



Goyder North Wind Farm

Targeted Pygmy Blue-tongue Lizard Survey Report

Final

September 2025

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Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Neoen Australia Pty Ltd

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Acknowledgement of Country

Umwelt acknowledges the Traditional Owners of Country throughout Australia and their continuing values, culture and connection to the land, waters and sky.

We pay our respects to Elders past and present.

The below image is from the artwork *Yapung Maryiyang* (Pathway Forward) by Saretta Fielding.



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Executive Summary

Neoen Australia Pty Ltd (Neoen) is proposing to construct the Goyder North Renewable Energy Facility (GNREF), located north of Burra in the Mid-North of South Australia (SA). Due to the scale of the Project, it will be undertaken in multiple stages, with Goyder North Wind Farm Stage 1 and Stage 2 (GNWF, the Project) the focus of this report. The GNWF is associated with the Goyder Renewables Zone Project, which encompasses Hybrid Renewable Energy Project Goyder South Stage 1A, Goyder South Stage 1B (both currently under construction) and Goyder South Stage 2 (Development Approval granted).

Ecological assessments of the Project Area identified that the Pygmy Bluetongue Lizard (*Tiliqua adelaidensis*) (PBTl), listed as nationally Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), is known to occur within the Project Area. Umwelt (Australia) Pty Ltd (Umwelt) was engaged by Neoen in 2024 to undertake ongoing targeted surveys for PBTls across the Project Area. These proposed works included surveying within the proposed infrastructure layout that was current in February 2024 and follow-up micro siting surveys.

The 2024 surveys checked a total of 16,292 burrows, recording a total of 151 holes containing 154 PBTls. Lizards were recorded in the following vegetation associations:

- Mixed *Austrostipa* spp. and *Rytidosperma* spp. Grassland.
- *Lomandra* spp. Grassland.
- *Maireana rohrlichii* Open Shrubland.
- Cropping (exotic grassland on edge of cropped land).

The 2025 surveys comprised targeted surveys for micro siting of early geotechnical investigations (Geotech), as well as targeted surveys in updated infrastructure design footprint.

Habitat suitability mapping indicated that most of the Project Area can be considered as likely PBTl habitat, with all areas within 50 m of a known record considered 'known habitat'. Unlikely PBTl habitat is restricted to non-grassy shrubland, woodland and mallee vegetation associations, as well as rock outcrops, flats and plains and Murray Darling Depression Bioregion.

A risk assessment of the Disturbance Footprint indicates that there is a high risk of impact to PBTls and that this would constitute a significant impact under EPBC Act guidelines. Areas of likely habitat that have not been surveyed and are therefore not covered by the risk assessment should also be considered as high risk.

While impact to PBTls cannot be avoided by the Project, it is possible it may be reduced by the following:

- Continued minimisation of the Disturbance Footprint as far as practicable upon PBTls and their habitat. This may include constructing access roads to the narrowest possible width, turbine hardstands kept to the smallest possible dimensions and incorporating design elements such as routing reticulation along access roads.
- One to four weeks before construction, additional targeted PBTl surveys should be undertaken by a suitably qualified ecologist(s) to establish the location of PBTls.

- If PBTs are located within the Disturbance Footprint, then investigations of micro-siting options for the infrastructure away from the individuals should take place. Micro-siting will need to include additional survey effort in areas where information is lacking.
- Where micro-siting cannot sufficiently reduce impacts, alternative mitigation measures (e.g. relocation) will be implemented in accordance with the PBT Management Plan (Umwelt 2025).
- Implement the PBT Management Plan by considering strategies for avoiding, minimising and mitigating direct, indirect and unforeseen impacts to PBTs during construction and operation of the Project.
- The offset strategy (in prep.) should be implemented as some level of impact on PBTs cannot be avoided due to the extensive areas of suitable habitat, the cryptic nature of the PBT, and the type of development being proposed. The offset strategy aims to benefit the species, offsetting unavoidable impacts to the species, is likely to be essential to any approvals process.

Abbreviations

Abbreviation	Definition
BDBSA	Biological Database of South Australia (maintained by DEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEW	Department for Environment and Water (South Australia)
EBS	Environment and Biodiversity Services Pty Ltd (trading as EBS Ecology) (now Umwelt)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
Geotech	Geotechnical Investigations
GNREF	Goyder North Renewable Energy Facility
ha	hectare(s)
km	kilometre (s)
LMR	Landscape Management Region
LSA Act	<i>Landscape South Australia Act 2019</i> (SA)
m²	square metres / metres squared
MDB	Murray Darling Basin
Met mast	Meteorological mast (a free-standing tower which carries instruments to measure climatic parameters such as wind speed and / or temperature)
mm	millimetre(s)
MNES	Matters of National Environmental Significance
MW	megawatts
Neoen	Neoen Australia Pty Ltd
NPW Act	<i>National Parks and Wildlife Act 1972</i> (SA)
PBTL	Pygmy Blue-tongue Lizard (<i>Tiliqua adelaidensis</i>)
SA	South Australia(n)
sp.	species
spp.	species (plural)
ssp.	sub-species
Umwelt	Umwelt (Australia) Pty Ltd
WTG	Wind Turbine Generator
%	per cent

Glossary

Action	The Action includes both construction and operation of the proposed Project, and any change from existing activities which are required to undertake these tasks safely and effectively.
Declared weed	A plant that is regulated under the LSA Act due to its threat to primary industry, the natural environment and public safety.
Department	The Australian Government agency responsible for administering the EPBC Act.
Development Envelope (DE)	A 'buffered' version of the Disturbance Footprint that represents the maximum spatial extent in which the Disturbance Footprint will occur within.
Disturbance Footprint (DF)	The area in which all Project infrastructure is constructed and operated.
Minister	The Australian Government Minister administering the EPBC Act including any delegate thereof.
Operation	All activities that occur after the components of the final wind turbine generator are installed and the usage of the transmission line and substation for the purposes of transforming and/or redistributing electric current.
Project	The Goyder North Stage 1 and Stage 2 Wind Farm Project, inclusive of Wind Turbine Generators (WTG), overhead power transmission lines, expansion of existing Bunday substation, on-site battery energy storage solution (BESS), access tracks and temporary facilities and infrastructure to enable construction. The Project is part of the larger Goyder North Renewable Energy Facility which includes a future stage of development which is not yet defined.
Project Area	All Project components within GNWF including WF and OTL.
Project components	Includes boundaries of GNREF, GNWF, GN3, Development Envelope, Disturbance Footprint and Search Area.
Project elements	Distinct functional elements of the GNWF Project including WF, OTL and Site Access.
Search Area	5 km buffer around GNREF applied to all database searches and desktop study.
Significant impact(s)	Impacts which are important, notable, or of consequence, having regard to their context or intensity, and assessed within the framework of the Matters of National Environmental Significance – Significant Impact Guidelines 1.1, Commonwealth of Australia 2013.

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1.0 Introduction

1.1 The Project

Neoen Australia Pty Ltd (Neoen) is proposing to construct the Goyder North Renewable Energy Facility (GNREF), located north of Burra in the Mid-North of South Australia (SA). The Goyder North Project is associated with the Goyder Renewables Zone (GRZ) Project, which encompasses Hybrid Renewable Energy Project Goyder South Stage 1A, Goyder South Stage 1B (both currently under construction) and Goyder South Stage 2 (Development Approval granted). Due to the scale of the Project, the GNREF is further divided into multiple stages with Goyder North Wind Farm (GNWF) at the detailed design stage, and the focus of this report.

Preliminary ecological assessments, including desktop and field assessments (EBS 2022; Umwelt, 2025), have identified several Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which are likely to occur within the GNWF. The Pygmy Bluetongue Lizard (*Tiliqua adelaidensis*) (PBT), listed as nationally Endangered, was identified as known to occur within the Project Area. Umwelt (Australia) Pty Ltd (Umwelt) was engaged by Neoen to undertake targeted surveys for PBTs within the GNREF including within the proposed infrastructure layout (current February 2024) and additional micro-siting (moving and/or adjusting slightly) surveys at several targeted locations.

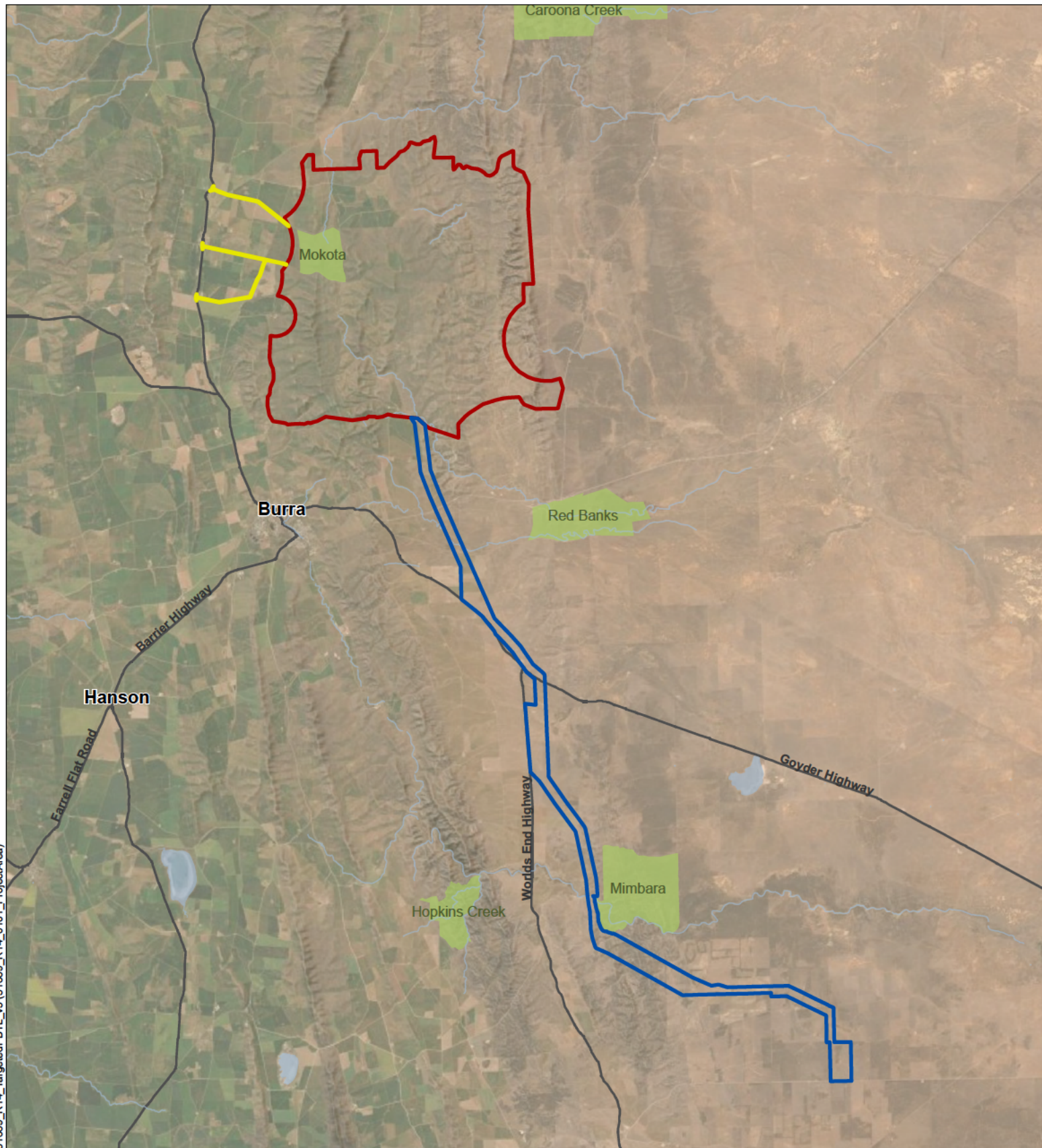
1.2 GNWF Project Area

The proposed GNWF development, herein referred to as the Project Area or the Project, incorporates a Wind Farm and an Overhead Transmission Line (OTL) which stretches approximately 48 km south from the wind farm to an existing substation at Bunday. The GNWF Project comprises:

- 99 Wind Turbine Generators (WTGs) with a capacity of up to 600 MW, a maximum blade length of 95 m, and an overall maximum height of 240 m.
- Associated infrastructure for connection to the electricity grid including underground cables, substations (one at the wind farm and the other as an extension of the existing Bunday Substation) and ~48 km of OTL between the wind farm at the Bunday Substation.
- One Battery Energy Storage System (BESS).
- Access tracks (permanent and additional temporary tracks for construction access).
- Temporary and permanent laydown areas, temporary concrete batching plant facilities, temporary construction compounds and site offices as well as permanent operations and maintenance facilities.

