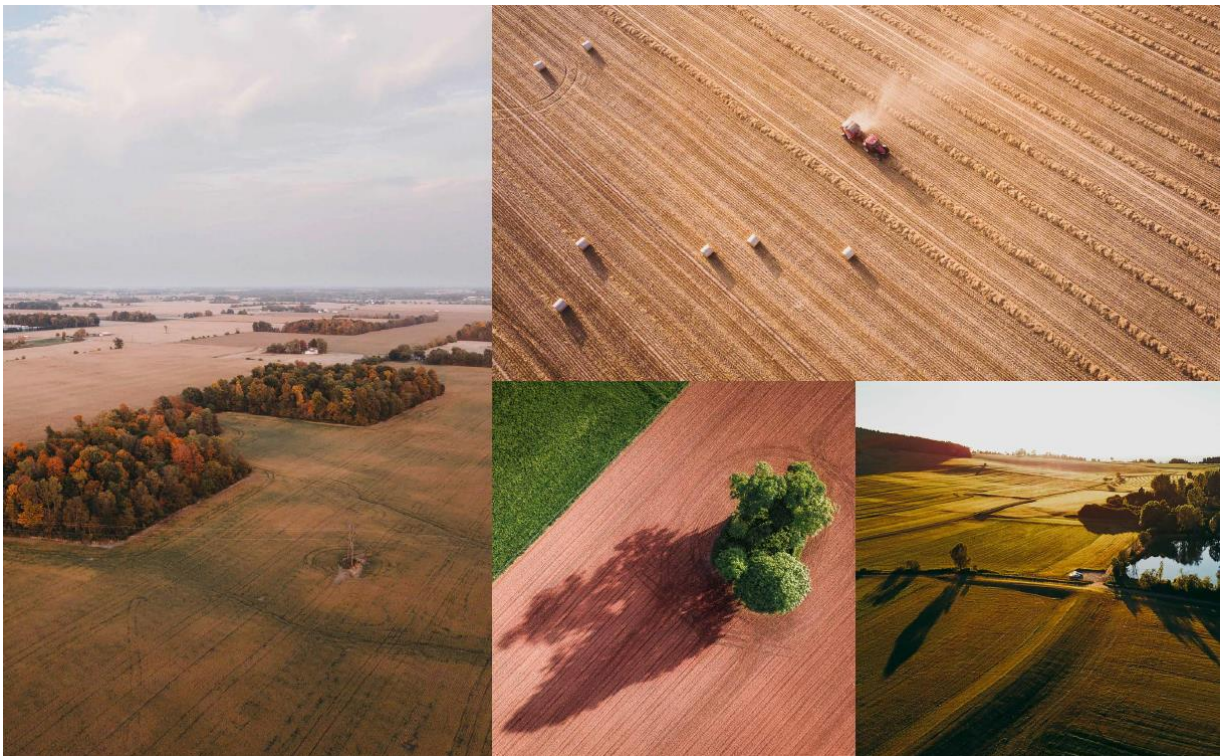


Desktop Review

Matters of National Environmental Significance



Stage 1 Commercial Development within Petroleum Production Licence (PPL) 269

April 2023

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Revision History

Revision	Date	Purpose	Prepared by	Reviewed by
01	26.04.2023	Desktop Review of Matters of National Environmental Significance	MS	KG/ DN / JC / ES

NeuRizer Ltd. acknowledges the Adnyamathanha people, the traditional owners of the land on which our operations occur and pay our respects to their Elders past and present.

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1 Introduction

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) has recently updated the Species Profile and Threats Database (SPRAT) to include newly listed Threatened Flora and Fauna species under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth of Australia, 2023; DoE, 2023a-d).

The current desktop review aims to gather updated information to address and assess any new Matters of National Environmental Significance (MNES) within the Stage 1 Commercial Development Project Area (PPL 269). As such, the purpose of this report is to document results of an updated desktop assessment of the potential presence of recently added EPBC listed species at the proposal location. The desktop review is based on available data from Department for Environment and Water (DEW) database, Biological Databases of South Australia (BDBSA) records and existing ecological survey reports obtained by consultants from field surveys at the existing Leigh Creek Mine Site (PEL 650) and Stage 1 Project Site (PPL 269).

NRZ have carried out four ecological surveys in total, covering summer, spring and winter seasons. The first baseline ecological assessment of the PEL 650 was undertaken by T&M Ecologists in December 2017 to determine the flora and fauna species within a 20-kilometre buffer from the PEL 650 boundary (T&M Ecologists, 2018a). A further study was then commissioned in December 2018 to present an overview of the ecological assets present within the area of the PPL 269 (T&M Ecologists, 2018b). The spring study was a targeted Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) listed Thick-billed Grasswren (*Amytornis modestus*) and Sea Heath (*Frankenia plicata*) survey (Jacobs, 2019).

The final study was a winter flora and fauna survey completed in August 2021 (Jacobs, 2021), with an addendum to this winter ecological survey being completed in August 2022. The addendum to this winter survey was prepared by Jacobs to assess the potential direct and indirect impacts on EPBC listed Species and Ecological Communities as a result of Stage 1 proposed actions (Jacobs, 2022).

2 Project Location

NRZ is the owner and proposed operator of the NeuRizer Urea Project (NRUP) (Formerly known as Leigh Creek Energy Project – LCEP) located at Leigh Creek in South Australia (SA), 550 km North of the city of Adelaide, SA.

The NRUP is located in the former Leigh Creek mine, approximately 10 km northeast of the Leigh Creek Township within the northern Flinders Ranges. The NRUP will produce urea fertilizer from the remnant coal resources at Leigh Creek utilising in-situ gasification (ISG) technology and will provide long term growth and opportunities to the communities of the northern Flinders Ranges and South Australia. Refer to **Attachment 1, Section 3** for a detailed project description of the Stage 1 proposal (NeuRizer, 2020). The Stage 1 project will be located within the Petroleum Projection Licence 269 (PPL 269) covering an area of 5 km² that falls within the 87.94 km² of the Petroleum Exploration Licence 650 (PEL 650), which overlies the Leigh Creek Coalfield (See Figure 1).

