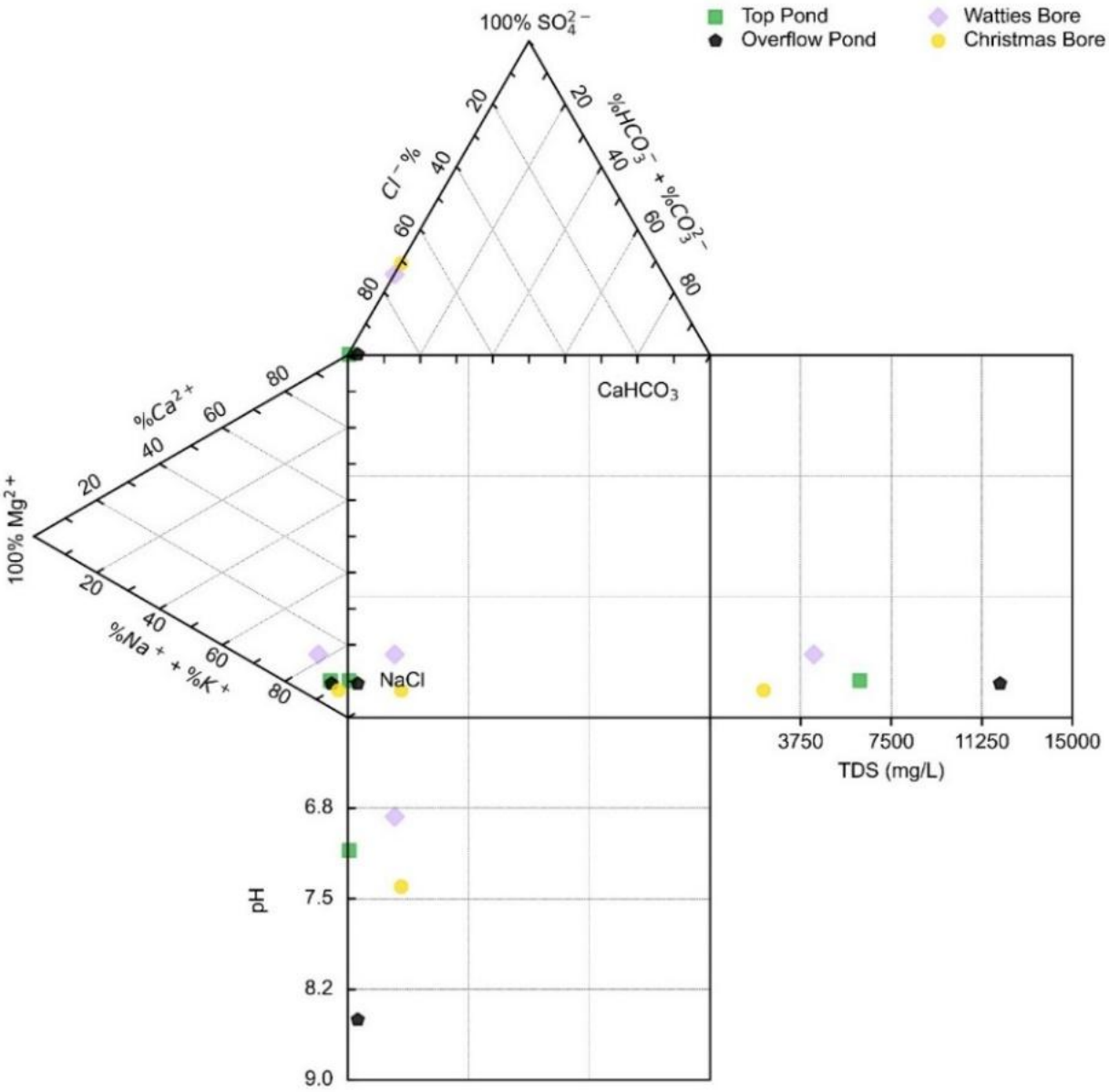


Figure 3.7 Durov diagram

3.6 Hydrogeological conceptual model

Figure 3.8 presents a hydrogeological conceptual model of Vali gas field based on the data available. Other local water supply bores in the Project area extend to less than 300 metres below ground level and are therefore thought to be extracting from the Winton or Glendower Formations. The Eromanga Basin unconformably overlies the Cooper Basin where the three active production bores, Vali-1, Vali-2 and Vali-3 are extracting water from between 2,380 and 3,110 m below ground level. This places the production zone more than 2,080 metres below the depth of local groundwater extraction.

Vali-1 is screened within the deepest unit, the Patchawarra Formation. The production well Vali-3 is currently screened within the Toolachee Formation, while Vali-2 extracts gas from both the Toolachee and Patchawarra Formations. In 2026, Vali-3 will be reconfigured to target the Patchawarra Formation, which will also be the target formation for the upcoming Vali-4 and Vali-5 wells.

Adopted hydraulic conductivity and storativity values are based predominantly on values available for adjacent lease areas (Santos 2019; Beach Energy, 2020) which are shown in Figure 3.8. Sections 3.6.1 and 3.6.2 below describe the estimated water levels and potential groundwater flow and recharge mechanisms within the Cooper Basin.

3.6.1 Underground water flow and aquifer interactions

As would be expected given the depth of the target formations in the Project area, information on groundwater levels and flow directions in the Toolachee and Patchawarra formations and the Cooper Basin in general are limited. Groundwater movement even within coarse sandstone units present at such depths is likely to be limited by its reduced capacity to transmit water as permeability tends to decrease with increasing depth. Similarly, groundwater recharge through the overlying 2,400 m thick sedimentary pile which includes significant thicknesses of aquitard material is likely to be negligible. Hence consistent with the water quality data described above (Section 3.5) Toolachee and Patchawarra formations are saline and likely to be relatively old, when compared to waters from the overlying GAB aquifers in the Eromanga Basin. The implication here is that the recharge of the Cooper Basin aquifers may be considered minimal to none (Keppel at al., 2016). In general groundwater flow, if it occurs at all given the expected low permeability, generally follows the sedimentary bedding, towards lower-lying areas.

Evidence gathered from drill stem testing (DST) during drilling showed “over-pressuring” in the Toolachee, Daralingie and Patchawarra Formations (i.e. pressures which increase with depth and are above the hydrostatic pressure line), which suggests the existence of highly effective seals (i.e. aquitards) within the Nappamerri Group (Lech et al., 2020). Movement of groundwater into and out of the Cooper Basin formations via the overlying Eromanga Basin aquifers is therefore only likely to occur where a connected pathway through the Nappamerri group exists or is subsequently established. Hypothesized pathways include locations where the unit abuts basement highs which could, in combination with localised faulting, create preferential pathways for vertical fluid migration.

3.6.2 Underground water level trend analysis

There is limited groundwater level information in the Cooper Basin within the Vali gas field. Short post-production and production shut-in pressure tests were provided for two production wells, Vali-1 and Vali-2, in August 2023. The estimated water levels at Vali-1 from the pressure tests vary between 190 and 1,500 metres (not stabilised) below ground level. The shut-in pressure test at Vali-2 was not stabilised and the pressure measured was equivalent to 1,140 metres below ground level at the time of the test. It is likely there is a depressurisation in the production wells above 1,500 metres of water depletion however it is unlikely the depressurisation extends to the overlaying Eromanga Basin. The Winton Formation is likely locally depressurised from the water users' bores.

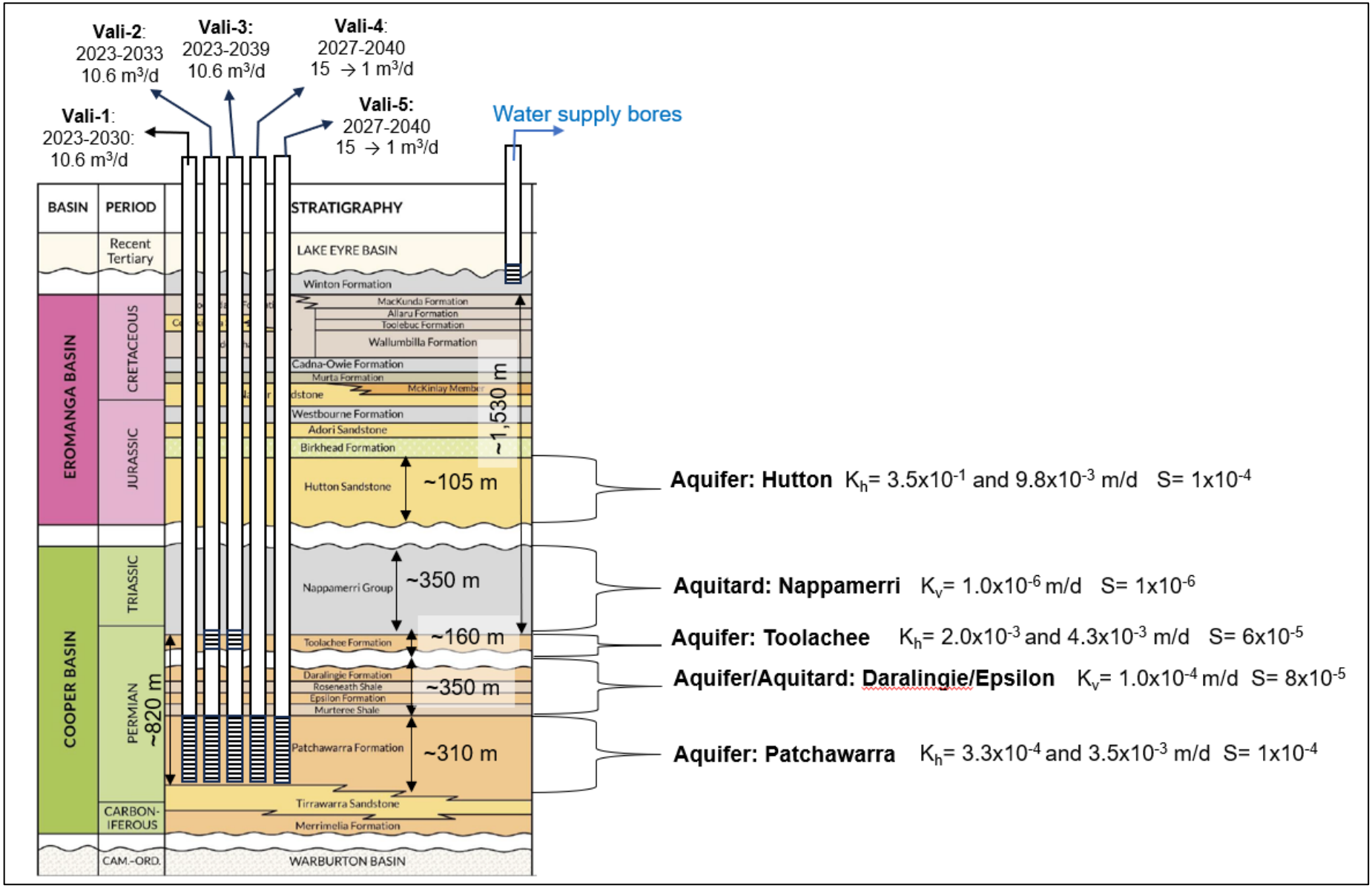


Figure 3.8 Hydrogeological conceptual model

4 Predictions of groundwater impacts (Part C)

For the purposes of this UWIR, the affected area in the Cooper Basin and the Hutton Sandstone is considered to be the area where observed or predicted groundwater level drawdown, caused by the removal of water to allow efficient gas extraction, exceeds five metres (Section 1.3.2). The drawdown threshold for potential impact on springs and groundwater dependent ecosystems (GDEs) is 0.2 m.

As mentioned in Section 2, during IAA frame time 2023-2026, water extraction is currently supported by the following three wells:

- Vali-1: Predicted to remain online until 2030.
- Vali-2: Predicted to remain online until 2033.
- Vali-3 (Toolachee Formation): Predicted to extract from this formation until 2026.

Vintage has also indicated plans to expand production capacity by adding two new wells (Vali-4 and Vali-5), with Vali-3 extracting from the Patchawarra Formation:

- Vali-3 (Patchawarra Formation): Scheduled to come online in 2026, with operations expected to continue through to 2039.
- Vali-4: Expected to come online in 2027 and remain operational until 2040.
- Vali-5: Expected to come online in 2027 and remain operational until 2040.

Vali-3 (Patchawarra Formation), along with the new wells Vali-4 and Vali-5, has been considered in relation to long-term declines in groundwater levels (LTAA).

The description of the method used to predict groundwater impacts is provided in Section 4.1, while the predicted groundwater level drawdown outcomes for the IAA and LTAA areas are presented in Section 4.2 and shown in Figure 4.3 and Figure 4.4. See Section 8 for the annual review program.