The boundary surrounding the wind farm infrastructure components including WTG, substation, BESS, access tracks and construction and laydown compounds is collectively referred to as the Wind Farm (WF), while components occurring outside of the WF associated with the OTL corridor (including Bunday), are referred to as OTL. The Project Area and its components are indicated on the map in **Figure 1.1**.

Figure 1.1 GNWF Project Area Components



Goyder North Wind Farm (GNWF)

- Wind Farm (WF)
- OTL
- Access Rd

- NPW reserve
- Waterbody
- Watercourse
- Main road



1.3 Survey Objectives

1.3.1 Field Survey 1 (February 2024)

Targeted surveys were undertaken with the aim to detect the presence or absence of PBTs within the proposed GNWF Project infrastructure layout (supplied 5 February 2024). Specifically, the objective of the survey was to:

- Determine the distribution and abundance of PBTs within the proposed GNWF infrastructure layout (including WTG hardstands, access roads, OTL, BESS, substation, and several alternative WTG locations).
- Inform the location of PBT 'hotspots' and identify areas which may need to be relocated (or micro-sited) to avoid or minimise potential impacts to PBTs.
- Provide information on the potential level of impact to this species in an EPBC Referral.

1.3.2 Field Survey 2 (March 2024)

Additional targeted survey work was undertaken to enable potential micro-siting of several existing WTG locations following the early reporting of the targeted infrastructure field survey results. This survey was undertaken between 18 and 22 March 2024. the objective of the survey was to:

- Determine the distribution and abundance of PBTs at six potential alternative WTG locations within GNWF.
- Determine the distribution and abundance of PBTs at proposed access road, Belcunda Road.

1.3.3 Field Survey 3 (February 2025)

Additional targeted survey work was undertaken in conjunction with early works associated with the Project, namely Geotechnical Investigations (Geotech). A significant impact assessment was completed prior to undertaking the minor works, which recommended that significant impact to PBTs could be avoided by preclearance surveys and careful micro-siting to avoid impacts to individual PBT. Habitat impacts were restricted to a small area of less than (<) 0.47 ha. Specifically, the objective of the survey was to:

- Undertake pre-clearance surveys at all proposed Geotech locations within suitable PBT habitat.
- Identify PBTs and mark ecological exclusion zones to be avoided during Geotech.
- Provide advice to Geotech contractor on site access to minimise impact to PBTs and PBT habitat.

1.3.4 Field Survey 4 (April 2025)

After further design refinement and submission of the EPBC Referral, the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) requested additional information on the extent of PBTs within the current Disturbance Footprint. A Variation to the EPBC Referral Variation was submitted in April 2025.

The objective of the fourth field survey was to:

- Map presence of PBTs and suitable PBT habitat across the updated Disturbance Footprint (current April 2025).

1.3.5 Additional Surveys

As of April 2025, there has been two small micro-siting surveys completed for the Project, this includes:

- November 2023: Surveyed two 0.06 ha areas for the construction of two meteorological masts (Met masts) called Met mast 05 and 06 for the presence of PBTs.
- July 2024: Surveying a 10 m wide access track, 10 m wide from the centre to the end of each guy wire, and a circular area for vehicle movement from the centre to the first footing around Met mast 05.

2.0 Environmental Context

2.1 PBTL Species Profile

The PBTL (**Photo 2.1**) is listed as Endangered under the EPBC Act and Endangered under the State *National Parks and Wildlife Act 1972* (NPW Act). These classifications are consistent with the International Union for Conservation of Nature (IUCN) (2001) criteria for listing species on the IUCN Red List System (Duffy *et al.* 2012). The species is also listed as one of the 110 priority species by the Australian Federal Government.



Photo 2.1 PBTL seen through lens of an endoscope during field survey at GNREF

2.1.1 Ecology and Biology

The PBTL is a moderate sized skink that has a total length of less than 20 centimetres and a relatively heavy body, large head and short limbs. Its body colour varies from grey-brown to orange-brown and may include a series of black flecks along the back and flanks. It is the smallest member of the genus *Tiliqua*, which consists of seven terrestrial lizard species, commonly known as Bluetongues. Unlike other members of the genus, the PBTL has a pink tongue (Hutchinson *et al.* 1994; Duffy *et al.* 2012).

PBTLs are known to occupy native grassland habitats. Even degraded grasslands (dominated by exotic species) are potential habitat, providing that the area is un-ploughed, and the soil structure remains intact (Milne 1999). The species has been recorded at sites dominated by species including *Austrostipa* spp. (Spear-grasses), *Rytidosperma* spp. (Wallaby Grasses), *Maireana* spp. (Bluebush), *Aristida behriana* (Brush Wire-grass) and *Lomandra* spp. (Iron-grasses) (Hutchinson *et al.* 1994, Souter *et al.* 2007). All known habitat is considered critical to the survival of the species (Duffy *et al.* 2012).

A critical feature of PBTL habitat is the presence of spider holes/burrows. The species occupies spider burrows (predominantly trapdoor spiders) which can be up to 20 millimetres (mm) in diameter and 250 mm deep. Different sized burrows are utilised by adults (greater than 16 mm in diameter and with a depth of approximately 200 mm) and juveniles (smaller burrows). The lizards use the narrow, vertical spider burrows for shelter and protection, as ambush sites for hunting passing prey, basking sites for thermoregulation, and birthing sites.

2.1.2 Population and Distribution

The PBTL is endemic to South Australia (SA), where its population is severely fragmented and occupies less than 500 km² (Duffy *et al.* 2012). The PBTL is now known from at least 31 sites extending from Peterborough in the north to Kapunda in the south, and to the South Hummocks (north of Port Wakefield) in the west (Duffy *et al.* 2012). The full extent of most populations is yet to be determined. Therefore, it is possible that some apparently isolated populations may occur within larger, more contiguous populations (Schofield 2007).

Very little information exists on the past distribution of the species. The relative abundance of PBTL in European collections of specimens in the 19th century suggests that the species was formerly more common and has undergone a marked decrease in distribution (Shea 1992).

The total population size of the PBTL is uncertain. Prior to 2000, the population was estimated to be around 5,000 lizards, based on 10 known populations (Milne *et al.* 2000). Since this time, there are now over 31 known PBTL populations (Duffy *et al.* 2012). Suitable habitats are largely on private land and historically may have been under-surveyed due to access considerations. All PBTL populations are considered important due to the restricted and fragmented distribution of the species (Duffy *et al.* 2012).

More recently, due to the PBTL Recovery Plan efforts, university studies and proposed wind farm flora and fauna assessments, surveys for PBTLs have increased. Despite this, overall population size is hard to estimate due to natural fluctuations (due to a number of factors such as climatic conditions, habitat conditions, food availability and breeding opportunities).

2.2 Landscape Context

2.2.1 Landform and Soils

The characteristic landform and soils of the Project Area is summarised in **Table 2.1**. The table is derived from the Interim Biogeographical Regionalisation of Australia (IBRA), as documented in *Goyder North Renewable Energy Facility Ecological Assessment Report* (EBS Ecology, 2024; Umwelt, 2025a).

Table 2.1 Characteristic Landforms and Soils of the Project Area

Project Area	Landform	Soils
WF	Hills and valleys; alternating subparallel hilly ridges and valleys with a general North-South trend in north. In south, hilly dissected tableland.	Hard setting loams with red clayey subsoils, highly calcareous loamy earths, hard setting loams with mottled yellow clayey subsoil, coherent sandy soils, cracking clays.
OTL	Very gently undulating, to flat aeolian sand covered depositional plain of the central-southern Murray Basin.	Brown calcareous earths and highly calcareous brown loamy earths, hard setting loamy soils with red clayey subsoils, cracking clays.

2.2.2 Vegetation

Native vegetation in the Project Area has been mapped in Goyder North Renewable Energy Facility Ecological Assessment Report (EBS Ecology 2024). This assessment recognised 23 native vegetation associations, as listed below:

- VA1. *Eucalyptus porosa* +/- *E. gracilis* / *E. brachycalyx* Woodland over Chenopods.
- VA2. Smooth-barked Mixed Mallee (*E. gracilis* +/- *E. brachycalyx* +/- *E. dumosa* +/- *E. leptophylla* +/- *E. socialis*) over Chenopods.
- VA3. *E. porosa* Woodland over *Senna artemisioides* sp. *coriacea* and Sclerophyllous Shrubs.
- VA4. *Acacia pycnantha* Tall Shrubland +/- *Austrostipa* spp. +/- *Cymbopogon ambiguus* in rocky creek.
- VA5. *Maireana aphylla* Shrubland over native and exotic grasses.
- VA6. *Lomandra* spp. Grassland.
- VA7. *Acacia spilleriana* Shrubland.
- VA8. *E. leucoxydon* ssp. *pruinosa* +/- *E. odorata* (Peppermint Box) Very Open Woodland over exotic grasses.
- VA9. *Maireana rohrbachii* open shrubland over *Austrostipa* sp. and exotics +/- *Lomandra* spp.
- VA10. *Allocasuarina verticillata* over *Cymbopogon ambiguus* and herbs on steep rocky slopes.
- VA11. a) Mixed *Austrostipa* spp. and *Rytidosperma* spp. Grassland; b) +/- emergent *Eucalyptus* (*E. porosa* / *E. socialis*) trees.
- VA12. Mixed Chenopod Shrubland of *Maireana pyramidata* and *Atriplex stipitata* over native and exotic grasses +/- *Lomandra* spp.
- VA13. *Hakea leucopetala* ssp. *leucopetala* Shrubland.
- VA14. *Eucalyptus camaldulensis* Riparian Woodland over reeds and sedges.
- VA15. *Juncus* spp. Sedgeland +/- *Typha domingensis* +/- *Phragmites australis* associated with minor drainage lines and creeks.
- VA16. *Acacia nyssophylla* shrubland.
- VA17. *Cryptandra* spp. Shrubland +/- *Lomandra* spp.