The Stage 1 Commercial site (PPL 269) has been selected since it meets ideal site attributes for in situ gasification, which include adequate depth, thick and impermeable overlying strata, absence of vertical connectivity, low dip angle (5 to 25 degrees), mechanically competent overlying rock and few faults (Camp and White, 2015). In particular, the depth of the coal, geology and hydrogeology of the site ensure that the gasification process can be safely contained, and the location avoids sensitive features such as aquifers with beneficial uses and values, residents or towns in close proximity, sensitive land uses or sites of high environmental value.

Other favourable factors that influenced the location of the Stage 1 Commercial Development include:

- high quality existing infrastructure (road, rail, and water).
- extensive information base for the Leigh Creek Coalfield.
- existing disturbed mine site (minimising disturbance footprint).
- distant from environmentally sensitive areas or conservation reserves.

Address: Leigh Creek Coal Fields, 16908 The Outback Highway, Copley SA, 5732.

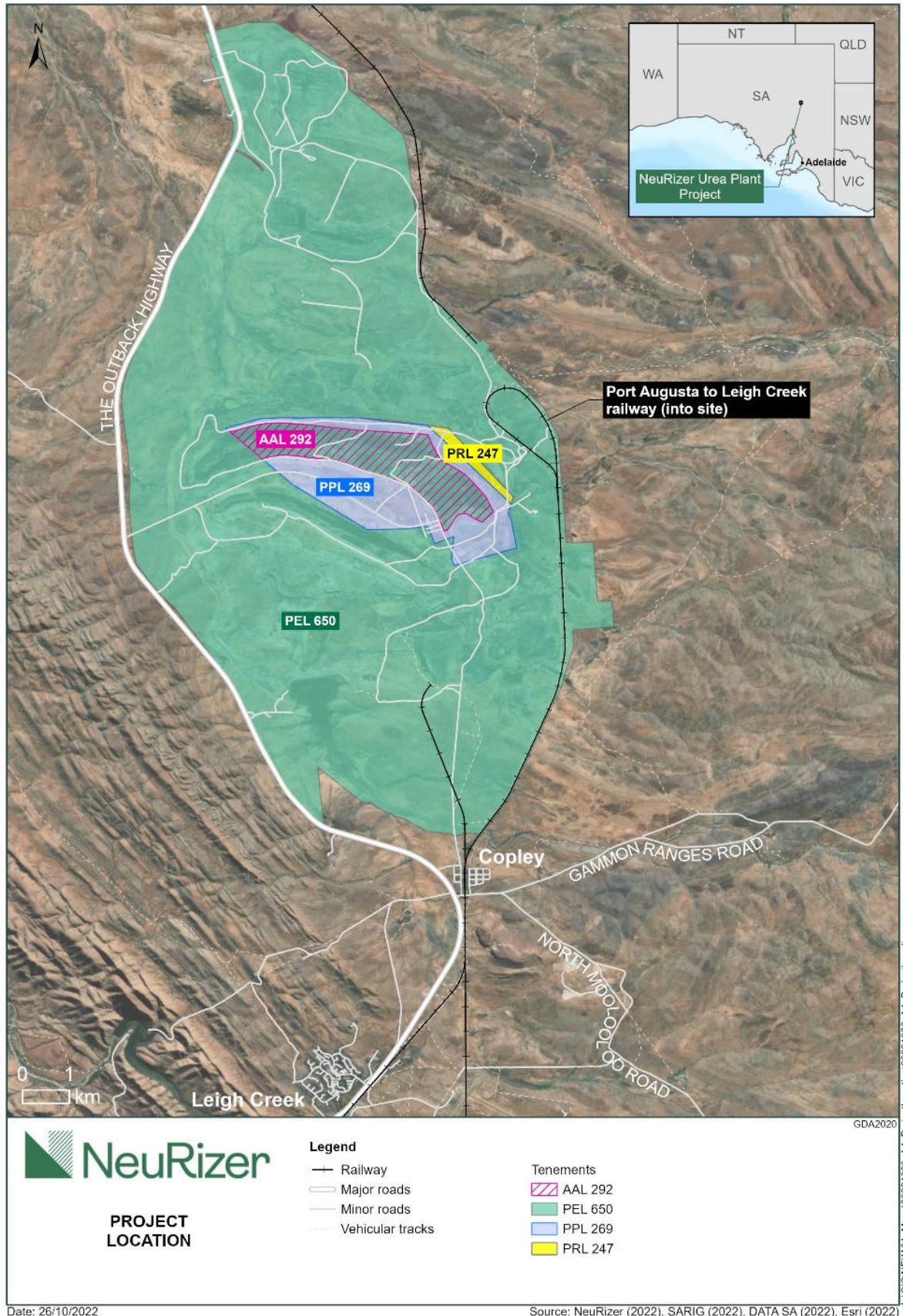


Figure 1: Location of the PPL 269 within the PEL 650 and the townships of Leigh Creek and Copley

3 Methodology

3.1 Desktop Assessment

An updated desktop review will be undertaken to identify the newly added Matters of National Environmental Significance and listed EPBC Threatened Species within the Stage 1 project area, which is located within PPL 269. This will include:

- A review of Environment Protection and Biodiversity Conservation Act Protected Matters Search Tool (EPBC PMST) output (search date, 12 April 2023) from the boundary of the site with a 50km buffer (Appendix A) and the boundary of the site with a 10km buffer (Appendix B).
- A review of Biological Databases of South Australia records (BDBSA) (DEW, 2023a,b) within a 50 km buffer and 10 Km buffer on the Stage 1 site (PPL 269) boundary, which include a review of Atlas of Living Australia (ALA) records and NatureMaps records.
- Review of previous ecological surveys and assessments on PEL650 and Stage 1 project site (T&M Ecologist 2018a, 2018b; Jacobs 2019, 2021, 2022) and existing literature to inform likelihood of occurrence assessment of the newly added EPBC listed species with potential to occur within the PEL 650 and project area (PPL 269).
- A likelihood assessment for the potential for newly threatened and migratory species highlighted in the PMST to actually occur on Stage 1 Project site, which would also inform potential for impacts.
- Review of NeuRizer Stage 1 Commercial Development relevant environmental studies and assessments (Environmental Impact Report (EIR), Hydrogeological Conceptual Site Model (CSM), Final Air Quality Impact Assessment, NRZ Geotechnical Modelling (2022) & IKON Geotechnical Model (2018)) to assess potential impacts on newly EPBC listed species as a result of Stage 1 project activities.

3.2 Biological Database of South Australia (BDBSA)

An assessment on threatened species listed under the EPBC Act and *National Parks and Wildlife Act 1972* (NPW Act) was undertaken using the NatureMaps database. The dataset and information were obtained on 13 April 2023 and used to further identify threatened listed species that have been recorded within a 50 km buffer and 10 km buffer on the Stage 1 Study Area boundary.

Additionally, a search and data profiles of each identified species were undertaken using ALA Species Distribution Modelling of occurrence records of the last 50 years (1973 to 2023), accessed on 14 April 2023 (ALA, 2023a-d).

3.3 Likelihood of Occurrence

The likelihood assessment for newly listed EPBC species is supported by the likelihood criteria summarised in Table 1. These criteria are based on habitat characteristic assessments of the newly recorded EPBC flora and fauna species within 50 km and 10 km of the study area, or any newly recorded EPBC species that may potentially occur within the Stage 1 project area to determine likelihood of occurrence.

For a Likelihood and Significant Impact Assessment of EPBC listed species up to August 2022, please refer to Addendum to Winter Ecology Survey (Jacobs, 2022), which is **Attachment 16** of NRZ EPBC Referral.

Table 1: Species Likelihood of occurrence criteria used in the desktop review

Likelihood category	Criteria
Unlikely	No BDBSA records or field records in the last 50 years despite suitable habitat being known to occur in the area.

Likelihood category	Criteria
	No BDBSA records within 50 km buffer despite suitable habitat being known to occur in the area. Historical Records within 50 km buffer; however, no suitable habitat is known to occur in the project area (PPL 269). Habitat outside of the species range.
Possible	Recorded within the previous 20 years and suitable habitat is present but not largely intact. Few (< 10) BDBSA records within 50km, the area falls within the known distribution of the species, but the area does not provide species habitat which is largely intact.
Likely	Multiple (>10) BDBSA records in the last 10 years, the species does not have highly specific habitat needs and the habitat is largely intact. Recorded within 50 km buffer, the species has highly specific habitat requirements which occur in the project area (PPL 269), and the Stage 1 area provides the species habitat which is largely intact.
Known	Multiple (>10) BDBSA records in the last 10 years, within the site or within ~ 1 km of the site; the species does not have highly specific habitat needs, and the non-specific habitat on site is in good condition or the species has specific habitat requirements, and these are present within PPL 269. Species has been previously recorded on Stage 1 project site as part of ecological field surveys.

3.4 Significant Impact Criteria

The Matters of National Environmental Significance - Significant impact guidelines 1.1 (EPBC Act) were used to identify the 'significant impact criteria' for each MNES to evaluate whether potential impacts of the Stage 1 proposed actions are likely to cause any significant impacts on any MNES (DotE, 2013). Within the scope of the current assessment (newly added EPBC species and ecological communities), matters listed under EPBC Act relevant to Stage 1 development are threatened fauna species.

The significant criteria relevant to the current assessment are provided in Table 2 below.

Table 2. Significant impact criteria relevant to the proposed Stage 1 Commercial Development

Status	Significant Impact Criteria
Critically endangered and endangered species	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: <ul style="list-style-type: none"> • lead to a long-term decrease in the size of a population • reduce the area of occupancy of the species • fragment an existing population into two or more populations • adversely affect habitat critical to the survival of a species • disrupt the breeding cycle of a population • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat • introduce disease that may cause the species to decline, or • interfere with the recovery of the species.
Vulnerable species	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: <ul style="list-style-type: none"> • lead to a long-term decrease in the size of an important population of a species • reduce the area of occupancy of an important population • fragment an existing important population into two or more populations • adversely affect habitat critical to the survival of a species

Status	Significant Impact Criteria
	<ul style="list-style-type: none"> • disrupt the breeding cycle of an important population • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat • introduce disease that may cause the species to decline, or • interfere substantially with the recovery of the species.
Listed Migratory Species	<p>An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:</p> <ul style="list-style-type: none"> • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or • seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

3.5 Desktop Study Limitations

A comprehensive list of all EPBC terrestrial flora and fauna threatened species identified within a 50 km buffer from the boundary limit of the study area was not undertaken as this was not the objective of the assessment. Rather an update on MNES and additional listed EPBC threatened species in effect under the EPBC Act from 31 Mar 2023 with potential to occur within or adjacent to the Stage 1 project area was recorded and assessed. An assessment on EPBC listed species and potential for direct and indirect impacts from Stage 1 project was previously undertaken by Jacobs in 2022.

The content of this study, as previously mentioned, was derived from existing databases and field ecological surveys relevant to Stage 1 project site. MNES and EPBC fauna and flora records were sourced from the information available in EPBC PMST and the BDBSA via ALA and NatureMaps records.

4 Results and Discussion

4.1 Desktop Review

4.1.1 Previous Field Surveys – Summary

NeuRizer contracted T&M Consulting (environmental consulting firm) and Jacobs (an environmental and engineering consulting firm) to conduct fauna/flora surveys and carried out four ecological surveys between 2017-2021, during the summer, spring and winter seasons (Figure 2).