4.1 Model approach

An analytical modelling approach has been adopted for the study on the basis that the risk to existing water users and GDEs are expected to be low, since:

- There is a significant (1,530 m) vertical separation of the target formations (the Toolachee and Patchawarra formations) from potential receptors (existing water supply bores screened into the Winton Formation and terrestrial GDEs potentially partially sourced by near surface aquifer units).
- The existence of a number of regional scale aquitards in the zone between the target formations and potential receptors, including in particular the Nappamerri Group (approximately 350m thick) which is known to form a highly effective seal at the top of the Cooper Basin in the area (Lech et al., 2020).
- There are no mapped major faults which might form vertical impact propagation pathways or mound springs which might provide evidence of actual pathways, within 100 km of the Project area.

Predictive modelling was undertaken using the MLU software (version 2.25.78). This is a relatively sophisticated quasi 3D analytical modelling tool which unlike other analytical tools allows simulation of multiple aquifer systems and intervening aquitards and can easily be set up to provide predictions in each aquifer based on ongoing extraction from a number of extraction wells.

The primary objective of the predictive modelling was to provide estimates of the decline in water level in response to the ongoing removal of water from the Toolachee and Patchawarra formations over a three-year period (i.e. identify the IAA area) and in the long-term (i.e. the LTAA area). Given the large distances between the target formation and the receptors this primarily involved assessing the degree to which extraction impacts propagate vertically through the overlying material.

Due to the existence of a geological discontinuity between the Eromanga and the Cooper Basins and the thickness of the Nappamerri Group aquitard above the Toolachee Formation, it is considered highly unlikely that the impact of water extraction in the Cooper Basin will propagate into the overlying Eromanga Basin.

Nevertheless, the Hutton Sandstone has been simulated to quantify potential drawdown at the base of the Eromanga Basin from the Vali gas field.

The proposed development involves groundwater extraction from a defined set of wells over two assessment periods:

- IAA: Groundwater extraction is limited to continued use of three existing wells (Vali-1, Vali-2, and Vali-3) throughout the IAA timeframe.
- LTAA: Groundwater extraction will include the continued use of Vali-3, along with two additional wells (Vali-4 and Vali-5) for the duration of the LTAA period.

4.1.1 Model construction

For analytical modelling purposes, as summarised in Table 4.1, the conceptual model shown in Figure 3.8 was slightly simplified by representing the interval between the Toolachee and Patchawarra Formations, including the Epsilon Formation aquifer and adjacent aquitards (Daralingie Formation, Roseneath Shale, and Murteree Shale) as a single layer. As shown each of the three remaining aquifers (i.e. the Hutton Sandstone and the Toolachee and the Patchawarra Formations) were simulated using dedicated layers and consistent with the conceptual model were modelled as being separated by significant thicknesses of intervening aquitard material.

Adopted hydraulic parameters used for modelling purposes are also provided in Table 4.1 and were sourced from existing UWIR surrounding the Project area.

Table 4.1 Initial scenario - hydrogeological parameters

Layer	Thickness (m)	K (m/d)	S	Lithology	Aquifer
1	105	$3.5x10^{-1}$	$1.0x10^{-4}$	Hutton Sandstone	Aquifer
2	350	$*1.0x10^{-6}$	$1.0x10^{-6}$	Nappamerri Group	Aquitard
3	160	$2.0x10^{-3}$	$5.5x10^{-5}$	Toolachee Formation	Aquifer
4	350	$*2.0x10^{-4}$	$8.0x10^{-5}$	Daralingie Formation/Roseneath Shale/Epsilon Formation/Murteree Shale	Aquifer/Aquitard
5	310	$3.3x10^{-4}$	$1.1x10^{-4}$	Patchawarra Formation	Aquifer

Note: *Vertical hydraulic conductivity.

Location and modelled layer attributions for each of the simulated extraction wells are summarised in Table 4.2. Additionally, Table 4.3 presents the average groundwater extraction rates applied in the analytical modelling to assess potential impacts on the regional groundwater system during both the IAA and LTAA phases.

Table 4.2 Existing and proposed production wells

Well name	Easting	Northing	Modelling layer	IAA	LTAA
Vali 1	506107.8	6903682.8	5	3 years	Until 2030
Vali 2 (dual screen)	507322.8	6903329.1	3,5	3 years	Until 2033
Vali 3 (Toolachee)	505599.3	6903174.4	3	3 years	Until 2026
Vali 3 (Patchawarra)	505599.3	6903174.4	5	-	Until 2039
Vali 4	506450.9	6904568.3	5	-	Until 2040
Vali 5	505418.5	6904879.0	5	-	Until 2040

Note: Coordinates system: GDA 2020.

Table 4.3 Average groundwater extraction rates used in analytical modelling for IAA and LTAA periods

Year	Date	Extraction wells online	Vali 1 (kL/y)	Vali 2 (kL/y)	Vali 3 (kL/y)	Vali 4 (kL/y)	Vali 5 (kL/y)	Total water extraction (kL/y)
2023/2024	1 July 2023 to 30 June 2024	Vali-1, Vali-2, Vali-3	2,300	2,300	2,300	0	0	6,900
2024/2025	1 July 2024 to 30 June 2025	Vali-1, Vali-2, Vali-3	3,867	3,867	3,867	0	0	11,600
2025/2026	1 July 2025 to 30 June 2026	Vali-1, Vali-2, Vali-3	3,867	3,867	3,867	0	0	11,600
2026/2027	1 July 2026 to 30 June 2027	Vali-1, Vali-2, Vali-3[a],	3,867	3,867	3,867	0	0	11,600
2027/2028	1 July 2027 to 30 June 2028	Vali-1, Vali-2, Vali-3 [a], Vali-4, Vali-5	3,867	3,867	3,867	4,558	4,558	20,717
2028/2029	1 July 2028 to 30 June 2029	Vali-1, Vali-2, Vali-3 [a], Vali-4, Vali-5	3,867	3,867	3,867	3,106	3,106	17,812
2029/2030	1 July 2029 to 30 June 2030	Vali-1, Vali-2, Vali-3 [a], Vali-4, Vali-5	3,867	3,867	3,867	2,252	2,252	16,104
2030/2031	1 July 2030 to 30 June 2031	Vali-2, Vali-3 [a], Vali-4, Vali-5	0	3,867	3,867	1,708	1,708	11,149
2031/2032	1 July 2031 to 30 June 2032	Vali-2, Vali-3 [a], Vali-4, Vali-5	0	3,867	3,867	1,340	1,340	10,413
2032/2033	1 July 2032 to 30 June 2033	Vali-2, Vali-3 [a], Vali-4, Vali-5	0	3,867	3,867	1,079	1,079	9,891
2033/2034	1 July 2033 to 30 June 2034	, Vali-3 [a], Vali-4, Vali-5	0	0	3,867	888	888	5,642
2034/2035	1 July 2034 to 30 June 2035	Vali-3 [a], Vali-4, Vali-5	0	0	3,867	743	743	5,353
2035/2036	1 July 2035 to 30 June 2036	Vali-3 [a], Vali-4, Vali-5	0	0	3,867	631	631	5,129
2036/2037	1 July 2036 to 30 June 2037	Vali-3 [a], Vali-4, Vali-5	0	0	3,867	543	543	4,952
2037/2038	1 July 2037 to 30 June 2038	Vali-3 [a], Vali-4, Vali-5	0	0	3,867	472	472	4,810
2038/2039	1 July 2038 to 30 June 2039	Vali-3 [a], Vali-4, Vali-5	0	0	3,867	414	414	4,694
2039/2040	1 July 2039 to 30 June 2040	Vali-4, Vali-5	0	0	0	233	233	467

Note: [a] Gas extraction from the Patchawarra Formation commencing July 2026.

4.1.2 Assumptions and limitations

The assumptions and limitations of the analytical modelling include:

- Predictive production rates provided by Vintage were equally divided between the Vali-1, Vali-2 and Vali-3 bores while the current production rates are mainly from Vali-1.
- Estimated aquifer parameters (hydraulic conductivity and storativity) are based on literature review and based on UWIRs for adjacent production leases (Santos, 2019; Beach Energy 2020). No hydrogeological parameter measurements were available for the Vali gas field.
- Project life of Vali gas field is estimated at 17 years.
- Like other similar tools MLU neglects the effects of the storage term within aquitard units and hence does not predict any lag between stresses applied to the target formations (Toolachee and Patchawarra formations). As such the predicted impacts are expected to be conservative especially with regard to the timing of any impacts in the Hutton Sandstone. In practice, impacts would likely take hundreds if not thousands of years to migrate through the underlying 350 m thick aquitard and would therefore be significantly delayed.

4.2 Model results

Figure 4.1 and Figure 4.2 present the predicted drawdown for the initial scenario in the production wells Vali-1, Vali-2, Vali-3, Vali-4 and Vali-5 in the Cooper Basin and the Hutton Sandstone. Table 4.4 resents the maximum drawdown, the IAA and LTAA, with five-metre drawdown contours in both Toolachee and Patchawarra aquifer.

Table 4.4 Predicted maximum drawdown – initial scenario

Aquifer	IAA (year 3)		LTAA	
	Drawdown (m)	5 m Drawdown Extent radius (km)	Maximum Drawdown (m)	5 m Drawdown extent radius (km)
Hutton	0.003	NA	0.02	NA
Toolachee	55	1.5	55	2.5
Patchawarra	153	1.5	183	3