VA18. Mixed Mallee (inc. *E. oleosa* dominant) over Chenopods and native grasses.

VA19. *Dodonaea lobulata* Shrubland +/- Scattered Mallee *Eucalyptus* spp.

VA20. *Alectryon oleifolius* Low Woodland over Chenopods.

VA21. *Senna* spp. Shrubland.

VA22. *Scaevola spinescens* Shrubland over Grass.

VA23. *Nitraria billardiera* Shrubland.

Vegetation associations are mapped in **Appendix 1**. Those areas not mapped as native vegetation were categorised as either:

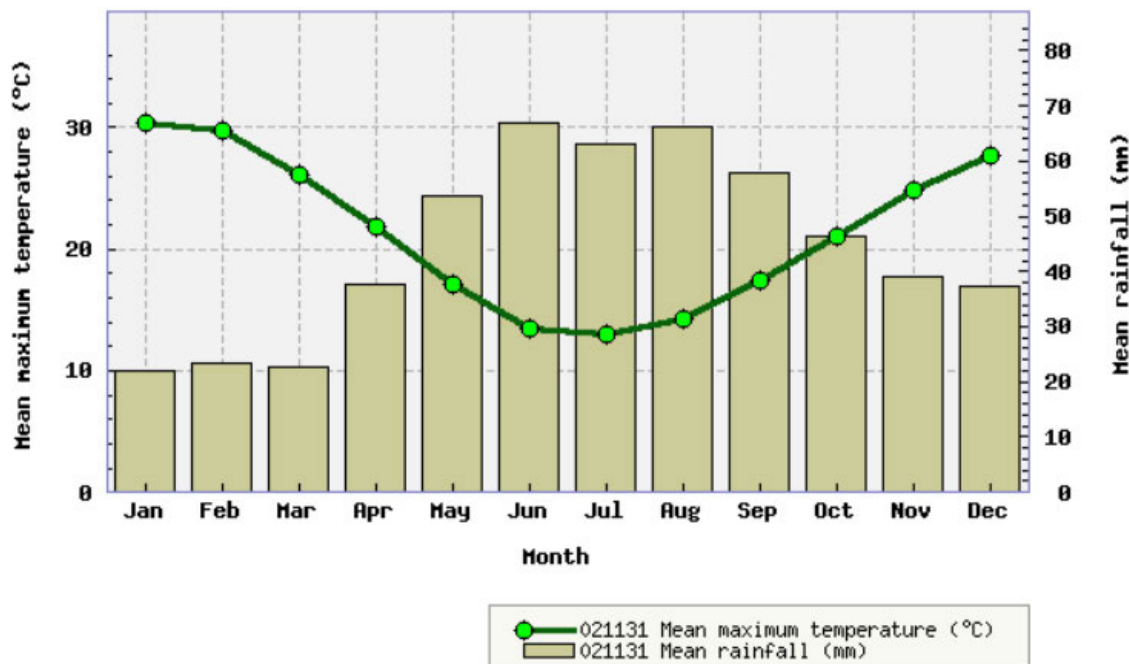
- Amenity vegetation: vegetation planted for shelterbelts, revegetation or ornamental purposes.
- Exotic vegetation: pastures dominated by exotic grasses (i.e., *Hordeum vulgare*, Barley Grass).
- Cropped: agricultural land currently or historically utilised for cropping.
- Other: including existing cleared areas (i.e. roads) and unsurveyed locations, such as around homesteads.

Past land clearing activities and a long history of agricultural land use has led to native vegetation typically existing in a poor to moderate condition. Most vegetation in the Project Area is impacted by fragmentation, weeds and grazing activities.

2.2.3 Climate

Climate data was sourced from the Clare High School Weather Station (site number: 021131), located approximately 40 km south of the southern boundary of the GNREF Project Area. The area surrounding Burra reaches relatively hot maximum temperatures in summer, with mean maximum temperatures highest in January (30.4 degrees) and February (29.7 degrees). The wettest months are June (66.9 mm), August (66.3 mm) and July (63.0 mm) (Commonwealth of Australia, 2019) (**Graph 2.1**).

Location: 021131 CLARE HIGH SCHOOL



Australian Government
Bureau of Meteorology

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Graph 2.1 Mean Maximum Monthly Temperatures and Mean Monthly Rainfall Recorded at Clare High School Weather Station (Site number 021131) from 1994 to 2024

3.0 Survey Methodology

3.1 Targeted Field Surveys

A total of four targeted field surveys have been conducted within the Project Area as of April 2025 (**Table 3.1**), each contributing to the knowledge and understanding of the distribution of PBTLs within the Project Area. The primary survey (Field Survey 1) was undertaken within the proposed Disturbance Footprint current at the time of the survey (February 2024). Subsequent surveys were conducted with specific goals including micro-siting for design, mitigation for geotechnical works and to survey additional areas added to the early Disturbance Footprint.

Experienced and suitably qualified ecologists were rotated throughout each survey period. Survey timing for Field Survey 1 was planned for late summer to enable maximum visibility in grassland vegetation (i.e. low grass and exotic pasture cover). Late summer is the typical birthing time for PBTL, with females and their young sharing burrows from mid-January to mid-March, and some juvenile dispersal during this time.

Subsequent surveys were also undertaken within the optimal time for surveying PBTLs.

Table 3.1 Field Survey Description

Survey	Timing	Duration	Staff	Description
Field Survey 1	12 February 2024 to 8 March 2024	20 days	4	Intensive targeted survey of entire Disturbance Footprint (Current February 2024).
Field Survey 2	18 to 22 March 2024	5 days	2	Targeted survey at six alternative WTG locations and proposed access road, Belcunda Road.
Field Survey 3	30 January 2025 to 3 March 2025	10 days	2	Targeted surveys at multiple test pits and boreholes at WTGs, access roads, substation and OTL.
Field Survey 4	15 to 17 April 2025	3 days	2	Targeted survey of areas added to the Disturbance Footprint since Field Survey 1 (current April 2025), including MV cables, and the updated Disturbance Footprint including WTGs and access roads.

3.1.1 Permits

All fauna surveys were undertaken by Umwelt under Scientific Research Licence K25613-27 (or earlier versions).

3.1.2 Survey Parameters

Prior to conducting the field surveys, the most current infrastructure layout was downloaded onto an offline ESRI ArcGIS Field Map, which was developed specifically to capture targeted PBTL survey data. Prior to undertaking the field survey, parameters were developed to define survey confidence based on grassland visibility, as detailed in **Table 3.2**.

Table 3.2 Survey Confidence Definition

Visibility	Description	Image
Poor (low confidence) (i.e. <50% of burrows within the immediate search area detected)	Thick covering of thatched or tall grasses (i.e. oat grass). Ground not visible unless parted at each step.	
Moderate (moderate confidence) (i.e. estimated up to 75% of burrows within the immediate search area detected).	Moderate coverage of native and introduced grasses, ground between tussocks generally visible.	
Good (high confidence) (i.e. estimated >90% of burrows within the immediate search area detected).	Very low covering of grasses, almost completely open, especially areas which have been heavily grazed.	

3.1.3 Field Survey Method

All infrastructure which occurred within suitable (i.e. grassland) or marginal habitat (i.e. shrubland with grassy understorey) was assessed in detail during the field survey. Two surveyors, separated by 5 m to 10 m walked systematically side-by-side at a slow and steady pace. Within the Disturbance Footprint (current at time of each survey), search effort included:

- A single pass (i.e. two transects 5 m to 10 m apart) along all access tracks and turn-around bays.
- Parallel transects at 5 m to 10 m intervals across all WTG hardstand, BESS and substation infrastructure.
- A single pass along the OTL.

Where time permitted, surveys were also conducted where the infrastructure layout intersected habitat considered unsuitable for PBTL, such as mallee woodland. Several additional areas, outside of the current infrastructure footprint were surveyed to enable potential micro-siting to avoid mallee woodland habitat.

At the start of each walking transect one team member used the ESRI Field Map to start a 'live-stream' track, which detailed the level of confidence as well as the surveyors, date of survey, and any relevant notes on survey conditions. Simultaneously, both surveyors would use the tracking function on their GARMIN GPS 62/64 handheld device to record all tracks walked.

Each time the visibility / confidence level changed, or at any other logical time, a new ESRI Field Map track was started.

Each burrow encountered along the survey transect was searched using an optic fibre endoscope (Yateks M Series) to determine whether burrows were occupied by PBTLs. The endoscope is an illuminated articulating insertion probe, approximately 8 mm (or less, <) in diameter, with a digital video display screen. The probe can be easily directed into the burrow and bent around corners with the use of a 'joystick'. The optic fibre was slowly fed into each burrow, until a PBTL, spider or other fauna was observed, or until the bottom of the burrow was reached. The survey method was consistent with the Survey guidelines for Australia's threatened reptiles: *Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DSEWPaC 2011).

A handheld GPS was used to mark each burrow searched to provide an indication of burrow density and survey effort. Each time a PBTL was encountered the point was marked in the GPS as 'PBTL'.

3.2 Data Processing

All waypoints and tracks collected were downloaded from the GPS at the conclusion of each week of survey. Waypoints were collated into a single file, indicating location of each PBTL and all searched holes.

Search effort and confidence level were indicated by the tracks collected. A 2.5 m buffer was applied to each walked track, which indicates the actual search area in which the confidence level applies (i.e. each observer is expected to have observed burrows within a 5 m width corridor, total search width of 10 m with two observers).

3.2.1 Habitat Suitability Mapping

Habitat suitability was mapped using vegetation associations, as surveyed and mapped in EBS 2024. Habitat suitability terminology and definitions are listed in **Table 3.3**.

Table 3.3 Habitat Suitability Definitions

Habitat Suitability	Definition
Known	All areas within 50 m of a known location of a PBTL including recent and historical records. Records include those collected by Umwelt and historical records sourced from the Biological Database of South Australia (BDBSA) (Recordset number: DEWNRBDBSA240207-2).
Likely	Vegetation associations in which there are no PBTL records but are considered potentially suitable habitat and preferred habitat parameters are available (including slopes and hills, suitable soil types without dense surface rock cover).
Unlikely	Vegetation associations in which there are no PBTL records and are otherwise not considered suitable habitat (i.e. mallee, woodland, areas with no grass component, rock outcrops, flats and plains, Murray Darling Depression Bioregion, areas with high surface rock cover).

3.2.2 Significant Impact Risk Assessment of Surveyed Areas

Areas that were surveyed were assessed for the risk of impacting PBTLs through the construction of GNREF infrastructure. Areas were mapped as either High risk, Moderate risk or Low risk, with risk levels defined in **Table 3.4**. The assessment was based on the presence and proximity of PBTL records, both recorded during the survey and historical records, habitat suitability, and the confidence / visibility level of the search effort undertaken during the field survey.

GPS points of burrows and PBTLs were correlated with the survey confidence parameters to assess the risk of a significant impact occurring on PBTLs from the construction of infrastructure in the surveyed areas.

In summary, a 50 m buffer (conservatively based on typical 20 m foraging range of the PBTL), was applied to all current and historical records of PBTL, determined to be 'High Risk' areas. Where the survey confidence was high (i.e. minimal grass cover and good visibility) and no current or historical PBTL records were present, the survey area was determined to be 'Low Risk'. Mapped vegetation associations with no dominant grassy component to the understorey (i.e. woodland and chenopod shrublands) were also considered 'Low Risk'.