4.1.1.1 T&M Ecologists – Flora and Fauna Assessment PEL 650 (Jan 2018) (Attachment 9)

For the purpose of providing an initial baseline overview of the ecological assets present within PEL 650, T&M Ecologists undertook a desktop review and carried out supporting field observations, including the characterisation of vegetation and potential habitat, fauna trapping and bird surveys in the PEL 650 in December 2017 (T&M Ecologists, 2018a).

During the bird surveys the Southern Whiteface (*Aphelocephala leucopsis*) and the Blue-winged Parrot (*Neophema elegans elegans*) were not observed, although historical records of these species noted their presence within 20km of the site. As there were historical records of the Hooded Robin (*Melanodryas cucullata*) within 20km of the site the species was noted as part of the overview of habitats utilised by species observed from the broader region however, there were no historical records of the south-eastern subspecies of the Hooded Robin (*Melanodryas cucullata cucullata*) being noted in the area, and although some areas of habitat where Hooded Robins may be found were present at the site, it was not considered prime habitat and

this species was considered unlikely to be found in the area. No prime habitat was recorded in the PEL 650 that would suit the needs of the Southern Whiteface. Some habitat types where the Blue-winged Parrot may be found were also noted within the PEL 650, however these areas were quite small and not considered prime habitat for the species, therefore it was considered unlikely that the Blue-winged Parrot would be present in the PEL 650 and was noted to be more likely seen flying overhead to reach more suitable habitat.

The Diamond Firetail (*Stagonopleura guttata*) was not recorded during these bird surveys, nor were there any historical records of them being present within 20km of the PEL 650 at the time of the study (T&M Ecologists, 2018a)..

4.1.1.2 T&M Ecologists – Flora and Fauna Assessment Program 1 Area (Dec 2018) (**Attachment 10**)

In December 2018 a further study was undertaken by T&M Ecologists to survey and map the vegetation within the Stage 1 Project Area (PPL 269) (T&M Ecologists, 2018b). During this study an opportune bird survey was also conducted to build on the comprehensive bird survey that was undertaken as part of the previous study of the PEL 650 (T&M Ecologists, 2018a).

The result of the vegetation survey showed that the majority of the PPL 269 was highly disturbed and did not contain remnant vegetation. The relatively small patches of remnant vegetation that did remain suggested that the site was unlikely to provide core habitat for any species of state or national conservation significance. Nationally listed migratory species were likewise considered unlikely to be using the site as core habitat (T&M Ecologists, 2018b).

The Blue-winged Parrot (*Neophema elegans elegans*) was not seen during the opportune bird surveys conducted in the PPL 269 however, the species was included as part of the likelihood assessment conducted as part of this assessment due to the species having previously been recorded within 20km of the PEL 650 (T&M Ecologists, 2018a).

4.1.1.3 Jacobs Targeted EPBC species and habitat assessment (2019) (**Attachment 11**)

The primary focus of this field survey was to report observations of Thick-billed Grasswren within the PEL 650, though opportunistic records were taken of other bird species that responded to calls or were in, or adjacent to, vegetation patches searched. All birds heard or seen during this survey were recorded.

There were no instances of the Southern Whiteface (*Aphelocephala leucopsis*), the Hooded Robin (southeastern) (*Melanodryas cucullata cucullatata*), the Blue-winged Parrot (*Neophema elegans elegans*), or the Diamond Firetail (*Stagonopleura guttata*) being recorded during this survey (Jacobs, 2019).

4.1.1.4 Jacobs PEL 650 Winter Survey (2021) (**Attachment 12**)

A winter survey was carried out by Jacobs in 2021 to build on the prior investigations undertaken on the PEL 650. The assessment included undertaking an updated desktop assessment, including review of relevant previous studies and data, as well as undertaking a baseline winter survey to detect common and threatened flora and fauna species that occur across the site.

There were no instances of the Southern Whiteface (*Aphelocephala leucopsis*), the Hooded Robin (southeastern) (*Melanodryas cucullata cucullatata*), the Blue-winged Parrot (*Neophema elegans elegans*), or the Diamond Firetail (*Stagonopleura guttata*) being recorded during this survey (Jacobs, 2021).

4.1.1.5 Jacobs Addendum to Winter Ecology Survey (2022) (**Attachment 16**)

An addendum to the Winter Survey (Jacobs, 2021) was requested in 2022, after further clarity was able to be provided regarding construction and operations activities in the Stage 1 Project Area (PPL 269). This information enabled the consideration of the potential direct and indirect impacts to conservation significant species at the time. The potential indirect impacts of the Stage 1 Project, such as air and noise emissions, collision with vehicles or disturbance from traffic and/or contamination of soil or land, are expected to be avoided, temporary and/or limited in spatial extent to heavily disturbed environments. Therefore, it was considered unlikely that any significant direct or indirect impacts to threatened species will occur as a result of the Stage 1 Project.