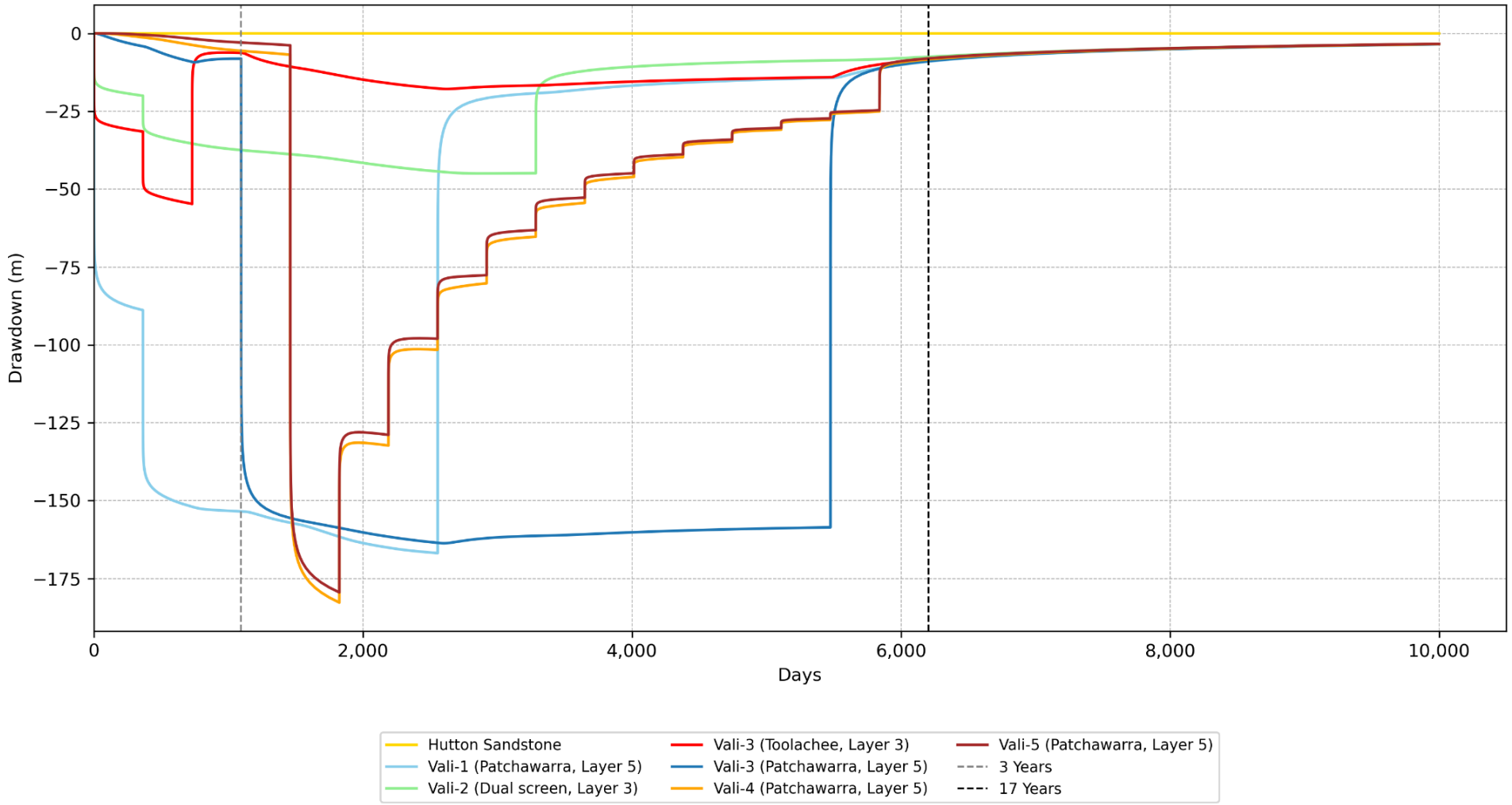


Figure 4.1 Predicted drawdown – initial scenario

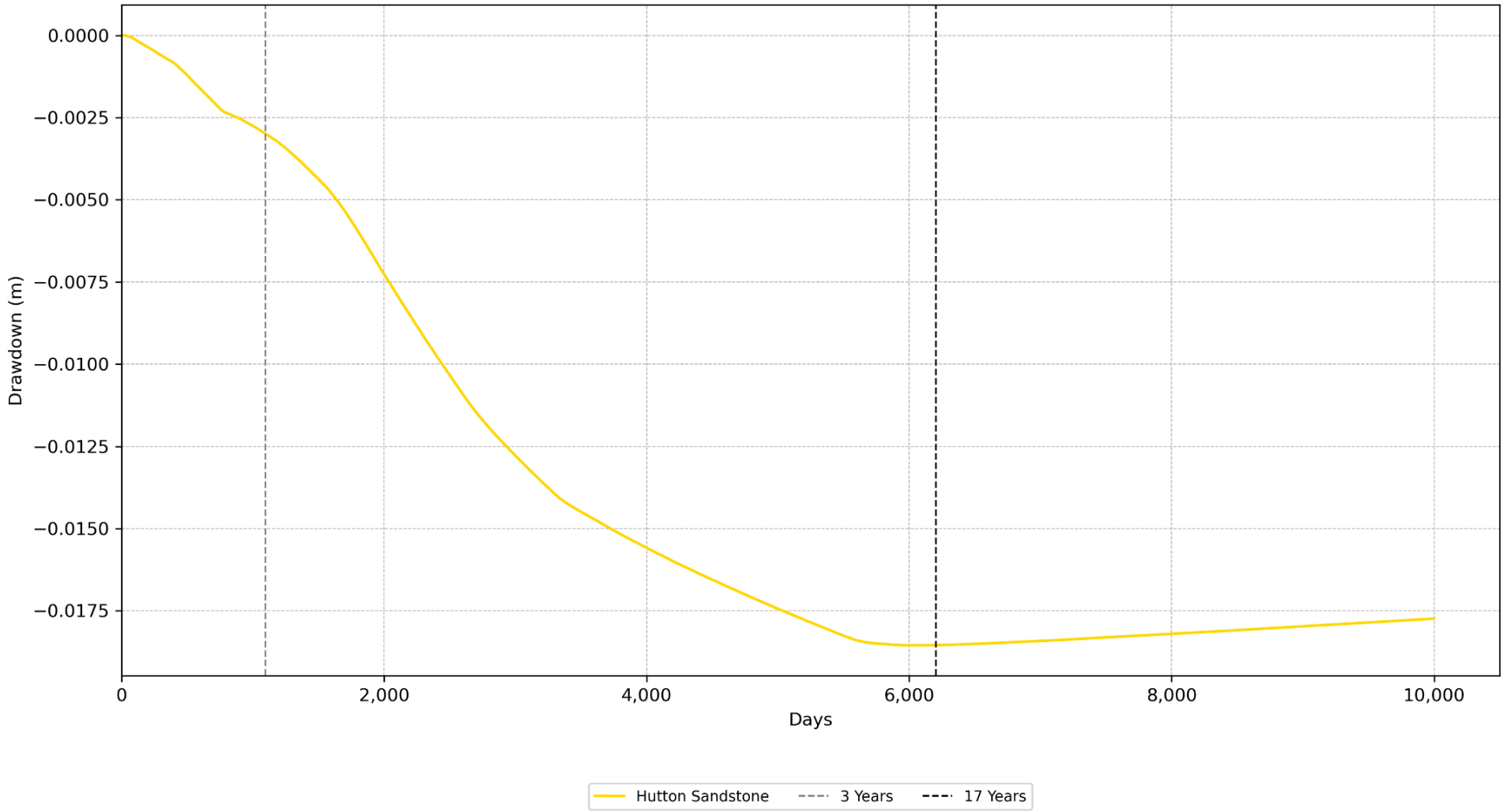
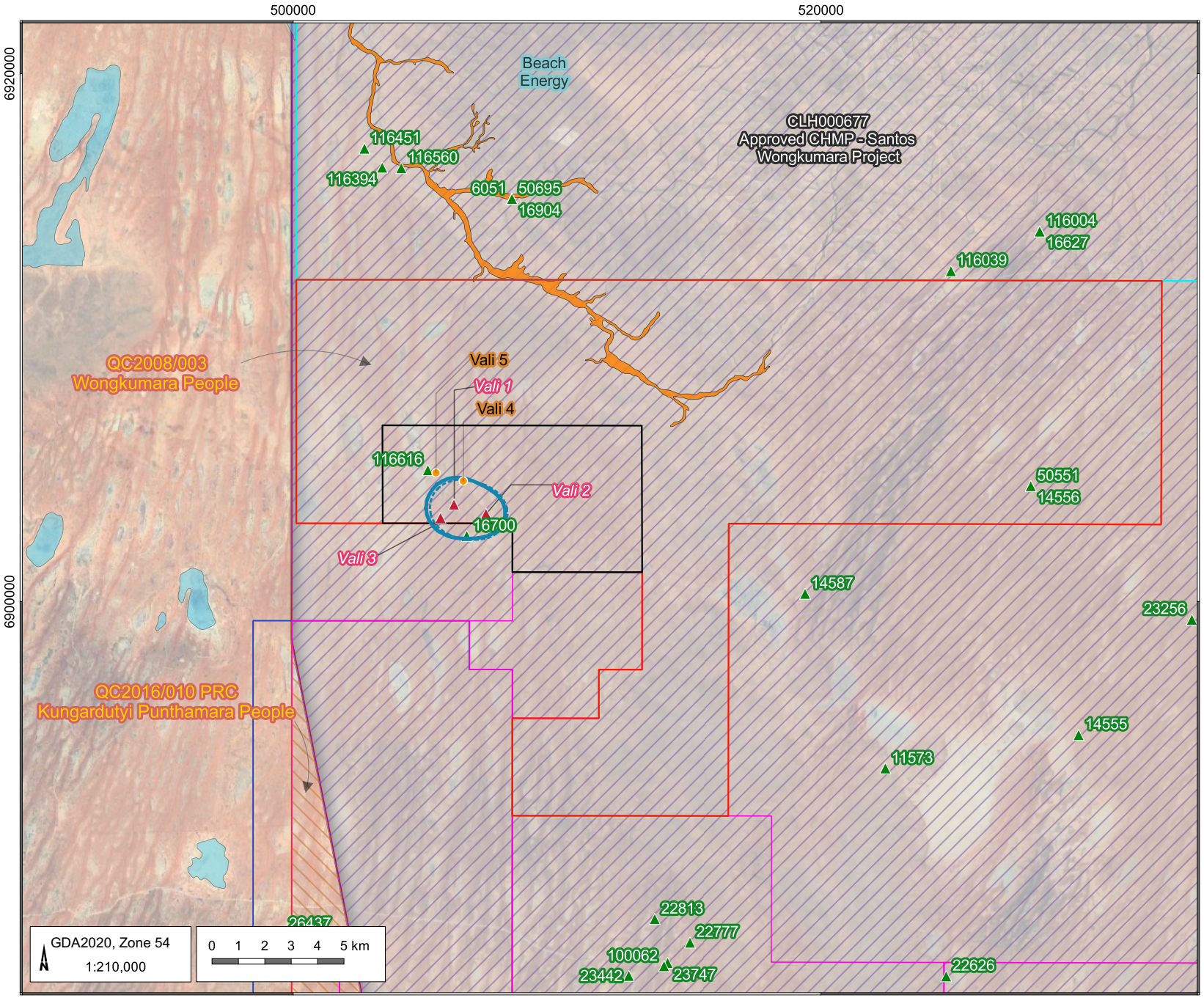


Figure 4.2 Predicted drawdown – initial scenario - Hutton Sandstone



LEGEND

- Place names
- Vali wells
- Vali wells - proposed
- Registered bores
- 5m drawdown contour (m) - Toolachee
- 5m drawdown contour (m)- Patchawarra
- Authority to Prospect (ATP 2021)

Authority to Prospect (ATPs)

- Petroleum Lease 1125
- Santos Petroleum Leases
- Santos Exploration Permits for Petroleum
- Santos Cooper Basin
- Cultural Heritage Management Plan boundary

Cultural Heritage Party boundaries

- Kungardutyi Punthamara People
- Wongkumara People

Aquatic GDEs

- Low potential GDE - from national assessment

Terrestrial GDEs

- Moderate potential GDE - from regional studies

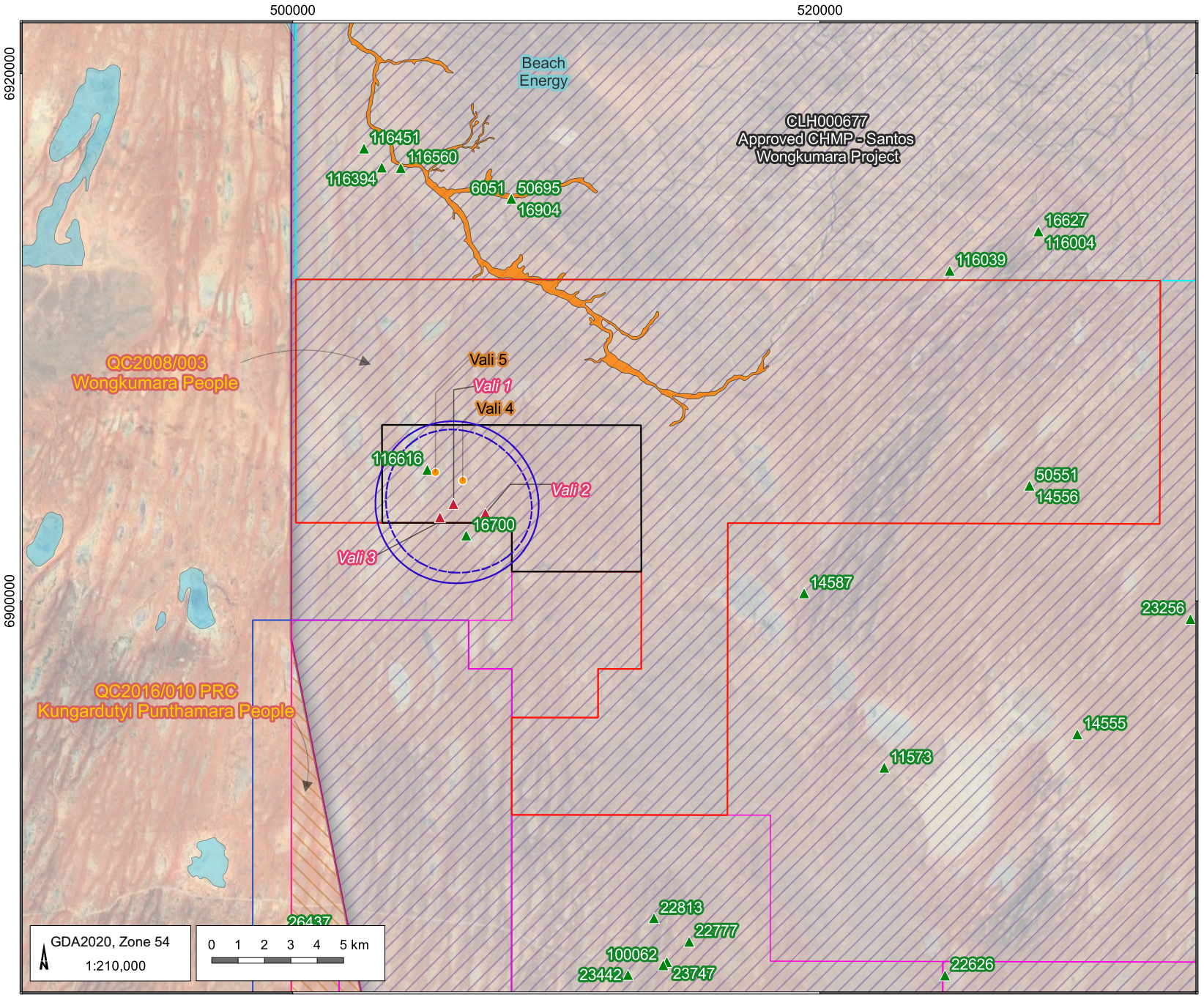
Vali Gas Field UWIR 2025 (VGF5000.002)