Additionally, the Murray Darling Depression (MDD) bioregion is considered to not be within the known range of the species, and several vegetation associations do not provide suitable habitat resources for PBTL. These areas were also mapped as 'Low Risk' as indicated in **Table 3.4**.

This mapping can then be utilised in conjunction with technical considerations, when determining micro-siting options to minimise and avoid impacts to PBTL population hotspots.

Note that it was not possible to assess risk of significant impact in areas of suitable habitat that have not been systematically surveyed.

Table 3.4 PBTL Habitat Suitability, Based on Proximity of Records, Survey Confidence and Habitat Type. The Table Also Defines Each Risk Level

Survey Confidence	Recent PBTL records (50 m buffer)	Historical PBTL Records (50 m buffer)	No PBTL records high burrow density	No PBTL Records Low Burrow Density	Low risk vegetation association (VA) / IBRA Bioregion exclusions
Low confidence	High risk	High risk	Moderate risk	Moderate risk	VA1, VA2, VA3, VA14, VA15, VA16, VA18, V19, VA20, VA21, VA22, VA23, Cropped. Murray Darling Depression (MDD) Bioregion. Other parameters: flats and plains, high rocky cover or unsuitable soil (i.e. sand / shale / rock outcrop).
Medium confidence	High risk	High risk	Moderate risk	Moderate risk	
High confidence	High risk	High risk	Low risk	Low risk	
Risk Level	Risk Definition				
High risk	Impact (death or injury) to individual PBTL almost certain. Removal and fragmentation of critical habitat almost certain. Significant impact to PBTL.				
Moderate risk	Impact (death or injury) to individual PBTL likely or possible. Removal and fragmentation of critical habitat likely or possible. Significant impact to PBTL without undertaking mitigation measures.				
Low risk	Impact (death or injury) to individual PBTL unlikely. Removal and fragmentation of critical habitat unlikely. No significant impact to PBTL.				

3.3 Limitations

The field survey was based on searching the infrastructure layout (Disturbance Footprint) which was current at the time of each survey. The layout did not include a search of the current entire proposed Disturbance Footprint which was not defined at the time of all surveys. The primary field survey (Field Survey 1) survey aimed to cover the entire Disturbance Footprint, current on 5 February 2024 in a broad sense to determine potential hotspot populations of PBTL. The survey did not aim to detect all PBTLs which may occur within the Disturbance Footprint. Subsequent surveys covered areas under consideration for micro siting (to avoid populations detected during the initial survey), or in areas where the Disturbance Footprint had been refined / altered for a range of reasons.

Visibility of burrows was dependent on a range of factors including:

- Available light and time of day (i.e. overcast conditions most suitable for detecting burrows, as it reduces distraction from light and shadow).
- Density of vegetation cover including native and exotic grasses (i.e. where thick thatch of grasses occurred, visibility of burrows was severely limited).
- Observer experience (where possible, all surveyors had previous experience searching for burrows and PBTL. If staff with limited experience were utilised, they were paired with an experienced observer for the duration of the survey period).

The results of the survey represent the number of PBTs detected within a select survey area at the time of the survey (February 2024). Little is known about the movements of the PBT within the landscape on a short- or long-term basis, including home range, dispersal of young, seasonal movements and landscape requirements (i.e. aspect, elevation, soil depth). During the survey period, PBTs may have been foraging outside of their burrows, and therefore, some burrows which were recorded as unoccupied may actually provide a regular shelter site for an animal. The survey results provide an indication of the use of spider holes in the landscape at a point in time but may not indicate the actual impact to this species in the future due to daily and / or seasonal movements.

Habitat suitability and risk assessment mapping has only been possible in areas that were surveyed. That is, within the Disturbance Footprint that was available at the time. The actual width of searched habitat is estimated to be a maximum of 2.5 m either side of each observer (i.e. total 10 m search width per pass). Where habitat suitability and associated risk level is not mapped for an area, this does not infer the absence of PBTs or associated risk of impact in that area.

Assessment of the appropriateness and validity of the approach in terms of survey methodology, survey effort, described limitations, habitat suitability mapping and population estimates has been validated by PBT Recovery Team Chair, Professor Mike Gardner, who also noted that population density estimates are likely to be slight overestimates given the searching that occurred around lizard hotspots, and due to the seasonal timing of surveys, which were undertaken predominantly after several years of favourable conditions.

3.3.1 Spatial Data Limitations

All spatial data has been captured or converted to the following coordinate reference system.

Datum: Geocentric Datum of Australia 2020 (GDA2020).

Projection: Map Grid of Australia 2020 (MGA2020), Zone 54.

All location coordinates listed in this report are expressed using this system. Spatial data converted from other coordinate reference systems may have accuracy limitations.

4.0 Field Survey Results

All PBTLs recorded throughout the different surveys conducted within the Project Area as of April 2025 are summarised in **Table 4.1** and shown in **Figure 4.1**, along with all historically sourced records from BDBSA (DEW 2024). Tracks from each survey in the WF and the confidence level of the search effort of these tracks are shown in **Figure 4.2**.

4.1 Field Survey 1: Targeted Infrastructure Field Survey Results – February 2024

A total of 15,534 potential burrows were searched during the initial field survey. Of these, 136 contained PBTL, including one burrow which contained 3 PBTLs (one adult and two juveniles), for a total of 138 individual PBTLs detected during the field survey.

Several areas searched were outside of the current proposed infrastructure footprint, this included records of four PBTLs which were not within the existing infrastructure footprint. An additional seven PBTLs were recorded directly adjacent to a proposed access track in an apparent PBTL research plot.

The Project Area, particularly within the WF boundary, is dominated by grassland in varying condition. This is the known and preferred habitat of the PBTL and is where most PBTLs were recorded. All habitats intersected by the Project infrastructure and searched during the field survey (and subsequent survey in March 2024) are presented in **Table 4.1**, with the number of holes searched and number of PBTLs detected for each.

4.2 Field Survey 2: Additional Micro-siting Field Survey Results – March 2024

An additional 758 potential burrows were searched during an additional field survey in March 2024, in several potential micro-siting locations, and along an access road option. Of these, 15 contained PBTL, including one burrow which contained 2 PBTLs (one adult, one juvenile) for a total of 16 individual PBTLs detected in the micro-site alternative locations. In summary:

- No PBTLs were detected along a proposed access road, Belcunda Road.
- WTG098-Alternative (Alt): 11 occupied holes, 12 individuals within the WTG hardstand location, and two additional PBTLs in the surrounding area (between the vehicle track and the proposed location).
- WTG015-Alt: 2 PTBL detected in difficult terrain.
- WTG126-Alt, WTG121-Alt / WTG121-Alt, WTG120-Alt: no PBTL detected.

4.3 Field Survey 3: Geotechnical Investigation Field Survey Results – February–March 2025

The targeted surveys for the Geotech works recorded an additional 3,270 burrows which included 19 containing PBTLs across the Project Area from February to March 2025. In summary:

- A total of 32 WTG sites were surveyed for test pits and boreholes, with some sites having tracks surveyed for temporary access of the 2-tonne excavator. A total of 11 PBTLs across six different sites including four at WTG_084, two at WTG_038, and WTG_090, and one at WTG_096, WTG_006, and WTG_005.
- Some test pits were located at the same location or along the tracks of the WTG sites. An additional 27 test pits were surveyed along access roads where eight additional PBTLs were found at six different sites (TP27_AR, TP22_AR, TP24_AR, TP19_AR, TP10_AR, and TP07_AR), including one site (TP20_AR) which was found to have two PBTLs.
- The entire substation area was resurveyed due large amount of Geotech works and the revised Disturbance Footprint, however no PBTLs were found included the one recorded found in the February 2024 survey that was still within the Project Area.
- Surveys were conducted for the test pits and boreholes in suitable habitat along OTL but no PBTLs were recorded.

4.4 Field Survey 4: Updated Infrastructure Design Field Survey Results – April 2025

An additional 1,795 burrows were searched during the surveys in April 2025, where 10 PBTLs were newly recorded. The areas that were surveyed in this period includes:

- 10.24 km of Disturbance Footprint from the MV cable where five PBTLs were found. This includes, three PBTLs found between the BESS and WTG_028 and two found between WTG_014 and WTG_028.
- The Disturbance Footprint of 13 WTGs alternate locations and the Development Envelope of WTG_098 was surveyed. No PBTLs were found within the Disturbance Footprint of the 13 WTGs but three were found in the Development Envelope around WTG_098.
- 15.71 km of Disturbance Footprint from access roads where one PBTL was found along the proposed access road to WTG_114.
- 0.82 km of Disturbance Footprint from the stringing corridor of the OTL, where one PBTL was found near WTG_046.

4.5 Minor Surveys

4.5.1 Met Mast Field Survey Results - November 2023 & July 2024

Two small micro siting surveys were conducted prior to the construction of two Met masts. The findings of each survey are indicated below for:

- Survey 1 (Met Mast 06):
 - Only one burrow was searched within the direct vicinity of the existing Met Mast, however the survey did not cover the area specific to the proposed design, as it was not known at the time of the survey (i.e. proposed access route).

- One PBTL record is known along the existing track to the south, approximately 260 m away. This location will be avoided during Met Mast installation.
- Much of the site is considered non-preferred habitat for the species, with a steep slope, rocky surface covering and heavy grazing providing very low vegetation cover at present.
- Survey 2 (Met Mast 05):
 - A total of 283 burrows were inspected during the field survey. Of these, three burrows contained an individual PBTL.
 - The proposed met mast and associated access track was micro-sited using coloured flag pins, to avoid known records of PBTL, including any known PBTL records from the surveys undertaken
 - Any area outside of this search area has not been surveyed for PBTLs and should not be disturbed.