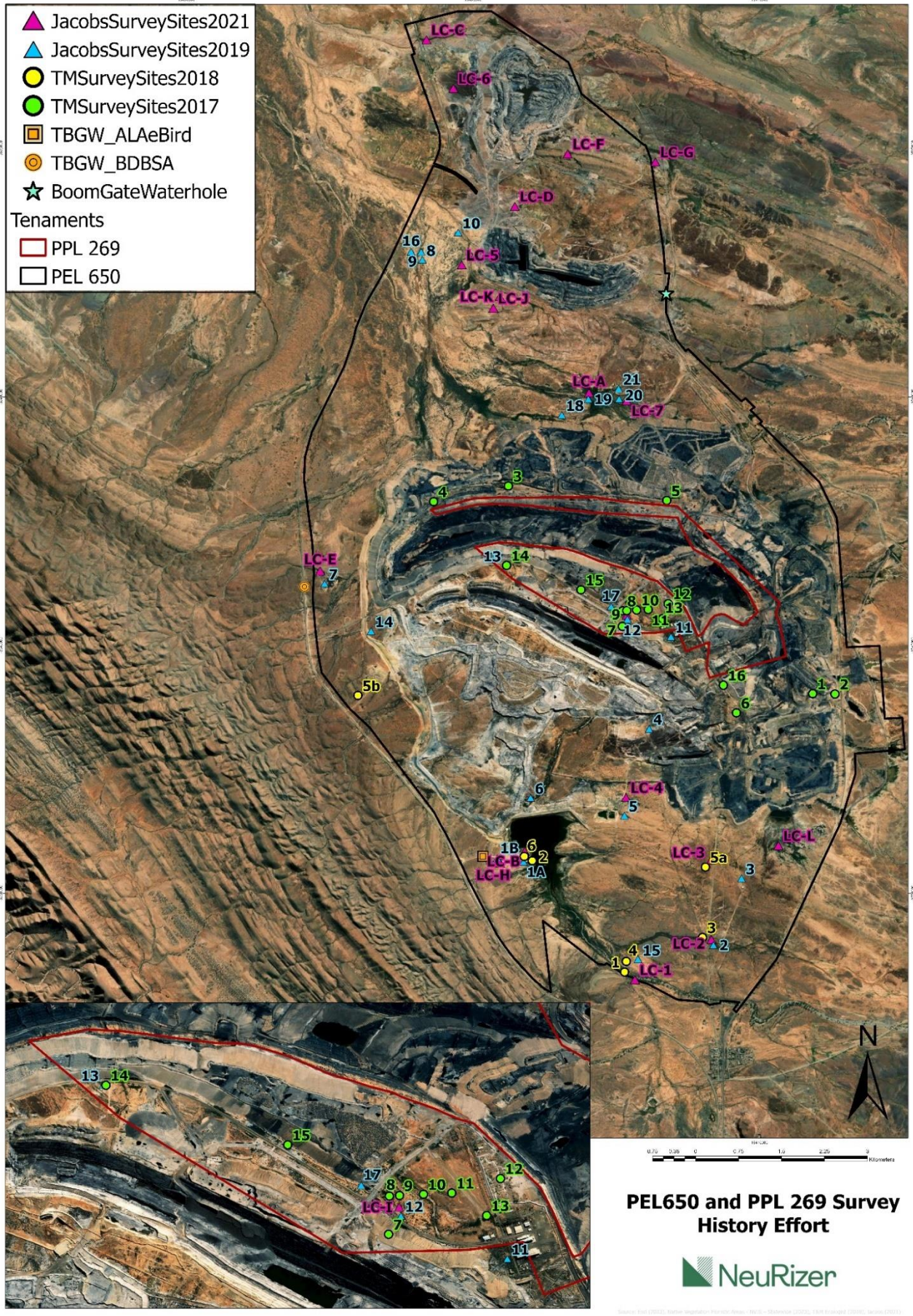


Figure 2: PEL 650 survey history effort

4.1.2 EPBC PMST Search Result

On 12 April 2023, an Environment Protection and Biodiversity Conservation Act Protected Matters Search Tool (EPBC PMST) request was initiated to collect updated information on the Matters of National Environmental Significance (MNES). The EPBC PMST was used to identify newly listed EPBC flora and fauna species or ecological communities of national environmental significance that may occur or are likely to have suitable habitat within the Stage 1 Project area (PPL 269). The output included a 50km buffer from the boundary of the site (Appendix A) and a 10km buffer from the boundary of the site (Appendix B).

The review of the MNES within 50 km buffer and 10 km buffer from the Stage 1 Project Area (PPL 269) boundary is provided in Table 3 below. The results shown on Table 3 are based on a comparison between this EPBC PMST search undertaken on 12 April 2023 against the EPBC PMST output (search date – 29 June 2022) prepared by Jacobs for the Addendum to winter flora and fauna survey (Jacobs, 2022).

Table 3. Review of National Environmental Significance (MNES) within or adjacent to the Stage 1 Commercial Development Project Area

MNES	Additional identified MNES – 50 Km Buffer	Additional identified MNES – 10 Km Buffer	Comments
World Heritage Properties	None	None	No World Heritage Properties were identified to be located within or adjacent to the proposed action area.
National Heritage Places	None	None	No new National Heritage Places were identified to be located within or adjacent to the proposed action area.
Wetlands of International Importance (Ramsar)	None	None	No Ramsar wetland of international importance was identified or highlighted within or adjacent to the proposed action area.
Great Barrier Reef Marine Park	None	None	The proposed action is not being undertaken in the Great Barrier Reef Marine Park.
Commonwealth Marine Area	None	None	The proposed action does not occur in a Commonwealth marine area.
Listed Threatened Ecological Communities	None	None	No Threatened Ecological Communities were identified within or adjacent to the proposed action area.
Listed Threatened Species	4	2	Four additional EPBC Threatened fauna species (avian) were identified within the 50 km buffer of the proposed action boundary when compared with the PMST search results of the previous review assessment undertaken by Jacobs in 2022. Only 2 of the 4 identified EPBC Threatened species were highlighted within the 10 km buffer of the Stage 1 project site boundary. See section 4.1.5 for more information about additional EPBC threatened species identified.
Listed Migratory Species	None	None	No new EPBC listed Migratory Species were identified within or adjacent to the proposed action area.

Refer to Section 4.2 below regarding likelihood of occurrence and significance assessments on newly EPBC listed species and section 4.3 for information about potential impacts on newly EPBC listed species.

4.1.3 EPBC Threatened Ecological Communities (TECs)

No new EPBC listed Threatened Ecological Communities (TECs) were identified through the EPBC PMST search. No TECs were detected across PEL 650 or PPL 269, and, based on previous ecological assessments, TECs are not considered likely to occur (Jacobs, 2021 ; Jacobs 2022).