IAA - Predicted groundwater impact drawdown – Toolachee and Patchawarra formations

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14/10/2025

FIGURE No:
4.3

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LEGEND

- Place names
- Vali wells
- Vali wells - proposed
- Registered bores
- 5m drawdown contour (m) - Toolachee
- 5m drawdown contour (m)- Patchawarra
- Authority to Prospect (ATP 2021)

Authority to Prospect (ATPs)

- Petroleum Lease 1125
- Santos Petroleum Leases
- Santos Exploration Permits for Petroleum
- Santos Cooper Basin
- Cultural Heritage Management Plan boundary

Cultural Heritage Party boundaries

- Kungardutyi Punthamara People
- Wongkumara People

Aquatic GDEs

- Low potential GDE - from national assessment

Terrestrial GDEs

- Moderate potential GDE - from regional studies

Vali Gas Field UWIR 2025 (VGF5000.002)

LTAA - Predicted groundwater impact drawdown – Toolachee and Patchawarra formations

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FIGURE No:
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G:\Projects\VGF5000.002 Vali Gas Field UWIR 2025\3_GIS\Workspaces\001_UWIR update\04.03_VGF5000_IAA - Predicted groundwater impact drawdown – Toolachee and Patchawarra formations.qgz

4.2.1 Immediately affected area (IAA)

The predicted IAA area, i.e. the area where more than 5 m of drawdown is predicted during the 2023 to 2026 UWIR reporting period for the Toolachee and the Patchawarra formations (Layers 3 and 5) is presented in Figure 4.3. The maximum drawdown predicted in the Hutton Sandstone during this period (Figure 4.2) is 0.003 m and hence there is no IAA for this aquifer. No drawdown impacts are therefore predicted in any units overlying the Hutton Sandstone. The maximum predicted drawdown is 183 m at Vali-4 within the Patchawarra Formation.

As shown in Figure 4.3 and Table 4.4 the predicted IAA for the Toolachee and the Patchawarra formations are very similar (since the Vali-2 bore is screened in both formations and hence provides a location connection between the two units) and extend approximately 3km from the production wells Vali-1, Vali-2 and Vali-3.

4.2.2 Long-term affected area (LTAA)

The predicted LTAA area, i.e. the area where more than 5 m of drawdown is predicted at any time in the future for the Toolachee and the Patchawarra formations (Layers 3 and 5) is presented in Figure 4.4. Maximum predicted drawdown in the Hutton Sandstone at the end of the production period (Figure 4.2) is 0.02 m and hence there is no LTAA for this aquifer. No drawdown impacts are therefore predicted in any units overlying the Hutton Sandstone, including the Glendower and Winton Formations. The maximum predicted drawdown is 183 m in Vali-4 within the Patchawarra Formation (Figure 4.10).

As illustrated in Figure 4.4 the predicted LTAA for both the Toolachee and Patchawarra Formations is largely similar. This is primarily due to the Vali-2 production well being screened across both formations, providing a hydraulic connection between the two units. The LTAA extends approximately 8 kilometres from the production wells, Vali-1, Vali-2, Vali-3, Vali-4, and Vali-5.

However, the LTAA is slightly larger in the Patchawarra Formation compared to the Toolachee Formation. This difference is attributed to the planned cessation of water extraction from the Toolachee Formation and the expansion of production activities targeting the Patchawarra Formation.

4.2.3 Sensitivity

Nine scenarios were run for sensitivity analysis with hydraulic conductivities and storativity of one order of magnitude higher and lower than the initial scenario (scenario 5). Table 4.5 and Table 4.6 present the hydraulic parameters for the nine scenarios.

Figure 4.5, Figure 4.6, Figure 4.7 and Figure 4.8 present the predicted drawdown in each production well and the Hutton Sandstone for the nine sensitivity scenarios. The maximum predicted drawdown in the Hutton Sandstone is 3.91 m (Scenario 10) after approximatey 7 years of production (Figure 4.5). The maximum predicted drawdown after three years is 1,531 m and 1,657 m after 7 years in the well Vali-1 (Scenario 9).

Figure 4.12 and Figure 4.13 present the IAA and LTAA. The groundwater depletion in scenario 1 is lower than five metres in any of the analytical model layers except for Vali-1, therefore there are no IAA and LTAA identified for those sensitivity scenarios. The groundwater depletion in scenarios 3, 4 and 8 is lower than five metres within 3 years for Vali-4 and Vali-5. Scenarios 2, 3, 6, 7, 8, 9 and 10 show a predicted drawdown exceeding 5 metres within 3 years and at the end of life of the project for all the other wells. The largest predicted IAA in the Patchawarra and Toolachee is approximately 5 km radius and 10 km radius for the LTAA (scenario 6).

There is no groundwater drawdown greater than five metres predicted in the Eromanga Basin (Hutton Sandstone) in any sensitivity scenarios. There is no impact to registered water bores screened in the Cooper Basin and no environmental receptors identified within the IAA and LTAA.

Existing petroleum wells Kappa 1, Kappa 3, Kappa 4 and Chef 1 from Santos's Petroleum Lease are within the LTAA of sensitivity scenarios 6 and 9, within a radius of eight kilometres.

Table 4.5 Sensitivity scenarios 1 to 4

Scenarios #	1		2		3		4	
Layer	K (m/d)	S	K (m/d)	S	K (m/d)	S	K (m/d)	S
1	$3.5x10^{-1}$	**$1.0x10^{-3}$**	$3.5x10^{-1}$	$1.0x10^{-4}$	$3.5x10^{-1}$	**$1.0x10^{-5}$**	$3.5x10^{-1}$	**$1.0x10^{-3}$**
2	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$
3	**$2.0x10^{-2}$**	**$5.5x10^{-4}$**	**$2.0x10^{-2}$**	$5.5x10^{-5}$	**$2.0x10^{-2}$**	**$5.5x10^{-6}$**	$2.0x10^{-3}$	**$5.5x10^{-4}$**
4	$2x10^{-4}$	$8.0x10^{-4}$	$2.0x10^{-4}$	$8.0x10^{-5}$	$2.0x10^{-4}$	$8.0x10^{-6}$	$2.0x10^{-4}$	$8.0x10^{-4}$
5	**$3.3x10^{-3}$**	**$1.1x10^{-3}$**	**$3.3x10^{-3}$**	$1.1x10^{-4}$	**$3.3x10^{-3}$**	**$1.1x10^{-5}$**	$3.3x10^{-4}$	**$1.1x10^{-3}$**

Table 4.6 Sensitivity scenarios 6 to 10

Scenarios #	6		7		8		9		10	
Layer	K (m/d)	S	K (m/d)	S	K (m/d)	S	K (m/d)	S	K (m/d)	S
1	$3.5x10^{-1}$	**$1.0x10^{-5}$**	**$3.5x10^{-2}$**	**$1.0x10^{-3}$**	**$3.5x10^{-2}$**	$1.0x10^{-4}$	**$3.5x10^{-2}$**	**$1.0x10^{-5}$**	**$3.5x10^{-2}$**	**$1.0x10^{-5}$**
2	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	$1.0x10^{-6}$	**$1.0x10^{-5}$**	$1.0x10^{-6}$
3	$2.0x10^{-3}$	**$5.5x10^{-6}$**	**$2.0x10^{-4}$**	**$5.5x10^{-4}$**	**$2.0x10^{-4}$**	$5.5x10^{-5}$	**$2.0x10^{-4}$**	**$5.5x10^{-6}$**	**$2.0x10^{-4}$**	**$5.5x10^{-6}$**
4	$2.0x10^{-4}$	$8.0x10^{-6}$	**$2.0x10^{-5}$**	$8.0x10^{-4}$	**$2.0x10^{-5}$**	$8.0x10^{-5}$	**$2.0x10^{-5}$**	$8.0x10^{-6}$	**$2.0x10^{-5}$**	$8.0x10^{-6}$
5	$3.3x10^{-4}$	**$1.1x10^{-5}$**	**$3.3x10^{-5}$**	**$1.1x10^{-3}$**	**$3.3x10^{-5}$**	$1.1x10^{-4}$	**$3.3x10^{-5}$**	**$1.1x10^{-5}$**	**$3.3x10^{-5}$**	**$1.1x10^{-5}$**