4.6 Summary of Survey Results

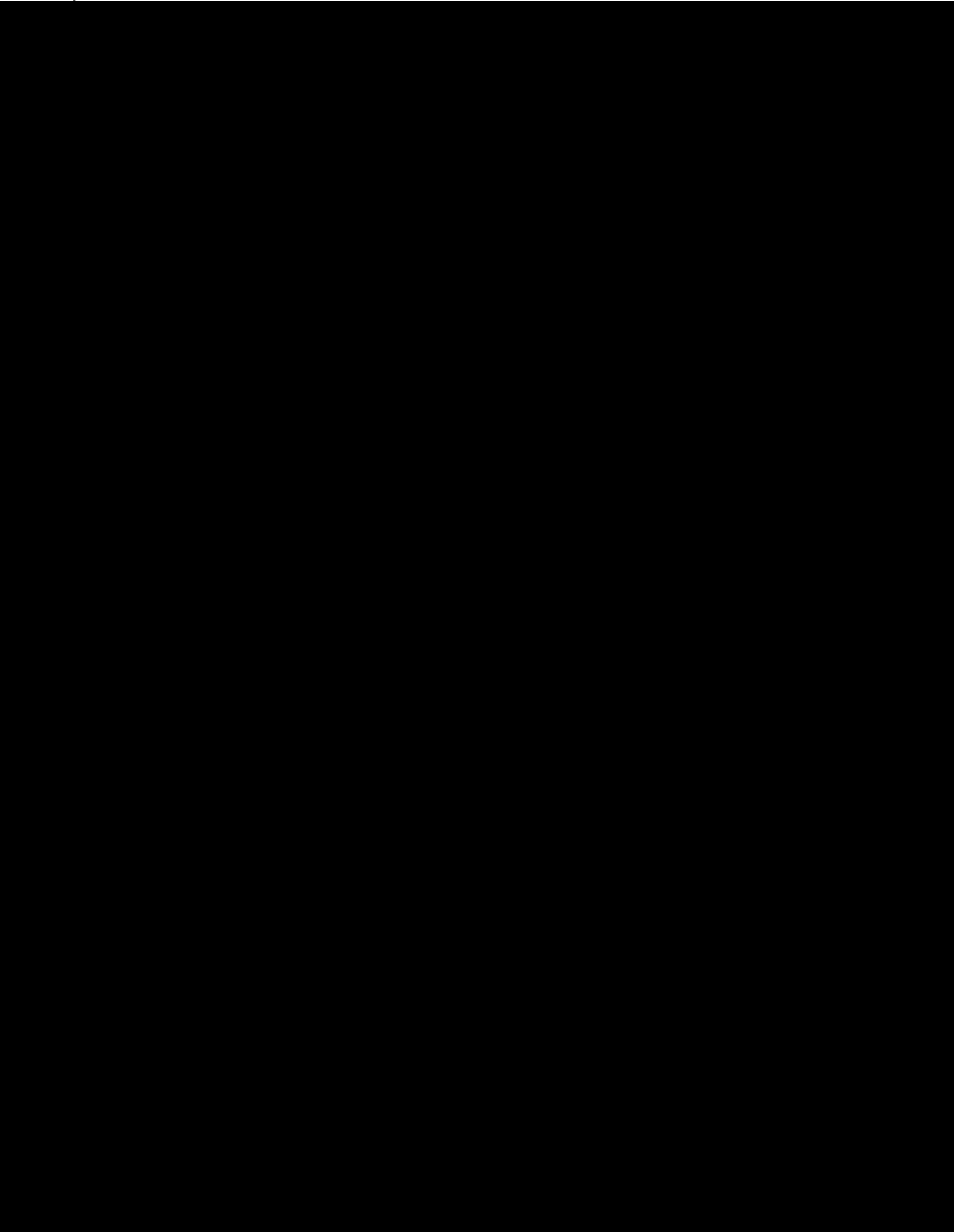
Table 4.1 The Number of Spider Burrows Searched and Number of Burrows Occupied by PBTL in Each Vegetation Association

Vegetation Association	Vegetation Association Description	(Feb /March 2024)		Geotech (Feb 2025)		April 2025		Other minor surveys	
		Number of burrows searched	Number burrows with PBTL	Number of burrows searched	Number burrows with PBTL	Number of burrows searched	Number burrows with PBTL	Number of burrows searched	Number burrows with PBTL
VA1	<i>Eucalyptus porosa</i> +/- <i>E. gracilis</i> / <i>E. brachycalyx</i> Woodland over Chenopods	278	0	0	0	1	0	0	
VA2	'Smooth-barked Mixed Mallee' (<i>E. gracilis</i> +/- <i>E. brachycalyx</i> +/- <i>E. dumosa</i> +/- <i>E. leptophylla</i> +/- <i>E. socialis</i>) over Chenopods	48	0	0	0	0	0	0	
VA3	<i>E. porosa</i> Woodland over <i>Senna artemisioides</i> sp. <i>coriacea</i> and Sclerophyllous Shrubs	8	0	0	0	0	0	0	
VA6	<i>Lomandra</i> spp. Grassland	640	4	191	1	24	0	0	
VA8	<i>E. leucoylon</i> ssp. <i>pruinosa</i> +/- <i>E. odorata</i> Very Open Woodland over exotic grasses	4	0	1	0	0	0	0	
VA9	<i>Maireana rohrlichii</i> open shrubland over <i>Austrostipa</i> sp. and exotics +/- <i>Lomandra</i> spp.	1,011	26	0	0	437	3	0	
VA10	<i>Allocasuarina verticillata</i> over <i>Cymbopogon ambiguus</i> and herbs on steep rocky slopes	38	0	0	0	12	0	0	

Vegetation Association	Vegetation Association Description	(Feb /March 2024)		Geotech (Feb 2025)		April 2025		Other minor surveys	
		Number of burrows searched	Number burrows with PBTl	Number of burrows searched	Number burrows with PBTl	Number of burrows searched	Number burrows with PBTl	Number of burrows searched	Number burrows with PBTl
VA11a / b	a. Mixed <i>Austrostipa</i> spp. and <i>Rytidosperma</i> spp. Grassland b. +/- emergent <i>Eucalyptus</i> (<i>E. porosa</i> / <i>E. socialis</i>) trees.	13,466	116	3,019	18	1,273	7	284	3
VA12	Mixed Chenopod Shrubland of <i>Maireana pyramidata</i> and <i>Atriplex stipitata</i> over native and exotic grasses +/- <i>Lomandra</i> spp.	158	0	0	0	0	0	0	0
VA14	<i>Eucalyptus camaldulensis</i> Riparian Woodland over reeds and sedges	0	0	0	0	0	0	0	0
VA15	<i>Juncus</i> spp. Sedgeland +/- <i>Typha domingensis</i> associated with minor drainage lines and creeks.	0	0	2	0	0	0	0	0
VA16	<i>Atriplex nummularia</i> (Old-man Saltbush) Plantation	0	0	0	0	0	0	0	0
VA17	<i>Cryptandra</i> spp. Shrubland +/- <i>Lomandra</i> spp.	0	0	0	0	0	0	0	0
VA18	Mixed Mallee (inc. <i>E. oleosa</i> dominant) over Chenopods and native grasses.	33	0	0	0	0	0	0	0
VA19	<i>Dodonaea lobulata</i> Shrubland +/- Scattered Mallee <i>Eucalyptus</i> spp.	15	0	0	0	0	0	0	0
VA20	<i>Alectryon oleifolius</i> Low Woodland over Chenopods	10	0	0	0	0	0	0	0

Vegetation Association	Vegetation Association Description	(Feb /March 2024)		Geotech (Feb 2025)		April 2025		Other minor surveys	
		Number of burrows searched	Number burrows with PBTl	Number of burrows searched	Number burrows with PBTl	Number of burrows searched	Number burrows with PBTl	Number of burrows searched	Number burrows with PBTl
VA21	<i>Senna</i> spp. Shrubland	16	0	0	0	0	0	0	0
VA22	<i>Scaevola spinescens</i> Shrubland over Grass	0	0	0	0	0	0	0	0
VA23	<i>Nitraria billardiera</i> Shrubland	48	0	0	0	0	0	0	0
Amenity	Vegetation planted for shelter-belts, revegetation or ornamental purposes.	0	0	0	0	0	0	0	0
Exotic	Pastures dominated by exotic grasses (i.e., <i>Hordeum vulgare</i> , Barley Grass)	83	0	5	0	20	0	0	0
Cropped	Agricultural land currently or historically utilised for cropping	88	2	4	0	1	0	0	0
Not mapped	These records represent VA11 (Grassland), however due to GPS accuracy and scale of mapping, are outside of mapped vegetation layers, typically occurring on road edges from which vegetation mapping has been clipped	348	3	48	0	27	0	0	0
Total burrows / occupied burrows		16,292	151	3,270	19	1,795	10	284	3
Total PBTl		NA	154	NA	19	NA	10	NA	3

Figure 4.1 PBTs Recorded by Umwelt Including Historical Records Sourced from the BDBSA (DEW 2024)



Data Source: Umwelt (2025),
ESRI (2025), DEW (2022), DIT (2022)
Neoen (2025)
Date Exported: 30/04/2025 9:33 am
Created by: Chelsea.Dawson

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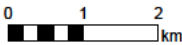
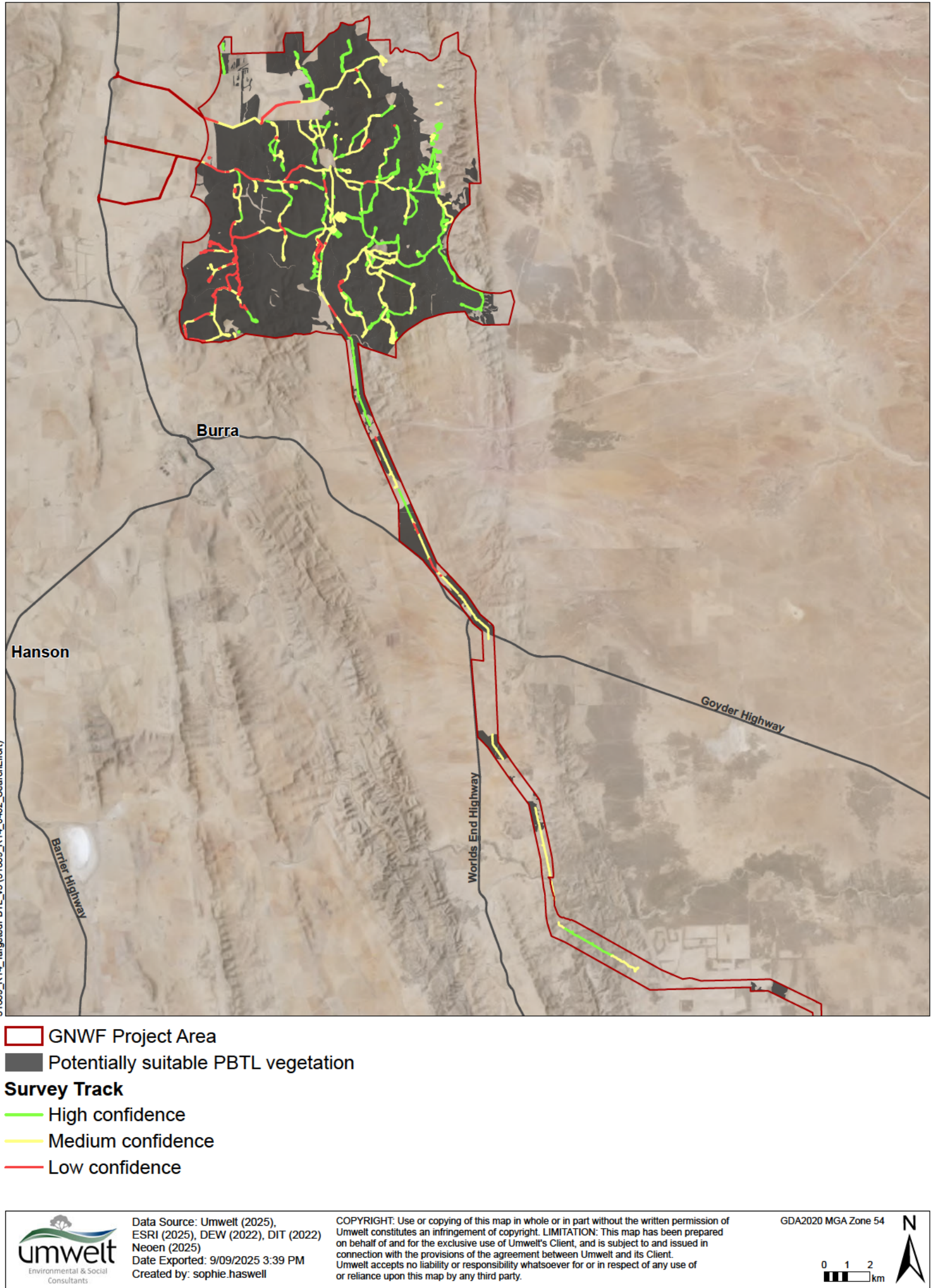


Figure 4.2 Search Effort and Confidence Level of Tracks Surveyed in GNWF



4.6.1 PBTL Distribution in the Project Area

PBTLs were found to be scattered throughout grassland and shrubland habitat within the WF infrastructure footprint. Over 1,000 historical records, held by the Department for Environment and Water (DEW) in the Biological Database of South Australia (BDBSA), are also present within the Project Area (DEW 2024). The locations of these records indicate areas of likely suitable habitat.