4.1.4 EPBC Threatened Flora

No additional EPBC listed Threatened flora was identified in the EPBC PMST – 50 km buffer and 10 km buffer from the boundary of the site or within the Stage 1 project site (PPL 269) compared to the EPBC PMST output (search date – 29 June 2022) (Jacobs, 2022). No EPBC listed flora species were detected as occurring across PEL 650 or PPL 269.

Figure 3 shows the South Australian Government's key extant native vegetation mapping layer from Native Vegetation Floristic Areas (NVIS) for the PEL 650, and the habitat characterisation based on the broad vegetation association spatial layers used in previous ecological surveys across PPL 269 (T&M Ecologists, 2018; Jacobs, 2021; Jacobs, 2022).

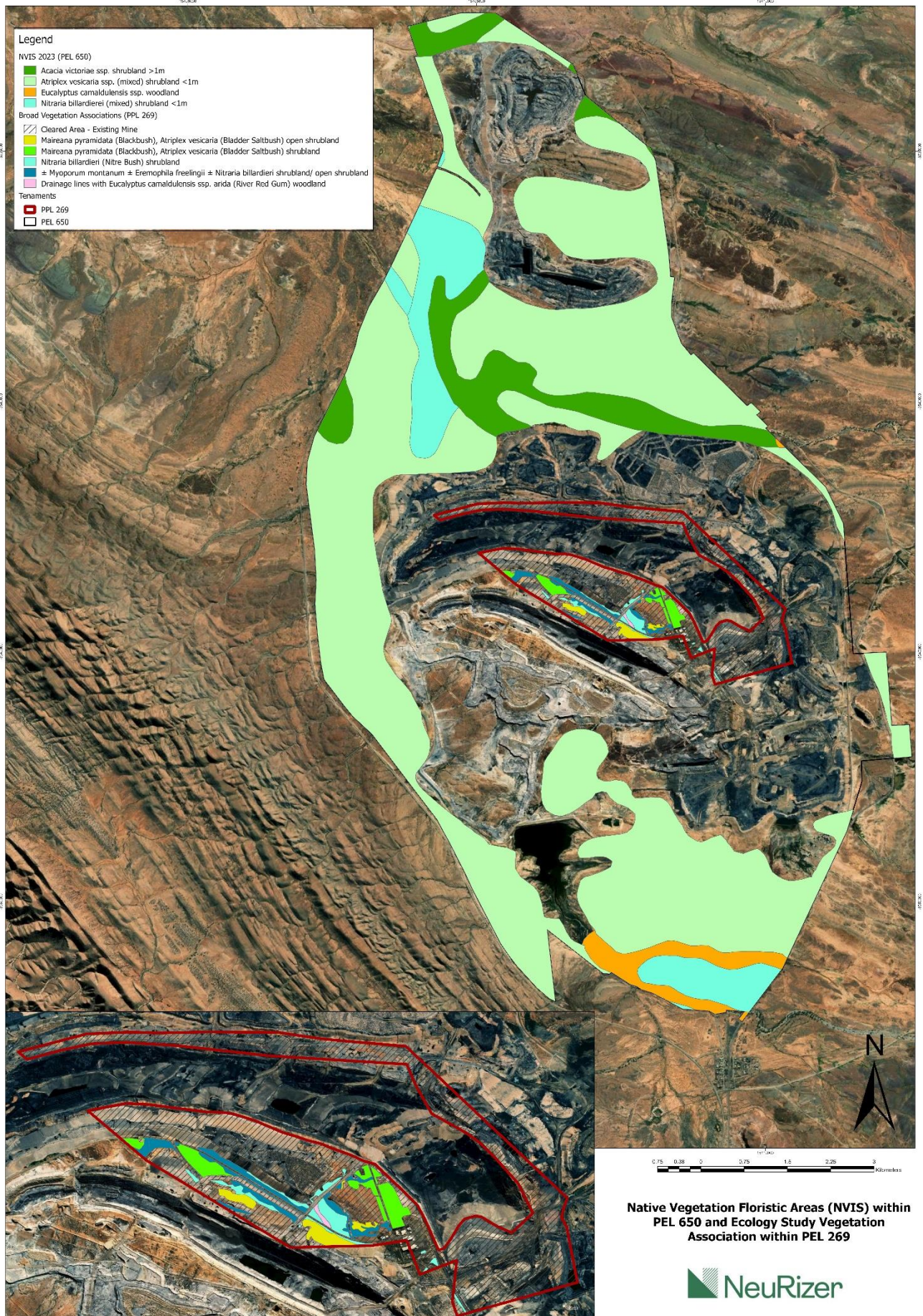


Figure 3: Leigh Creek Coal Mine Native Vegetation and vegetation associations within PPL 269

The mapped vegetation from NVIS (2023) shows no native vegetation across the Stage 1 project site (PPL 269). The identified and mapped vegetation across PEL 650 includes:

1. *Acacia victoriae* ssp. shrubland >1m,
2. *Atriplex vesicaria* ssp. (mixed) shrubland <1m,
3. *Eucalyptus camaldulensis* ssp. Woodland and
4. *Nitraria billardierei* (mixed) shrubland <1m

The vegetation associations mapped across the Stage 1 project site (PPL 269) are based on previous field surveys on site, which include:

1. *Maireana pyramidata* (Blackbush), *Atriplex vesicaria* (Bladder Saltbush) open shrubland/shrubland
2. *Nitraria billardieri* (Nitrate Bush) shrubland;
3. *Eucalyptus camaldulensis* ssp. *arida* (River Red Gum) woodland, and
4. ± *Myoporum montanum* ± *Eremophila freelingii* ± *Nitraria billardieri* shrubland/ open shrubland.