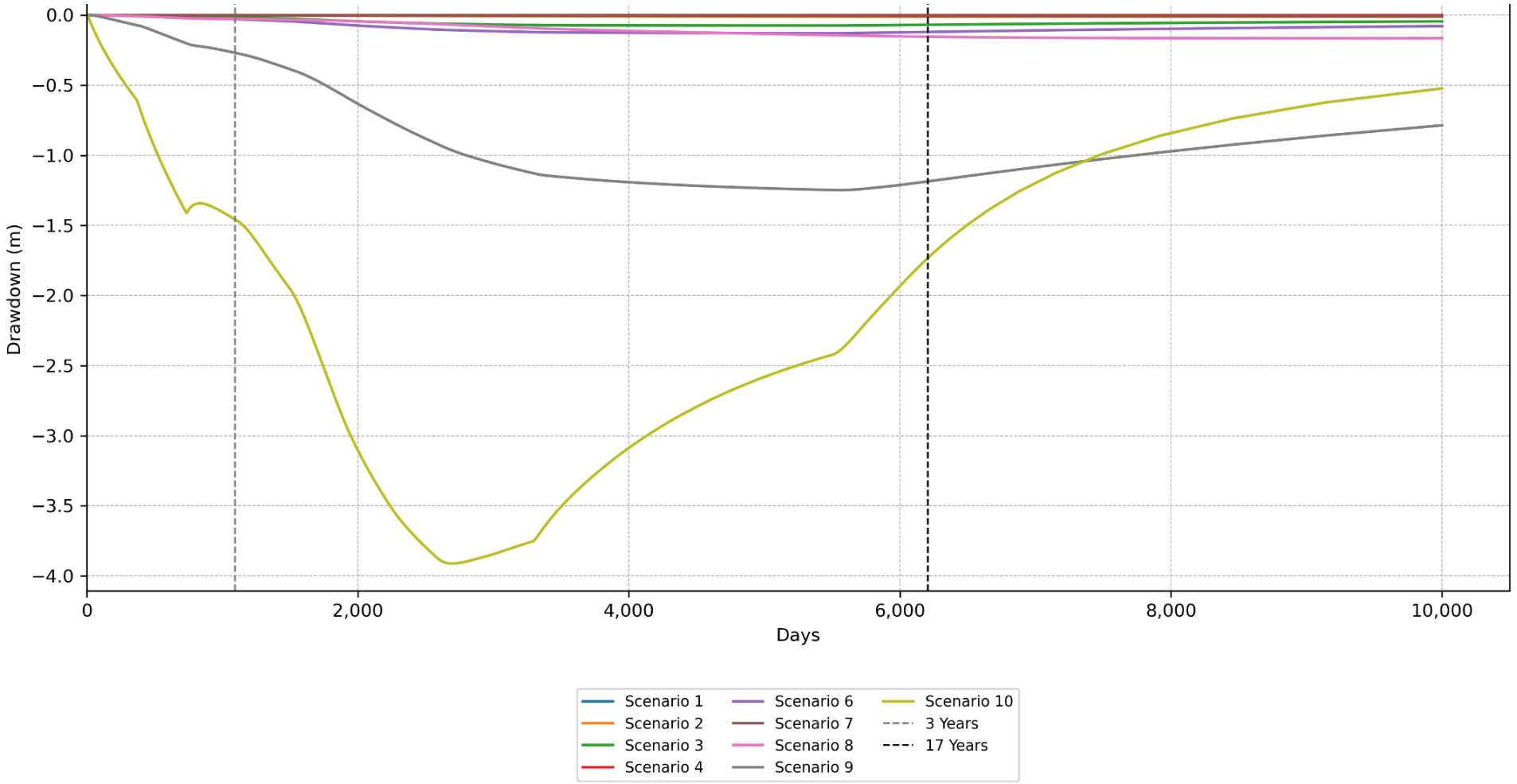


Figure 4.5 Sensitivity analysis – predicted drawdown – Hutton Sandstone

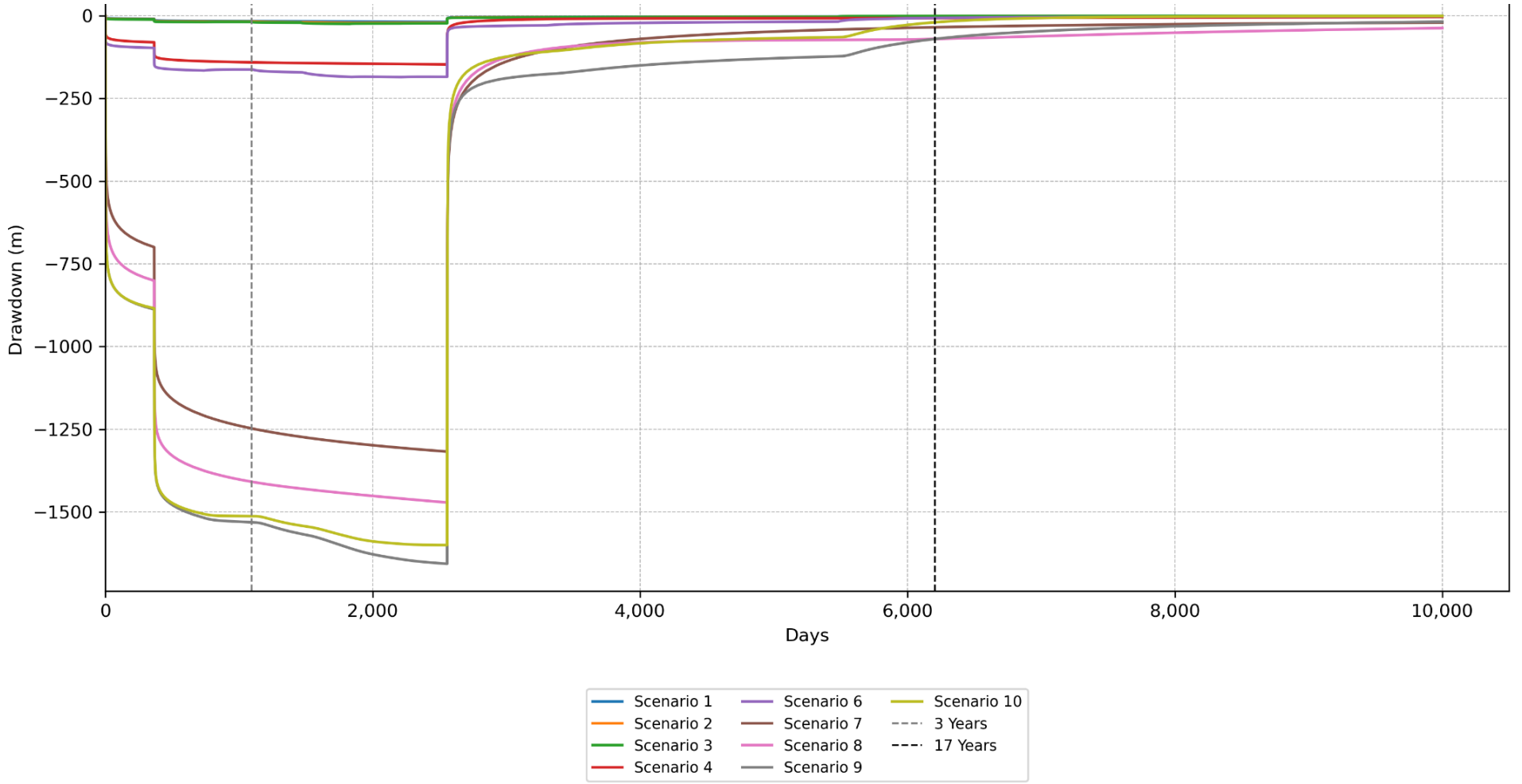


Figure 4.6 Sensitivity analysis – predicted drawdown – Vali-1

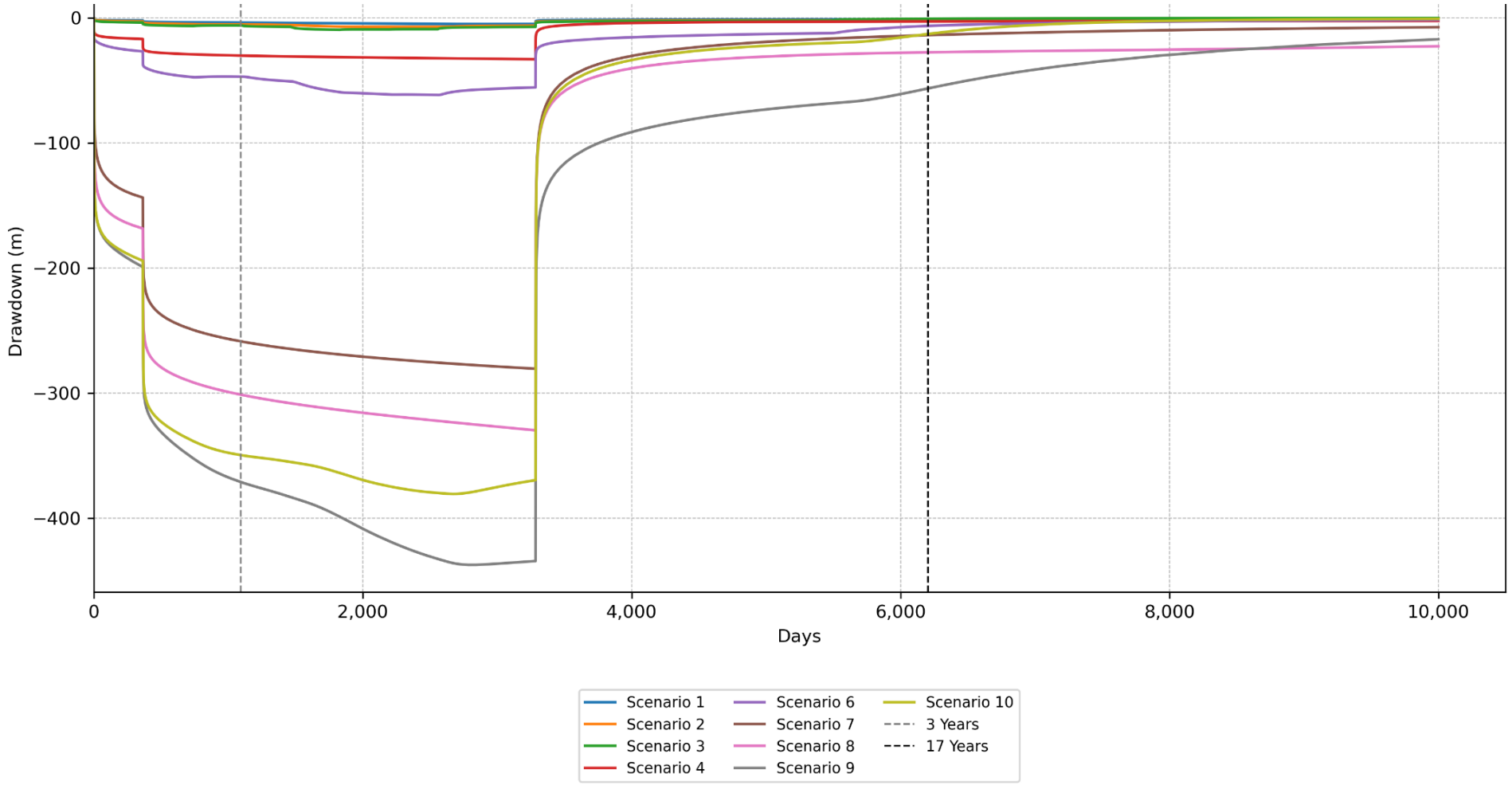
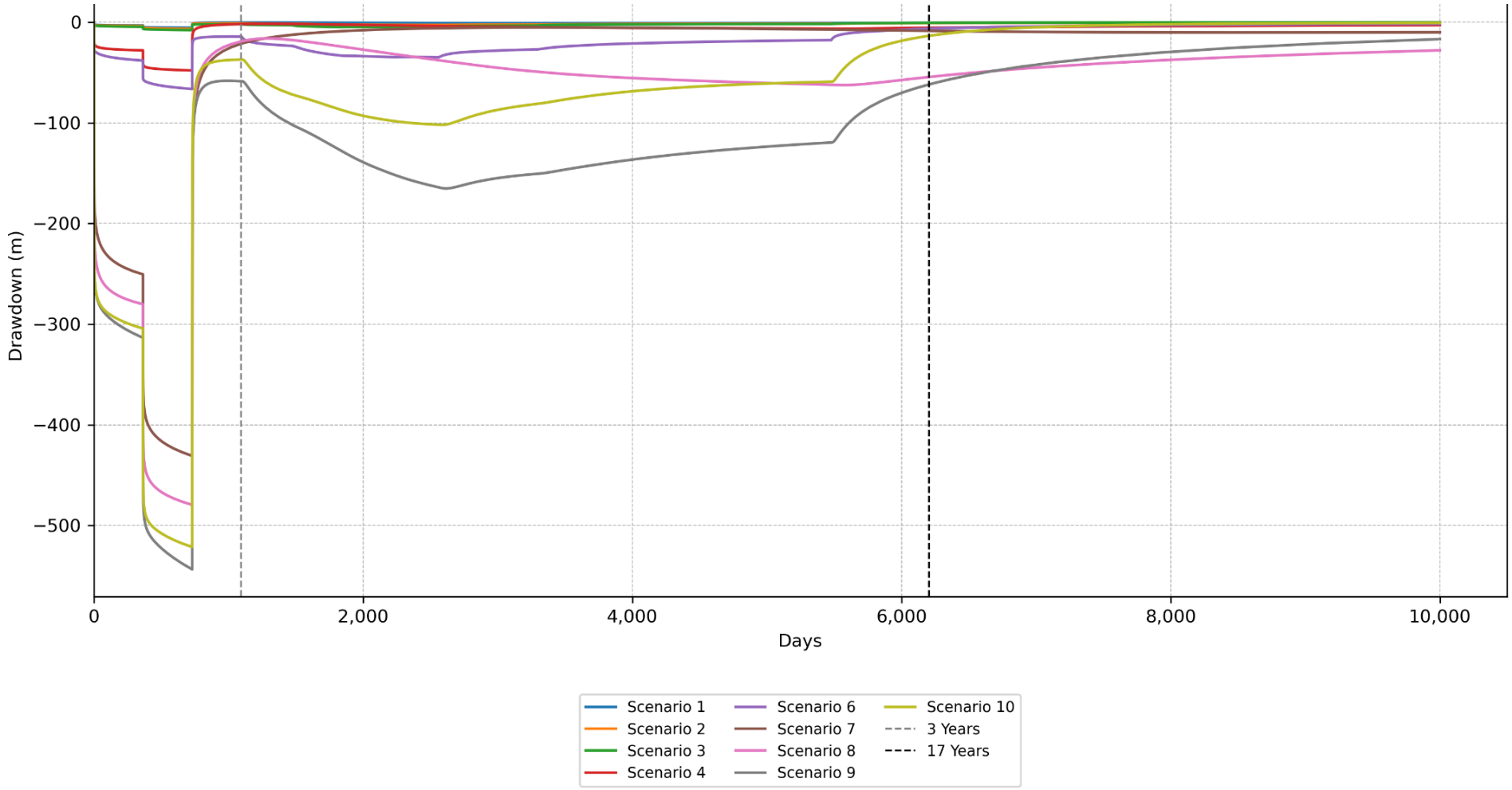


Figure 4.7 Sensitivity analysis – predicted drawdown – Vali-2 Toolachee and Patchawarra



c

Figure 4.8 Sensitivity analysis – predicted drawdown – Vali-3 (Toolachee)