Despite their widespread distribution, the survey identified several areas in which there were a higher density, or concentration, of PBTLs (known as ‘hotspots’) including:

- WTG 015 had 9 PBTL.
- WGT 087 south to WTG 092 is densely populated, with 23 PBTLs along the access track and / or on hardstands.
- WTG 090 and WTG 091 each had three PBTL.
- The access track between WTG 059 south to WTG 086 was also good habitat, and 7 PBTLs were identified in the narrow search area.
- A cluster of 16 PTBL were detected around WTG 098, which was initially not considered to be likely habitat, based on the vegetation association – VA9: *Maireana rohrlachii* shrubland over grass.
- Within the boundary of the GNREF, 19 records of PBTLs were recorded along the direct route of the OTL.
- Three PBTLs were also detected in or around the proposed BESS site.
- The stretch of MV cable from WTG 014 to the substation was found to have five PBTLs, concentrated near the creek lines.

No PBTLs were found to occur along the OTL route outside of the WF boundary. Habitat was predominantly chenopod shrubland and mallee woodland with a limited grassy understorey component, or where grassland occurred it was on previously disturbed flats / plains not known to be utilised by PBTL.

4.6.2 Habitat Suitability

Following survey work, data was interrogated to determine if factors such as slope, aspect, altitude, soil type, landform and a range of other factors could explain the distribution of PBTL within otherwise suitable habitat. There was no strong link between the location of PBTL records, or burrows, which was explained by these factors. Give the patchy widespread and patchy distribution of PBTL across the WF, habitat suitability mapping indicates that most of the WF will be considered as ‘likely’ PBTL habitat, with ‘known’ habitat restricted to within 50 m of known recent and historical records of PBTL. Unlikely PBTL habitat is restricted to patchy areas of cropped land, drainage lines and densely wooded mallee vegetation in the east of the WF and southern half of the OTL, as well as grassland areas which otherwise did not meet the criteria as described in **Table 3.3**.

Based on the survey findings and the location of historical records within the GNWF Project Area, the south-central portion of the WF is deemed to be of the highest habitat suitability for the PBTL. The outwash areas in the far southeast of the WF and woodland habitats were found to be least suitable. In general, Chenopod shrublands were found to be unsuitable, except where a significant grassy understorey was present and the shrubland occurred on low to medium hills.

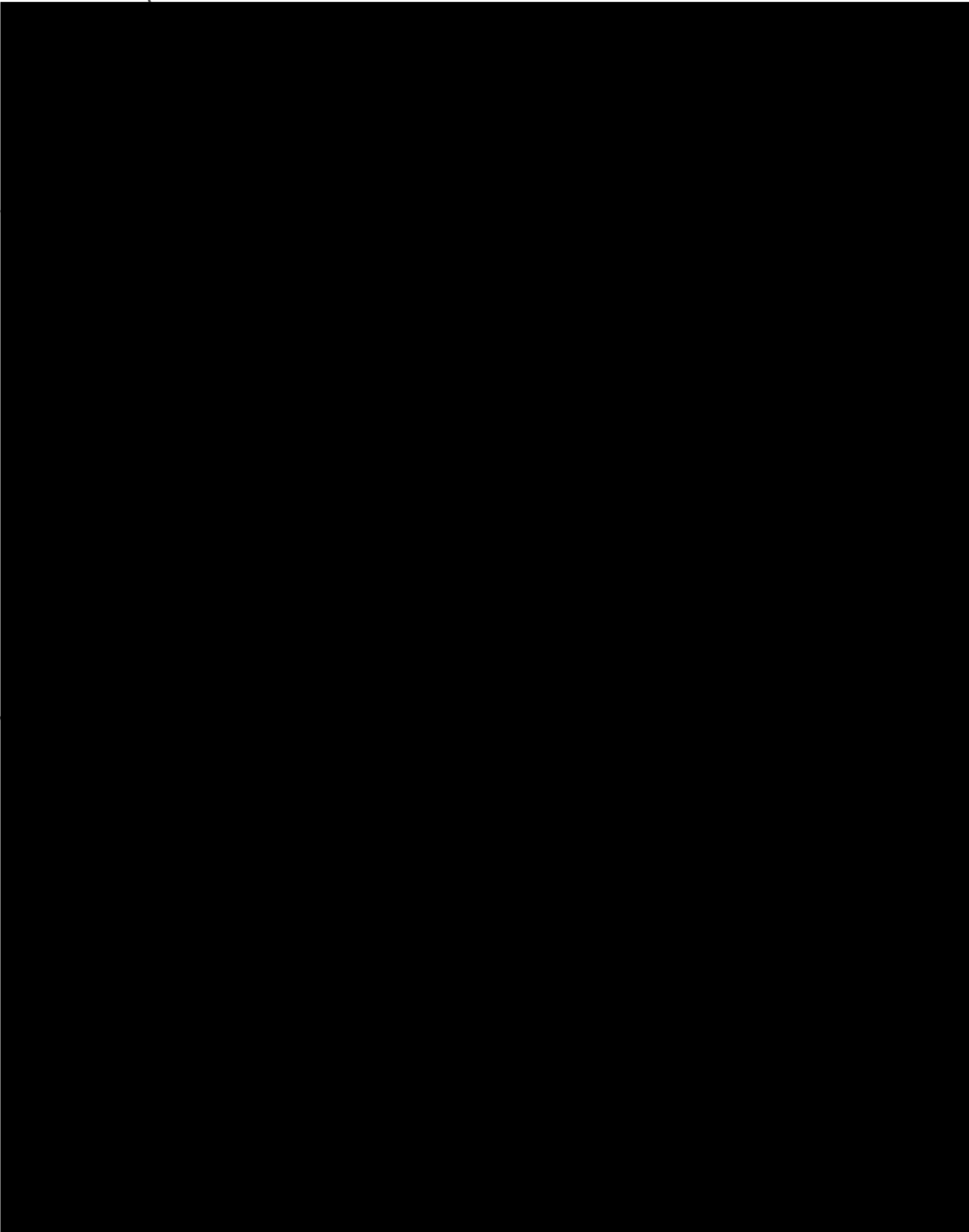
No PBTs were found in flat / low elevation areas. The species is not known to occur outside of the Flinders Lofty Block IBRA bioregion, and therefore habitat that occurs in the far south of the Project Area, within the MDD Bioregion is also considered unlikely habitat.

Habitat suitability mapping is described in **Table 4.2** and displayed in **Figure 4.3**, showing areas of known, likely and unlikely habitat.

Table 4.2 Summary of Likely and Known Habitat within the April 2025 Disturbance Footprint, Development Envelope and GNWF Project Area.

Habitat Classification	Description	Area of habitat in Disturbance Footprint	Area of habitat in Development Envelope	Area of Habitat in Project Area
Unlikely / Unsuitable	- Areas where no burrows were detected. - Non-grassy shrubland, woodland and mallee vegetation associations. - Habitat which otherwise meets the suitability criteria but occurs within the MDD bioregion. - Habitat which otherwise meets the criteria but occurs on flats / plains, or on sandy / shaley soil, or which high surface rock density.	178.55	1,735.40	6,271.21
Possible / Likely	- Areas where there are no PBT records, but are otherwise considered potentially suitable habitat, and preferred habitat parameters are available, such as presence of spider burrows, topography of slopes and hills and suitable soil types without dense surface rock cover. - Overlapping with low and moderate confidence tracks.	347.53	2,593.04	10,976.54
Known	Within 50 m of known record (recent and historical) and extending as far as suitable burrows occur. Records include those collected by Umwelt and historical records sourced from the BDBSA (Recordset number: DEWNRBDBSA240207-2).	20.48	76.71	182.88

Figure 4.3 Habitat Suitability Mapping of the Surveyed Infrastructure Footprint, Based on PBTL Records and Mapped Parameters



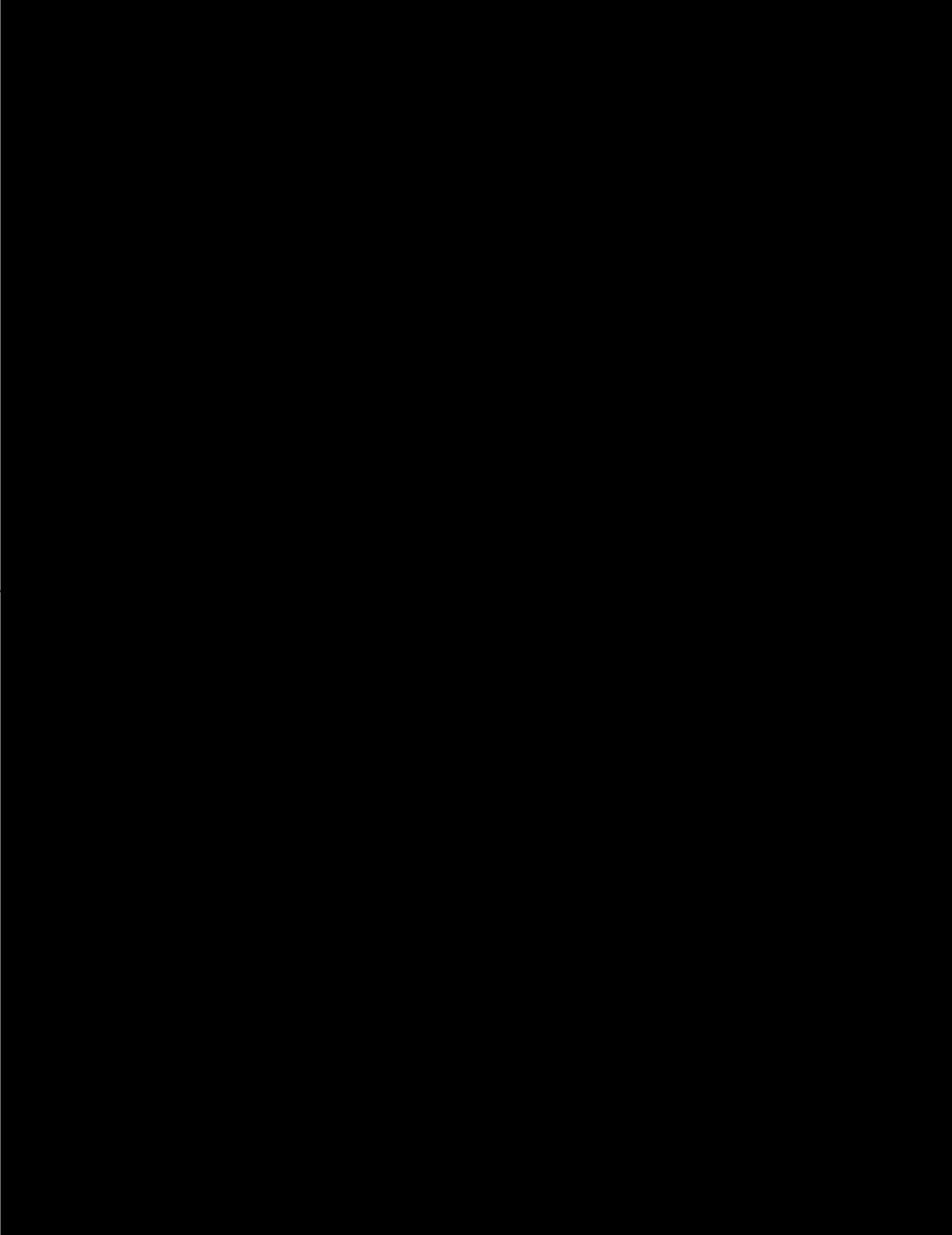
4.6.3 Risk Assessment Mapping

The survey results to date indicate that there is a high risk of impacting PBTs within some areas of the Disturbance Footprint. However, much of the OTL and eastern windfarm area is considered medium or low risk, due to unsuitable habitat including woodlands, unfavourable topography (outwash/drainage areas and plains) and unsuitable soil type. These unsuitable landscape characteristics are further qualified by the lack of historical and current PBT records / observations.