The majority of the Stage 1 project site is considered as previously disturbed land and cleared area from historical mining activities. All vegetation types observed in the most recent surveys were considered to be widespread and common (Jacobs, 2022). The Leigh Creek Coalfield has been extensively disturbed for over 70 years of open cut mining, with the majority of the PEL 650 having been previously cleared for mining activities, including open cut mines (main, upper, and lower series pits), waste rock dumps, mine spoil piles, numerous berms to modify water flows, quarries, and access tracks. The largest patches of remnant vegetation present in the PEL 650 are bounded to the north and south by extensive, deep mining pits. The small amount of vegetation that occurs within the Stage 1 impact footprint, although native vegetation, is highly disturbed, patchy and not well connected to habitat that occurs outside the historical coal mine areas (Jacobs, 2022).

The flora sites from NVIS within PEL 650 and the data from previous field surveys within Stage 1 project area will be used to assess the likelihood for any additional EPBC threatened flora and fauna habitats in the area of interest in the following sections of this report.

4.1.5 EPBC Threatened Fauna

The four additional species recorded within a 50 km buffer of the Stage 1 project area are included in the EPBC Act list of Threatened Fauna, including the Diamond Firetail (*Stagonopleura guttata*), Blue-winged Parrot (*Neophema chrysostoma*), Hooded Robin (south-eastern) (*Melanodryas cucullata cucullatata*), and Southern Whiteface (*Aphelocephala leucopsis*) (DCCEEW, 2023a; DotE 2023a-d).

Results of BDBSA (DEW, 2023a) search and records review (DEW, 2023b), as well as results of literature and previous ecological field surveys review (See section 4.1.1) for the identified species can be found in Sections 4.1.5.1, 4.1.5.2, 4.1.5.3 and 4.1.5.4.

4.1.5.1 Southern Whiteface (*Aphelocephala leucopsis*)

This is a small passerine or small stocky thornbill-like bird with vulnerable status under the EPBC Act (DotE, 2023a). The PMST output suggest that the species or species area is likely to occur within the 50 km and 10 km buffer area of the PPL 269. The extent of occurrence (EOO) for the species is estimated to be 4,910,000 km² with a stable trend, while the area of occupancy (AOO) is estimated to be 70,000 km², although it may range between 34,400 to 140,000 km² (DCCEEW, 2023a).

Figure 4 shows the distribution of the Southern Whiteface across Australia, which occurs along most of mainland Australia south of the tropics (DCCEEW, 2023a). The Southern whiteface is endemic to Australia and can be found in arid regions across the southern areas of Australia, excluding Tasmania (ALA, 2023a).

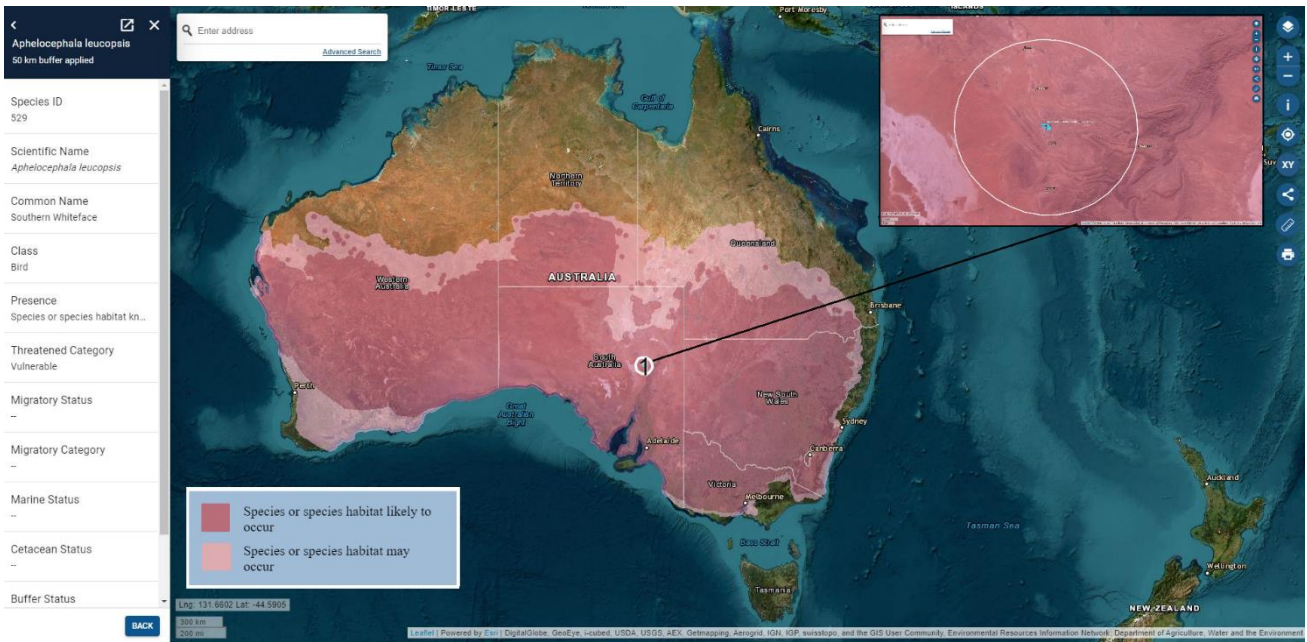


Figure 4: Modelled distribution of the Southern Whiteface in Australia.

Source: PMST 2023

The habitat of the species includes open woodlands and shrublands, which are usually dominated by eucalypts or acacias, grass plains, foothills and lowlands (BirdLife International, 2022a). The Southern whiteface prefers Acacia woodlands, mainly where there is mulga and drought-resistant chenopod shrub species, including saltbush and bluebush. The species was identified as sedentary resident and a ground-based insectivore of drier open woodlands such as open mallee, *Casuarina pauper*, and *Callitris spp.* (DotE, 2023a; T&M Ecologists 2018a). Habitat critical to the survival of the Southern Whiteface includes areas of (DCCEW, 2023a; DotE, 2023a):

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

There is no prime habitat for the Southern Whiteface within the PEL 650 or the proposed Stage 1 Commercial Development area (T&M Ecologists 2018a). The Stage 1 project area is a highly disturbed site with patchy vegetation, which is not well connected to habitats outside of the historical coal mining site (Jacobs, 2022).