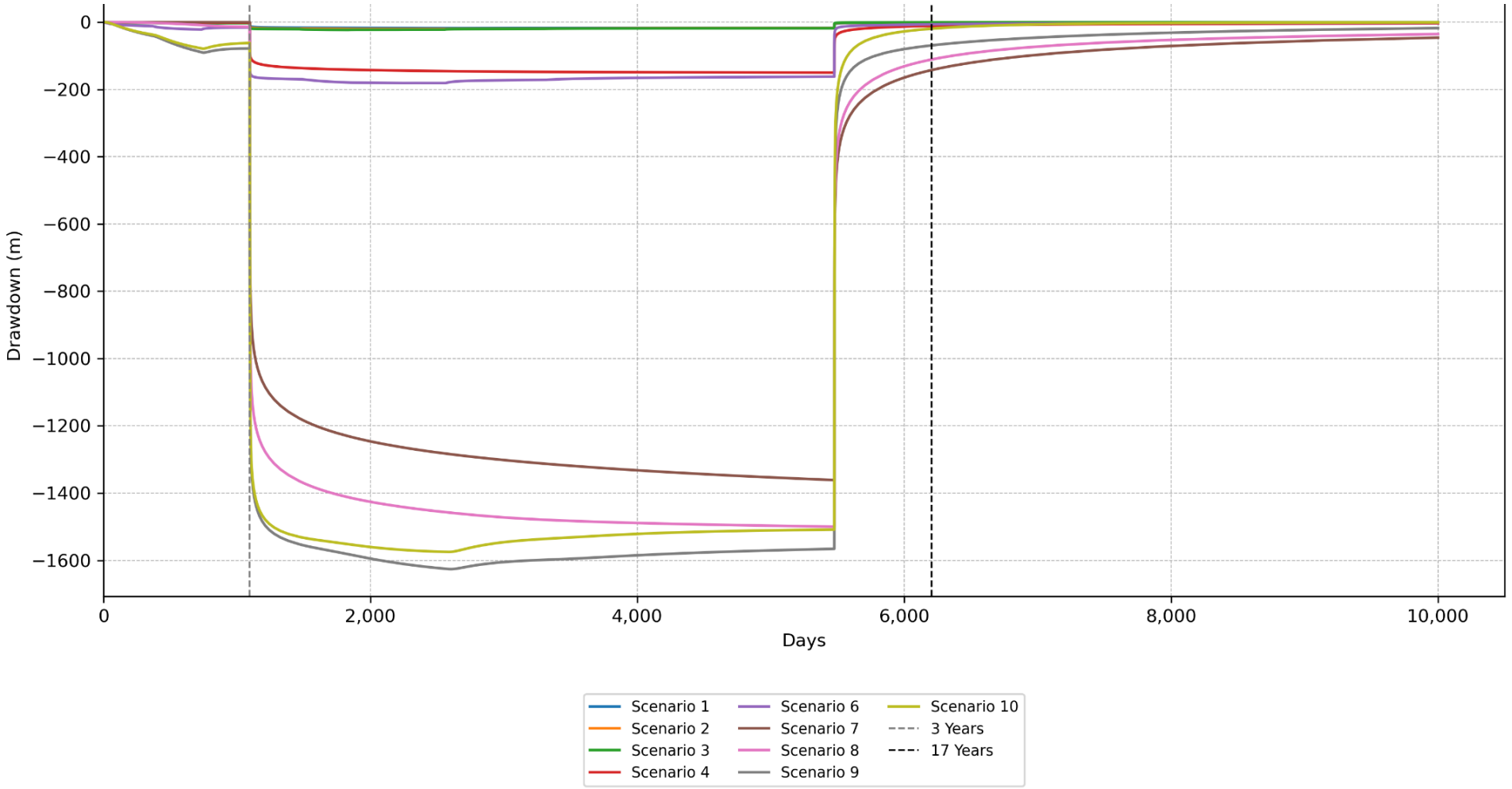


Figure 4.9 Sensitivity analysis – predicted drawdown – Vali-3 (Patchawarra)

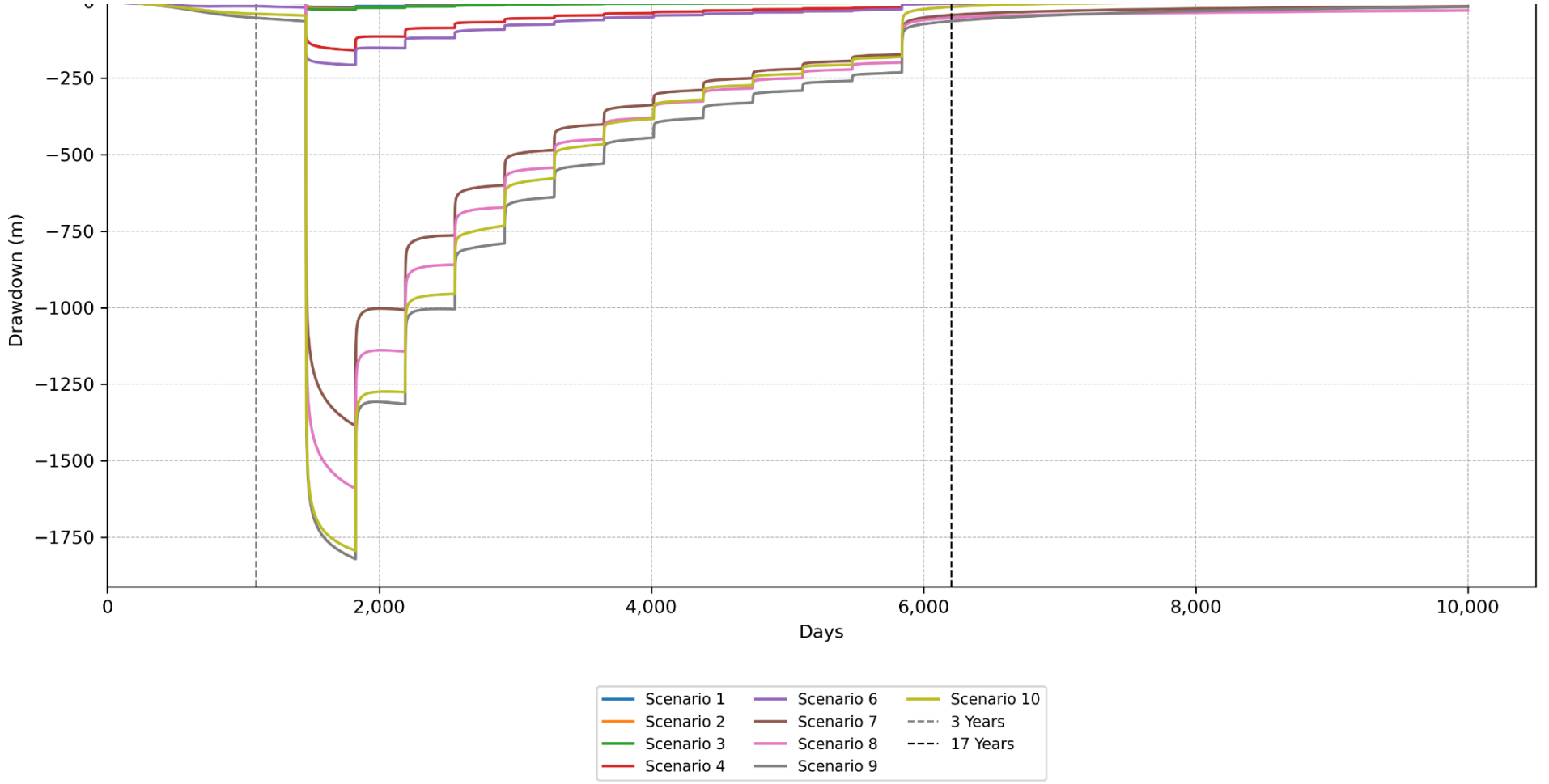


Figure 4.10 Sensitivity analysis – predicted drawdown – Vali-4

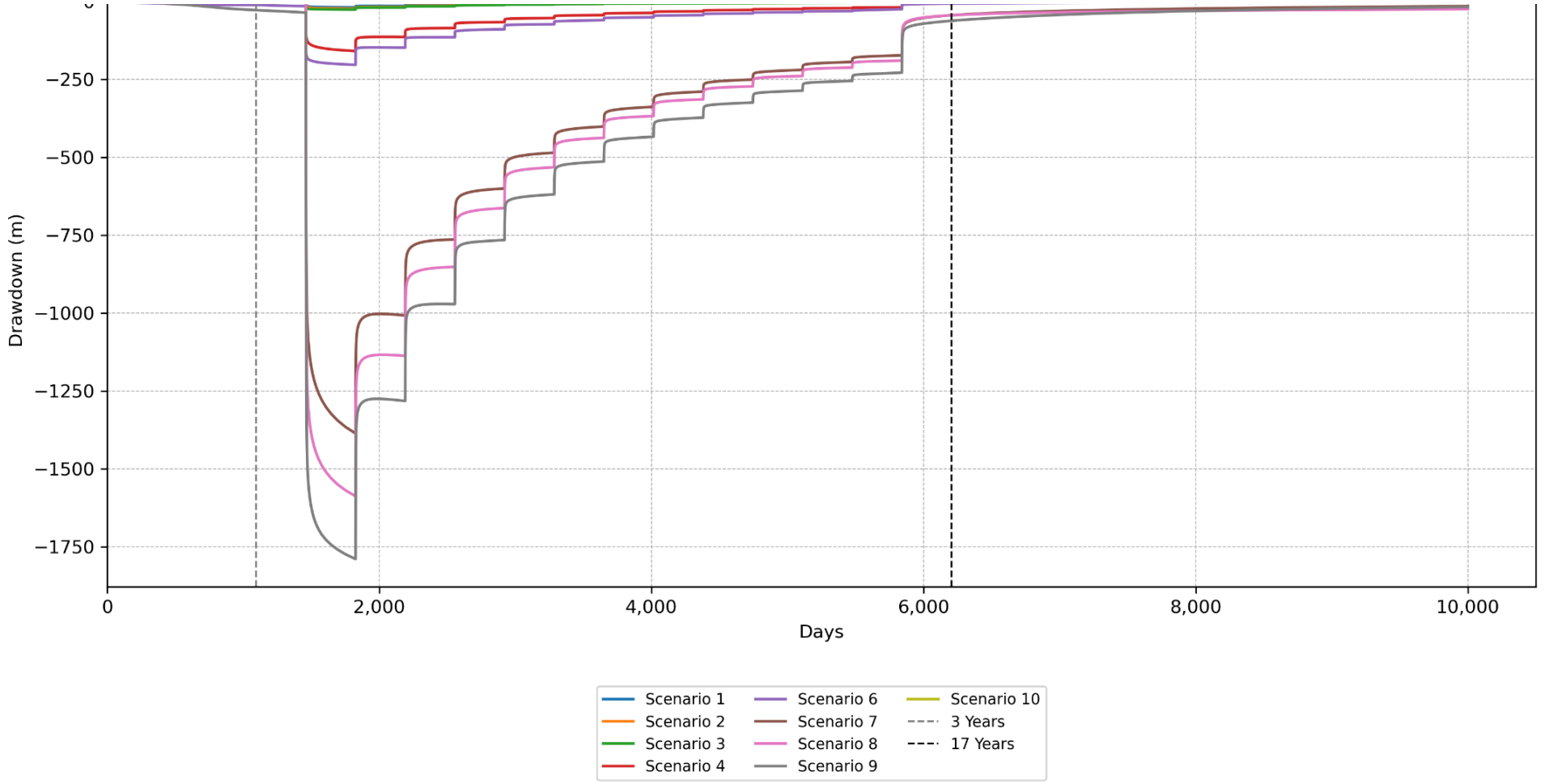
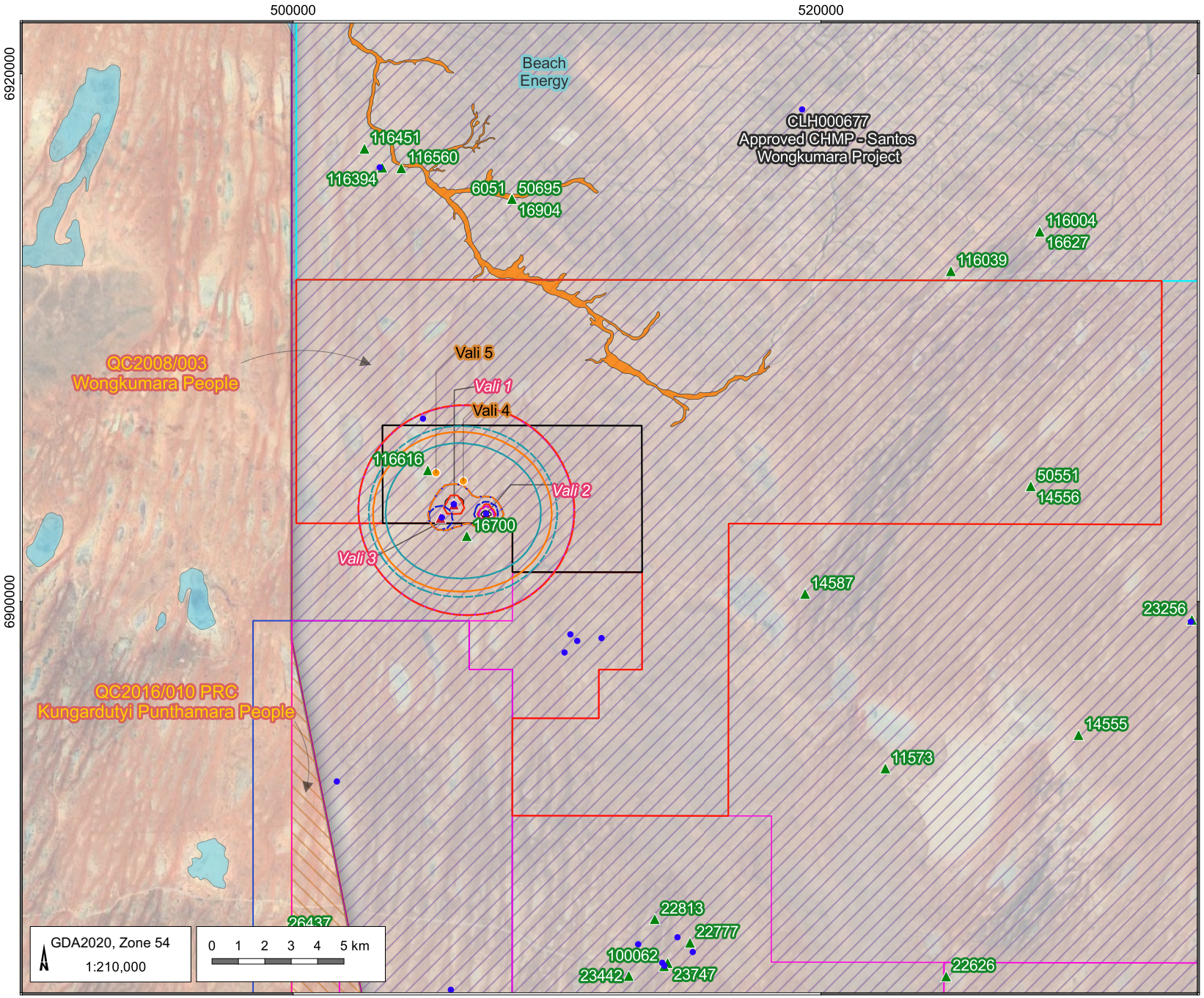