A map indicating areas of high, medium, and low risk to PBTs is shown in **Figure 4.4**. Note that this mapping is based around the Disturbance Footprint known at the time of the surveys.

Where an area is not mapped as any risk level, this is an indication of no survey effort, rather than of no risk. Much of the area not mapped in **Figure 4.4** represents potentially suitable habitat that has not been surveyed in detail.

Figure 4.4 PBTL Risk Assessment Map of the Surveyed Infrastructure Footprint



5.0 Discussion and Recommendations

5.1 Mitigation Measures

The infrastructure has been strategically designed and sited to minimise direct impacts on PBTLs and their habitat as much as possible, with ongoing refinements guided by the Mitigation Hierarchy. The initial design intentionally avoided areas identified as potentially having high PBTL densities, with subsequent redesigns aimed at further minimising the number of individuals within the Disturbance Footprint.

5.2 Disturbance Footprint

The April 2025 Disturbance Footprint impacts on 20.48 ha of known PBTL habitat, and 347.53 ha of likely habitat. Compared to previous iterations of the design, this represents a reduction of 48.04 ha (in both known and likely habitat) from the design submitted at the time of referral in October 2024. Comparisons have not been made to earlier designs due to the level of design maturity not accurately reflecting the full infrastructure layout.

Table 5.1 Comparison of Disturbance Footprint Through Design Iterations

Design Iteration	Known habitat impacted (ha)	Likely habitat impacted (ha)	Estimated no. individuals impacted.
Referral (2024)	24.37	391.68	261.53
Referral Variation (2025)	20.48	347.50	236.04

5.3 Discussion

The surveys indicate that PBTLs are widespread throughout the GNWF in the WF, however they are unlikely to be present in the OTL corridor outside of the WF boundary of the Project Area.

The 2024 survey was undertaken during the birthing and dispersal period after several consecutive years of favourable environmental conditions. Results may be representative of a population boom, both in terms of numbers of PBTLs and spread across the landscape, following favourable climatic conditions. This observation was further qualified in communications with PBTL Recovery Team Chair, Mike Gardner, who has more recently undertaken surveys at the site, in similar locations, and found lower numbers of PBTL and extremely patchy distributions.

Consequently, these high numbers may not to be reflected in results from surveys undertaken during poor conditions. Despite this, the survey results provide a good indication of the potential distribution of PBTLs in the Project Area. It also provided an ideal time to map habitat likelihood, with PBTLs present in marginal habitat that might otherwise have been mapped as unlikely.

Favoured habitats are VA11: Grassland, VA6: Lomandra Grassland and VA9: *Maireana rohrlichii* shrubland over grassy understorey, though it is noted that the population in VA9 was restricted to one dense population and did not extend with the VA across the rest of the Project Area. Two records are also reported within 'cropped' vegetation and three within 'unmapped' areas. These represent a discrepancy in scale of mapping and GPS point accuracy and are records which occur on the edge of cropping or road, within native or exotic grassland vegetation.

Survey results and risk assessment mapping shows that the Project will have a significant impact on the PBTLs if constructed according to the designs available at the time of the survey. Given that large areas of suitable habitat in the Project Area remain unsurveyed, it is not possible to determine whether impact can be reduced below significant by design changes.

5.4 Recommendations

Further avoidance and mitigation measures will be required to minimise and offset the residual impacts of the Project on PBTL. This may need to include the following considerations:

- Continued minimisation of the Disturbance Footprint as far as practicable upon PBTLs and their habitat. This may include constructing access roads to the narrowest possible width, turbine hardstands kept to the smallest possible dimensions and incorporating design elements such as routing reticulation along access roads.
- Implement a PBTL Management Plan by considering strategies for avoiding, minimising and mitigating direct, indirect and unforeseen impacts to PBTLs during construction and operation of the Project.
- One to four weeks before construction, additional targeted PBTL surveys should be undertaken by a suitably qualified ecologist(s) to establish the location of PBTLs.
 - If PBTLs are located within the Disturbance Footprint, then investigations of micro-siting options for the infrastructure away from the individuals should take place. Micro-siting will need to include additional survey effort in areas where information is lacking.
 - Where micro-siting cannot sufficiently reduce impacts, alternative mitigation measures (e.g. relocation) will be implemented in accordance with a site specific PBTL Management Plan (Umwelt, 2025c).
- The EPBC Offset Strategy (Umwelt, 2025d) should be implemented, as some level of residual impact on PBTLs cannot be avoided due to the extensive areas of suitable habitat, the cryptic nature of the PBTL, and the type of development being proposed. The Offset Strategy aims to benefit the species, offsetting unavoidable impacts to the species, is likely to be essential to any approvals process. The Offset Strategy focuses on protection and restoration of existing known and likely habitat for PBTL and may include expansion of habitat into currently unoccupied or otherwise unsuitable regions (i.e. cropped areas). The EPBC Offset Strategy for PBTL is also likely to incorporate a research component to investigate the success of relocation as a mitigation strategy for developments.

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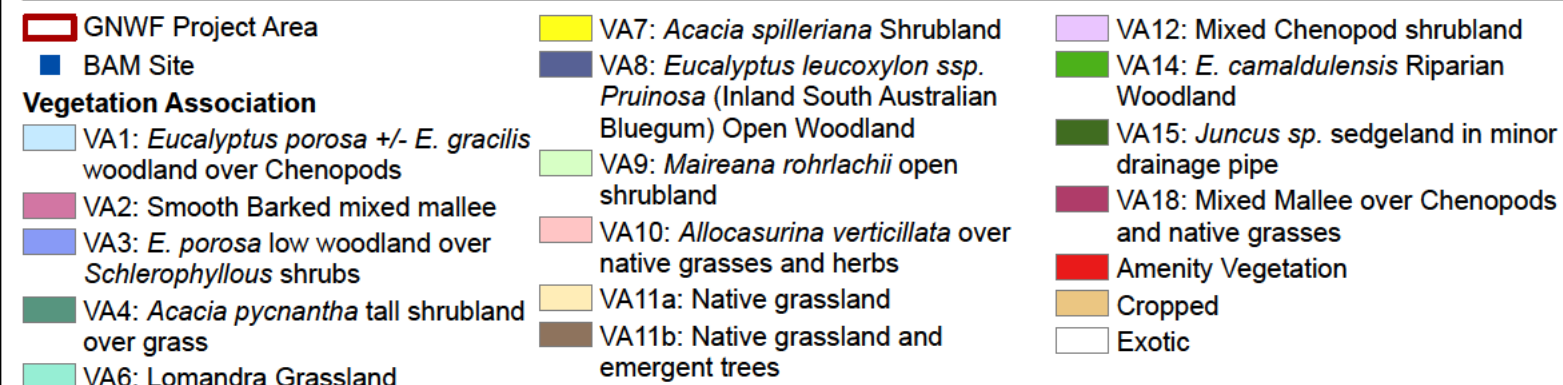
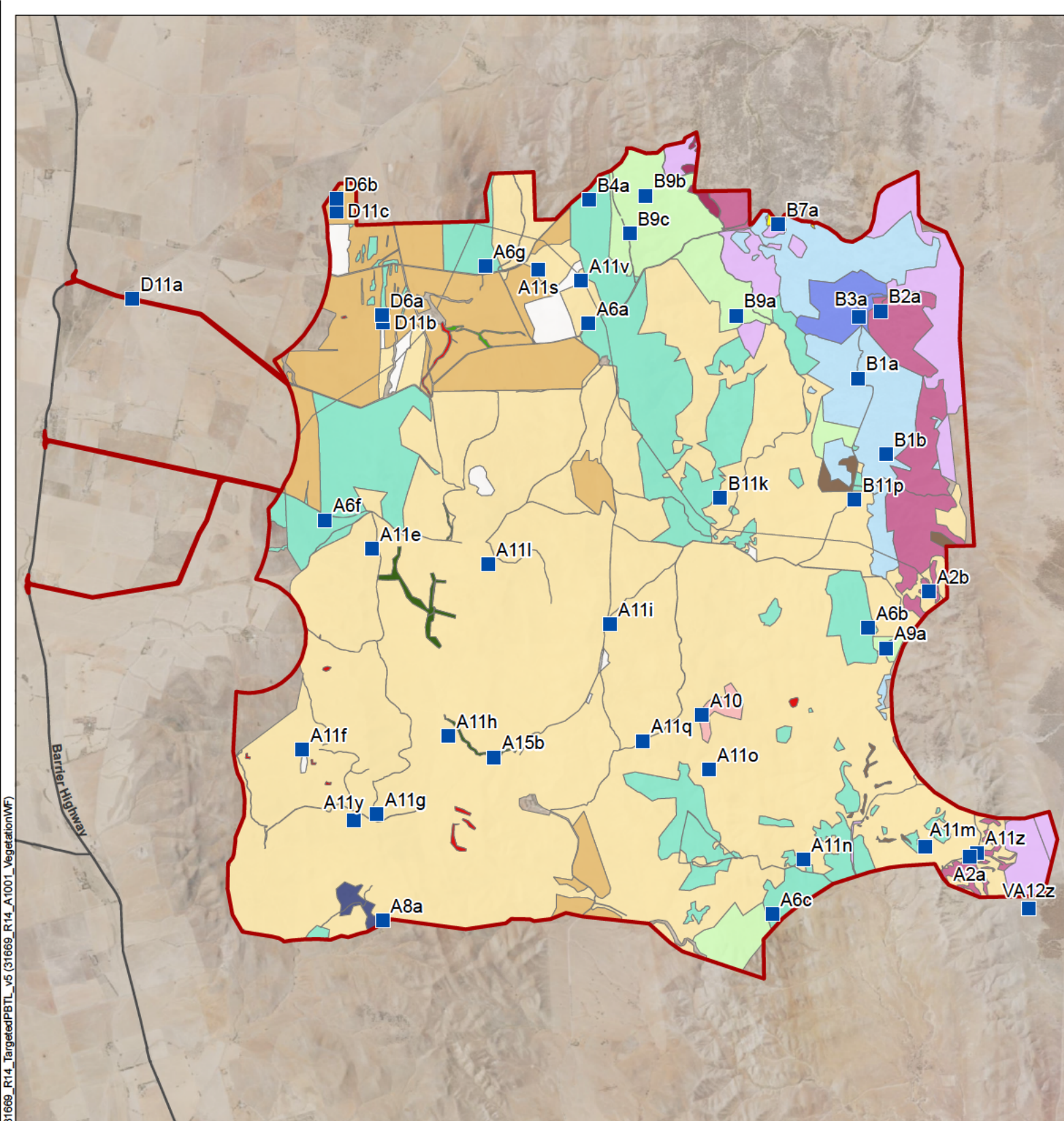
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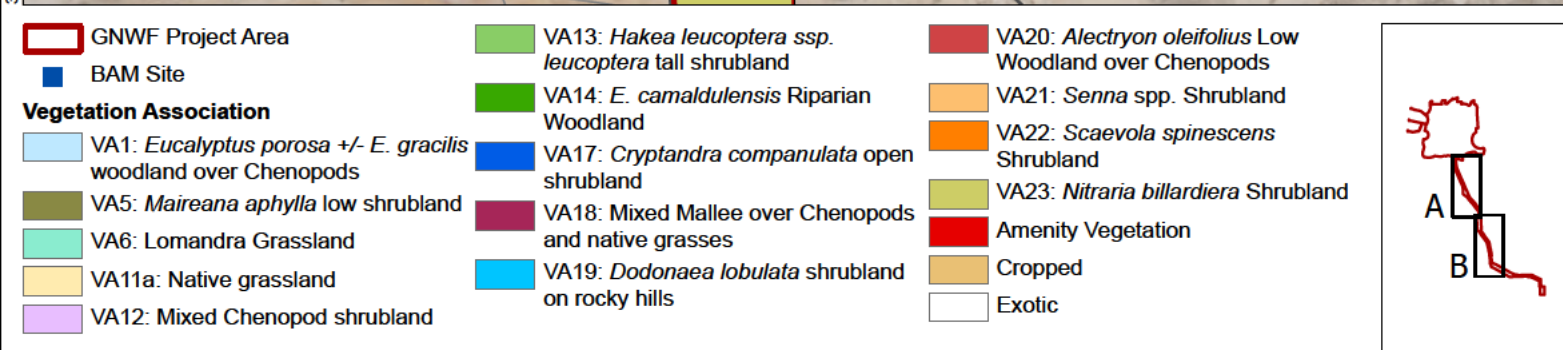
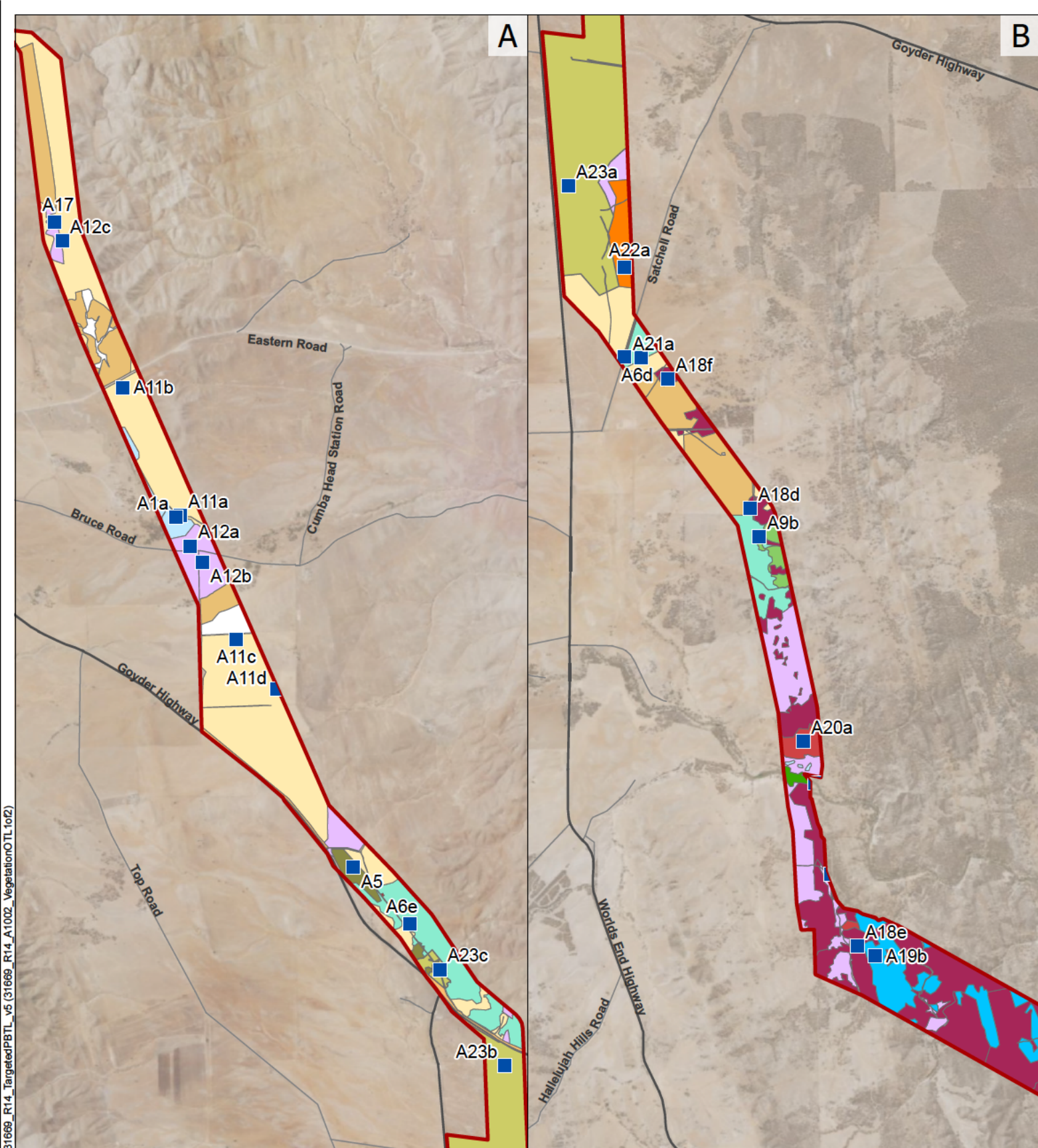
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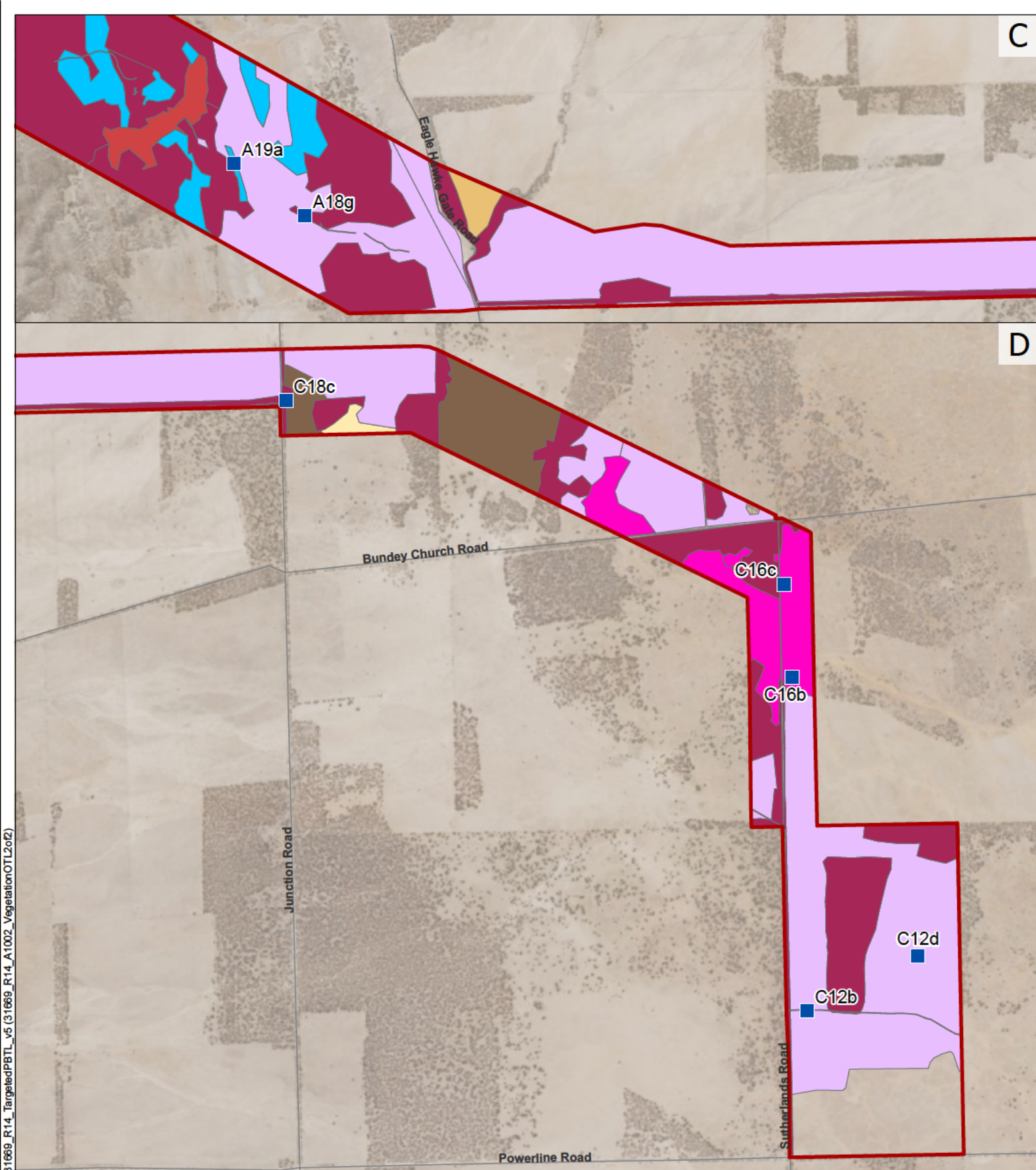
Appendix 1

Vegetation Maps

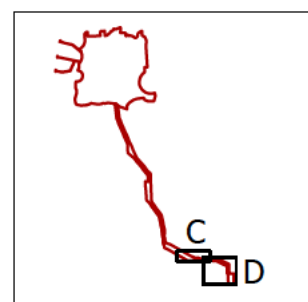








- GNWF Project Area**
- BAM Site**
- Vegetation Association**
- | | | |
|--|--|---|
| VA11a: Native grassland | VA12: Mixed Chenopod shrubland | VA19: <i>Dodonaea lobulata</i> shrubland on rocky hills |
| VA11b: Native grassland and emergent trees | VA16: <i>Acacia nysophylla</i> shrubland | VA20: <i>Alectryon oleifolius</i> Low Woodland over Chenopods |
| | VA18: Mixed Mallee over Chenopods and native grasses | Cropped |





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