Figure 4.11 Sensitivity analysis – predicted drawdown – Vali-5



LEGEND

- Place names
- Vali wells
- Valli wells - proposed
- Registered bores
- Petroleum wells
- Authority to Prospect (ATP 2021)
- Petroleum Lease 1125
- Cultural Heritage Management Plan boundary

Cultural Heritage Party boundaries

- Kungardutyi Punthamara People
- Wongkumara People

Aquatic GDEs

- Low potential GDE - from national assessment

Terrestrial GDEs

- Moderate potential GDE - from regional studies

5m drawdown contours (Toolachee)

- Sc. 4 Base K High S
- Sc. 6 Base K Low S
- Sc. 7 Low K High S
- Sc. 8 Low K Base S
- Sc. 9 Low K Low S
- Sc. 10

5m drawdown contours (Patchawarra)

- Sc. 4 Base K High S
- Sc. 6 Base K Low S
- Sc. 7 Low K High S
- Sc. 8 Low K Base S
- Sc. 9 Low K Low S
- Sc. 10

Vali Gas Field UWIR 2025 (VGF5000.002)

IAA – sensitivity analysis - Toolachee and Patchawarra

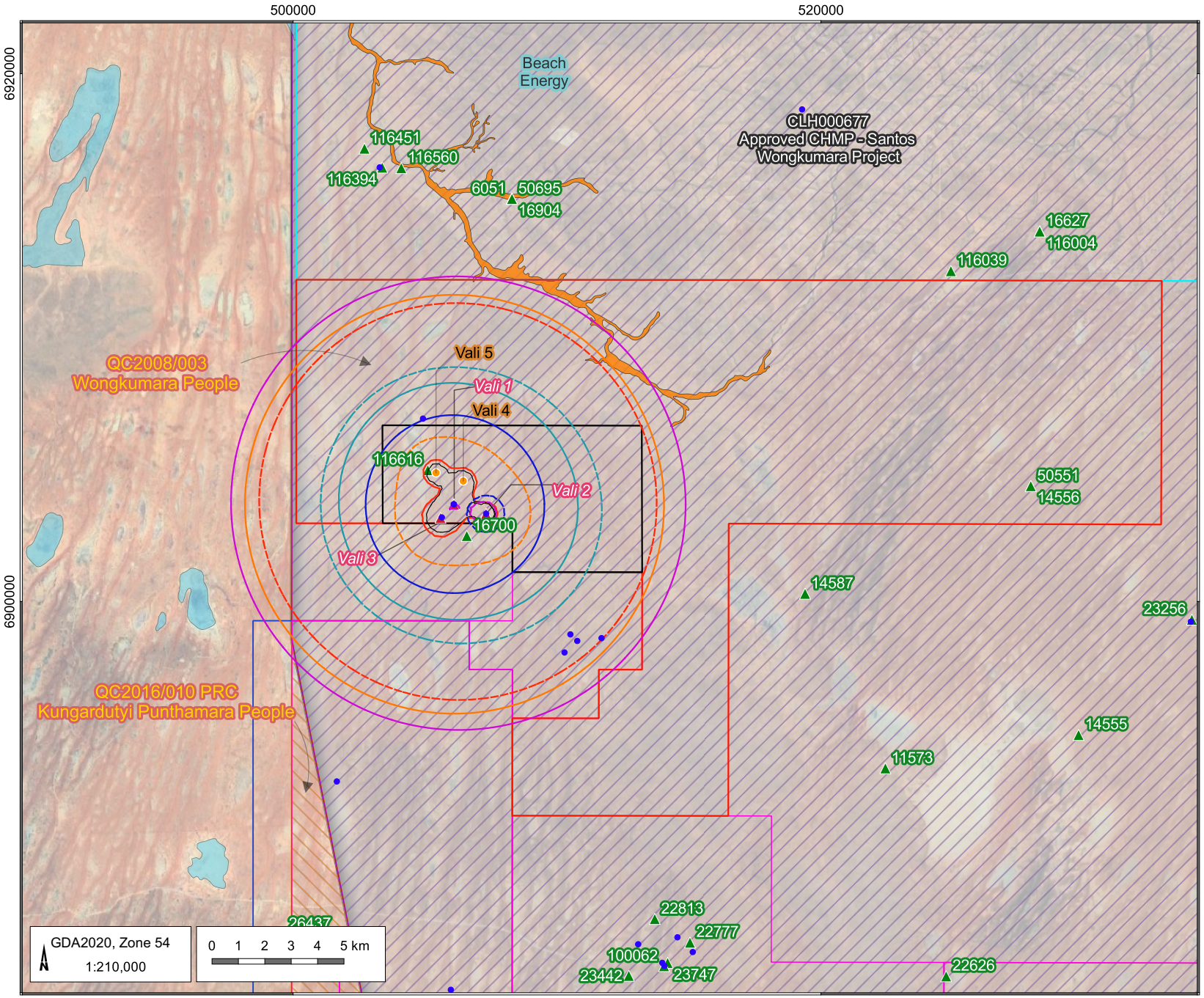
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LEGEND

- Place names
- Vali wells
- Vali wells - proposed
- Registered bores
- Petroleum wells
- Authority to Prospect (ATP 2021)
- Petroleum Lease 1125
- Cultural Heritage Management Plan boundary

Cultural Heritage Party boundaries

- Kungardutyi Punthamara People
- Wongkumara People

Aquatic GDEs

- Low potential GDE - from national assessment

Terrestrial GDEs

- Moderate potential GDE - from regional studies

5m drawdown contours (Toolachee)

- Sc. 4 Base K High S
- Sc. 6 Base K Low S
- Sc. 7 Low K High S
- Sc. 8 Low K Base S
- Sc. 9 Low K Low S
- Sc. 10

5m drawdown contours (Patchawarra)

- Sc. 4 Base K High S
- Sc. 6 Base K Low S
- Sc. 7 Low K High S
- Sc. 8 Low K Base S
- Sc. 9 Low K Low S
- Sc. 10

Vali Gas Field UWIR 2025 (VGF5000.002)

LTAA – sensitivity analysis - Toolachee and Patchawarra

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FIGURE No:
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5 Impact on environmental values (Part D)

According to the Water Act 2000 Guideline (Queensland Government, 2021), by default the environmental values may include (Section 1.3.4):

- aquaculture uses and human consumption of aquatic food;
- irrigation, farm supply/use, stock water uses;
- drinking water uses;
- aquatic ecosystems;
- recreational uses;
- industrial uses; and
- cultural and spiritual values.

Figure 5.1 presents the environmental values and existing registered groundwater bores identified within 15 km radius of the Vali gas field.

5.1 Irrigation, farm supply/use and drinking water

There are eight existing registered water bores within fifteen kilometres of Vali production wells. Further details relating to each of these existing bores is provided in Table 5.1. As shown, the majority of the bores are screened into the Winton Formation at depths of up to 294 m below ground and at least 1,600 m above the top of the Hutton Sandstone and hence based on the model results presented above (Section 4.2) are not expected to experience any drawdown due to previous or proposed underground water extraction activities associated with the Project. Therefore, there are no expected changes in water quality in the registered bores listed in Table 5.1 resulting from the decline of groundwater levels due to the project.

Table 5.1 Queensland registered water bores within 15 km radius

RN	Bore name	Easting*	Northing*	Ground elevation (mAHD)	Year drilled	Formation	Top Screen (mbgl)	Bottom Screen (mbgl)	Bore depth (mbgl)
14556	Watties bore	527944	6904365	80.5	1960	Glendower Formation or Winton Formation	NA	81.1	NA
16700	Christmas Yard bore	506583	6902489	96.3	1966	Winton formation	125	154.2	NA
50551	Watties No 2	527944	6904365	NA	1980	Winton formation	NA	81.1	NA
116616	Kudnari	505108	6904981	NA	2023	Winton formation	145.9	148.2	150.2
116394	NA	503380	6916450	NA	2013	-	NA	76	77
116560	Anakin Bore	504101	6916428	NA	2013	Winton formation?	260	272	294
50695	NA	508297	6915261	122	1990	Winton formation	NA	NA	125
14587	Roundhill Bore	519404	6900298	76.5	1961	Winton formation	NA	168.6	168.6

Notes: Coordinate system GDA 2020.
NA: Not Available.

5.2 Groundwater dependent ecosystems (incl. springs)

5.2.1 Springs

There are no springs mapped within 15 km of the Project area. The nearest known GAB springs are located around 100 km to the southwest in South Australia. In Queensland, the nearest springs are 300 km to the east of the area, outside the Cooper Basin. No information is currently available on the source aquifer for these springs in Queensland. Since the nearest springs are located far away from areas of predicted drawdown impacts in the gas reservoir targeted by the Project, no springs are impacted due to previous or proposed underground water extraction activities associated with the Vali Gas Project.

5.2.2 Groundwater Dependent Ecosystems (GDEs)

No GDEs have been identified within PL1125 according to the GDE Atlas. The only GDE present within PL1125 is a vegetation community classified as RE 5.3.22, belonging to the ephemeral wetland group. Additionally, a moderate potential terrestrial GDE has been identified by the Bureau of Meteorology (BOM) along the ephemeral Sandy Creek to the north of the Project area. Hence any groundwater support to this area will be provided by aquifers at or close to the ground surface. Therefore, potentially significant drawdown impacts of more than 0.2 m drawdown are not expected to extend beyond the top of the Cooper Basin at more than 2,000 m below ground. No qualitative and quantitative impacts of this or any other terrestrial GDEs present in the area are therefore predicted as a result of previous or proposed groundwater extraction activities associated with the Project.

5.3 Aquatic ecosystem

Several lacustrine and palustrine intermittent wetlands are present within the project area, with claypans adjacent to the well sites observed on aerial photographs. Low potential for aquatic GDEs associated with lacustrine wetland are mapped in South Australia, to the west of the project area (Aquatic GDEs). The closest aquatic GDE is more than 10 km from the Vali gas field. As no groundwater level impacts are expected above the top of the Cooper Basin which is around 2000 m below ground, no impacts on quality, water levels and flows are anticipated on any surficial aquatic ecosystems due to previous or proposed Project groundwater extraction activities.

5.4 Aquaculture

There is no known use of groundwater for aquaculture purposes within 15 km radius of the Project area. Therefore, no impacts on primary or secondary recreational waters are predicted due to previous or proposed underground water extraction activities associated with the Project.

5.5 Recreational waters

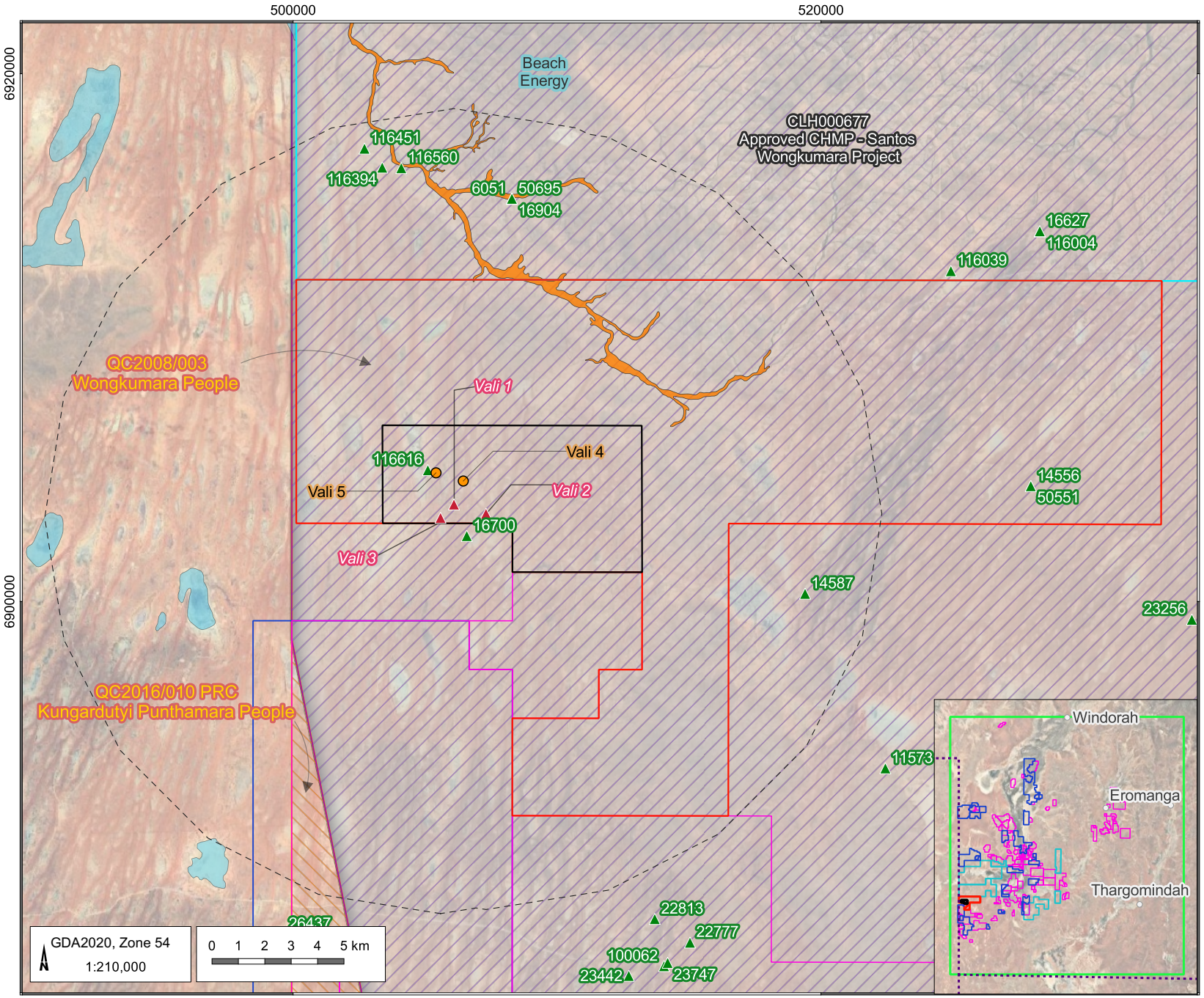
There are no known primary or secondary recreational waters within 15 km radius of the Project area. A such no impacts on primary or secondary recreational waters are predicted due to previous or proposed underground water extraction activities associated with the Vali Gas Project.

5.6 Industrial

Figure 1.1 shows the petroleum leases and exploration leases adjacent to Vali Gas Project. Santos Petroleum leases are directly adjacent to the south of the Project area. However, no existing Santos production bores are within 15 km radius of the Project area (Figure 4.13). No qualitative and quantitative impacts are anticipated on industrial users due to previous or proposed underground water extraction activities associated with the Vali Gas Project.

5.7 Cultural and spiritual values

The three production wells are within the cultural heritage area of the Wongkumara People. In the absence of any known mound springs or other similar features within 300 km of the Project area and no predicted impact on groundwater levels above the top Cooper Basin, no qualitative and quantitative impacts are anticipated on any water dependent cultural or spiritual features as a result of proposed or existing underground water extraction activities associated with the Project.



LEGEND

- Place names
- Vali wells
- Vali wells - proposed
- Registered bores
- State Borders
- Authority to Prospect (ATP 2021)
- Authority to Prospect (ATPs)
- Petroleum Lease 1125
- Santos Petroleum Leases
- Santos Exploration Permits for Petroleum
- Santos Cooper Basin
- Cultural Heritage Management Plan boundary
- Vli wells 15km radius

Cultural Heritage Party boundaries

- Kungardutyi Punthamara People
- Wongkumara People

Aquatic GDEs

- Low potential GDE - from national assessment

Terrestrial GDEs

- Moderate potential GDE - from regional studies

Vali Gas Field UWIR 2025 (VGF5000.002)

Environmental values

DATE
03/10/2025

FIGURE No:
5.1

©2025 Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) - www.ageconsultants.com.au; Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011; GEODATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006
G:\Projects\VGF5000.002 Vali Gas Field UWIR 2025\3_GIS\Workspaces\001_UWIR update\05.01_VGF5000_Environmental values.qgz

6 Water monitoring strategy (Part E)

Under section 376(f) of the Water Act, responsible tenure holders are required to develop an appropriate underground water monitoring strategy (WMS) to keep track of the quantity of water produced or taken because of the exercise of relevant underground water rights. Responsible tenure holders are also required to monitor any changes in underground water levels and the underground water quality.

6.1 Monitoring rationale

The monitoring rationale should include (but not be restricted to):

- an assessment of changes in water levels and water quality because of the exercise of relevant underground water rights;
- supplementation of existing monitoring programs to fill any critical gaps in data; and
- an explanation about how it will improve the understanding about the impacts of underground water extractions on aquifers.

Details on how the WMS aligns with the monitoring rationale are further described in Section 6.2 below.

6.2 Monitoring strategy

Based on the hydrogeological conceptualisation and the findings of the groundwater impact assessment for both IAA and the LTAA outlined in Section 4.2, the groundwater resources potentially impacted from Vali's operations are the gas reservoir formations, namely, the Toolachee, Epsilon, and Patchawarra Formations. These aquifers are located at depths of at least 2,080 metres below the shallow groundwater extraction zones, such as the Glendower and Winton Formations used by pastoralists.

Although no adverse impacts on environmental values within either the IAA or LTAA (Part D) are anticipated, a groundwater monitoring program is proposed to validate these predictions. In addition to the ongoing monitoring of the three gas production wells (Vali-1, Vali-2, and Vali-3), it is proposed that two nearby registered bores (RN 16700 and RN 116616) also be included in the monitoring network to confirm that no impacts are occurring at these existing groundwater users (Winton Formation). When the two additional wells Vali-4 and Vali-5 come online, they will be part of the monitoring program.

As the water supply bore RN16700 (Christmas Yard Bore) is outside of PL1125, an agreement between the landowner and Vintage will be necessary prior to including this bore in the monitoring program. Registered bore RN116616 (Kudnari bore) is located within PL1125 and is occasionally used for water supply by Vintage.

A monitoring program is recommended to record the following parameters for both the production wells and the two water supply bores:

- Total extraction volumes of the targeted gas reservoir (Toolachee and Patchawarra Formations) and the water supply aquifer (Winton Formation).
- Pressure of the targeted gas reservoir and water levels in the Winton Formation.
- Water quality of the gas reservoir and in the Winton Formation.

Table 6.1 outlines the monitoring parameters, schedule, frequency, and rationale for seven monitoring points, which include three existing production wells and two proposed monitoring locations at registered bores RN116616 and RN16700. For each site, the table details the monitoring period and the specific parameters to be measured, including those planned for the proposed bore monitoring activities.

Vintage Energy will maintain the current monthly monitoring of the water production rates for each gas production well (i.e. Vali-1, Vali-2 and Vali-3). The quality of combined water drawn from the production wells will be monitored biannually from the separator to identify any changes in groundwater chemistry which might be indicative of water being drawn from different sources. In addition, a minimum of one shut-in test will be recorded annually to estimate the reservoir pressure in the Toolachee and Patchawarra Formations to assess the change in gas reservoir pressure during the Project.

The monitoring of groundwater levels, groundwater quality and total extraction volumes will be undertaken biannually at Kudnari bore (RN 116616). Following an agreement with the landowner, the Christmas Yard Bore (RN 16700) might also be included in the monitoring program with proposed groundwater quality, total extraction volume and groundwater level[2] monitored biannually.

An annual review of monitoring data will be undertaken to determine whether there are any material changes in groundwater conditions or changes to the existing conceptual model. Results of the annual monitoring data review and WMS implementation will be reported per regulatory requirements (see Section 8).

[2] Pending on the access – submerged pump might prohibit the installation of a data logger or taking manual water level measurements.

Table 6.1 UWIR monitoring points - groundwater monitoring parameters and frequency

Unique Bore ID	Bore name	RN (QLD Globe)	Type	Tenure	Sub-block	Easting[1]	Northing[1]	Status	Monitoring period	Water level	Volume extracted	Water quality		Monitoring rationale
										Frequency	Frequency	Parameters	Frequency	
Vali1	Vali-1	-	Gas production well	PL1125	COOP 3421 Y	506107.8	6903682.8	Existing	August-2024 onwards	Annually[4]	Monthly	pH, EC, TRH, cations and anions	Biannual	A, C
Vali2	Vali-2	-	Gas production well	PL1125	COOP 3421 Z	507322.8	6903329.1	Existing	August-2024 onwards	Annually[4]	Monthly	pH, EC, TRH, cations and anions	Biannual	A, C
Vali3	Vali-3	-	Gas production well	PL1125	COOP 3421 Y	505599.3	6903174.4	Existing	August-2024 onwards	Annually[4]	Monthly	pH, EC, TRH, cations and anions	Biannual	A, C
Vali4	Vali-4	-	Gas production well	PL1125	COOP 3421 Y	506450.9	6904568.3	Scheduled for 2027	2027 onwards	Annually[4]	Monthly	pH, EC, TRH, cations and anions	Biannual	A, C
Vali5	Vali-5	-	Gas production well	PL1125	COOP 3421 Y	505418.5	6904879	Scheduled for 2027	2027 onwards	Annually[4]	Monthly	pH, EC, TRH, cations and anions	Biannual	A, C
RN116616	Kudnari	RN116616	Registered bore	PL1125	COOP 3421 Y	505108	6904981	Proposed	March-2026 onwards	Biannual	Biannual	pH, EC, TRH, cations and anions	Biannual	A, B, C
RN16700	Christmas Yard bore	RN16700	Registered bore	-	BROK 37 D	506583	6902489	Proposed[2]	March 2026 onwards	Biannual[3]	Biannual	pH, EC, TRH, cations and anions	Biannual	A, B, C

Notes: [1] Coordinate system GDA2020.

[2] Awaiting agreement between Vintage and the landowner to be included in the monitoring program.

[3] Pending on the access – submerged pump might prohibit the installation of a data logger or taking manual water level measurements.

[4] One pressure test annually.

Monitoring rationale: A: an assessment of changes in water levels and water quality because of the exercise of relevant underground water rights.

B: supplementation of existing monitoring programs to fill any critical gaps in data.

C: an explanation about how it will improve the understanding about the impacts of underground water extractions on aquifers.

7 Spring impact management strategy (Part F)

As discussed in Section 5.2.1 the nearest mapped GAB spring is more than 100 km away from the Project area, in South Australia. The nearest springs in Queensland are 300 km east outside the Cooper Basin boundaries. No impacts are predicted to extend beyond the Cooper Basin due to previous or proposed underground water extraction activities associated with the Vali Gas Project. As such a spring monitoring program is not required for this UWIR.

8 Annual review and UWIR reporting

Per Section 376(1)(e)(i) of the Water Act, this UWIR report will be reviewed annually, which will consider the following:

- new hydrogeological data that significantly alter the conceptual model;
- whether new production testing or production has been undertaken or is planned; and
- whether the predictions made in Section 4 have materially changed.

The outcome of this annual review will be reported to the Department of the Environment, Tourism, Science and Innovation (DETSI) as required per Section 376(1)(e)(ii) of the Water Act, including a statement of whether there has been a material change in the information or predictions presented in this UWIR. The program for the implementation of the WMS will also be reported to the Office of Groundwater Impact Assessment (OGIA) every six months.

In addition to the annual review, the UWIR will be updated every three years. However, if any material changes occur in the assumptions underpinning the UWIR or the annual review, a reassessment and potential revision of the UWIR will be triggered.

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