The BDBSA output from NatureMaps and ALA suggest that there have been no records of the Southern Whiteface within the Stage 1 Project Area and the PPL 269 in the last 50 years (See Figure 5) (ALA, 2023a; DEW, 2023a), and the species has not been observed or detected during the previous ecological field surveys within PEL 650 and PPL 269 (T&M Ecologists 2018a, b; Jacobs 2020, 2021).

The species has been documented within the 50 km buffer study area. The closest BDBSA record is from approximately 4 km south of the PPL 269 in October 2017 during the spring season. The record was a human observation documented by ALA (data source: eBird Australia) in the Leigh Creek Coal Retention Dam (ALA, 2023a; DEW, 2023a). However, this species was not identified during the early spring survey conducted by T&M Ecologists or during the late spring survey conducted by Jacobs in the same area (T&M Ecologists, 2018; Jacobs, 2019). The next closest records, which are outside of the PEL 650, are ~6 to 7 km from PPL 269 between 2001 and 2005. No known important population occurs within Stage 1 project area.

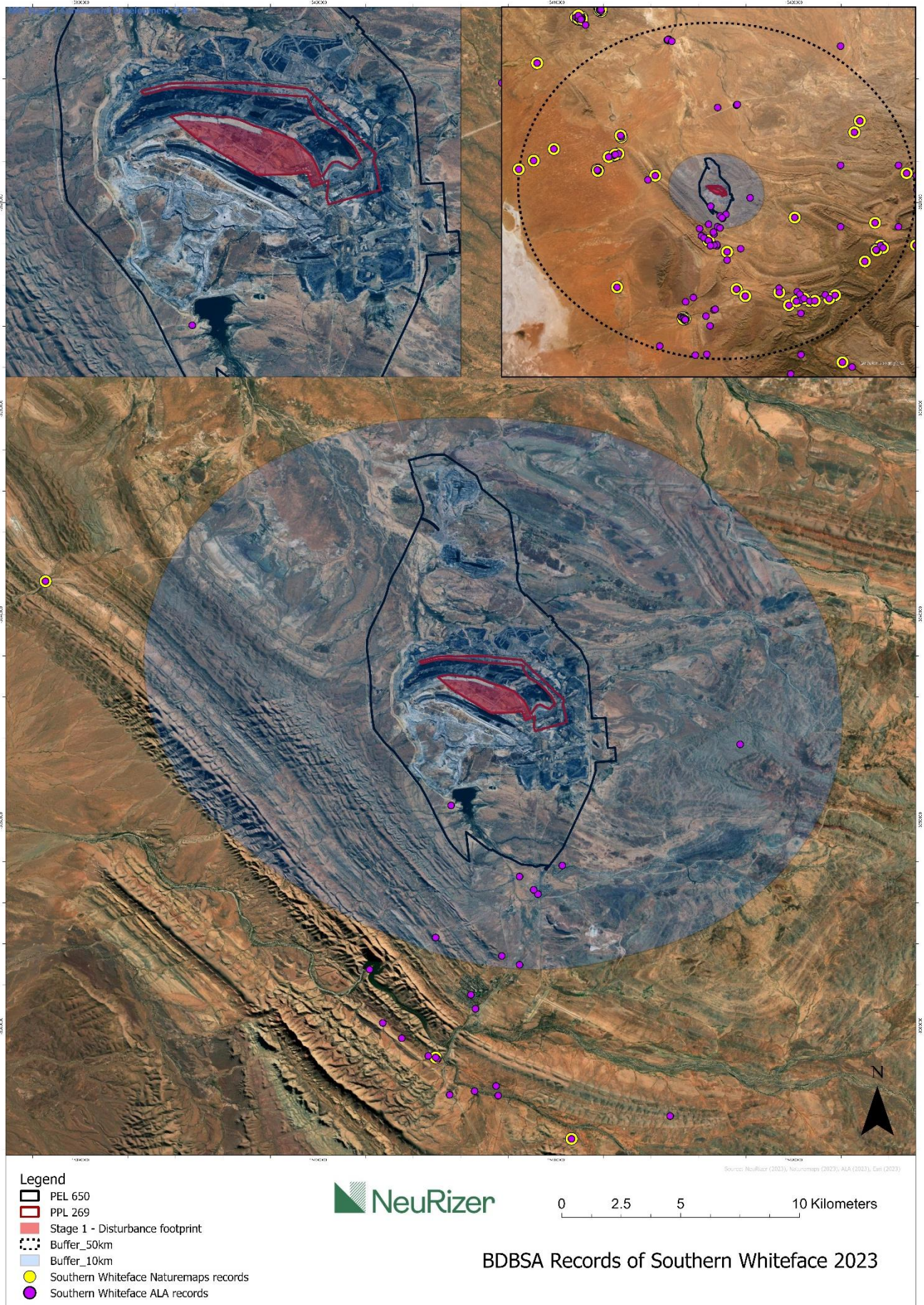


Figure 5: BDBSA Records of the Southern Whiteface 2023

4.1.5.2 Hooded Robin (south-eastern) (*Melanodryas cucullata cucullata*)

This is a bird with an endangered status under the EPBC Act (DotE, 2023b) and is described as largely sedentary and shy (DCCEEW, 2023b). PMST output suggest the subspecies is not likely to occur within a 10 km buffer of Stage 1 project boundary or within PPL 269. According to PMST output, the closest “species or species habitat” that may occur in the region is within 50km buffer, approximately 20 km away from the Stage 1 project area (Figure 6).

The extent of occurrence (EOO) for the subspecies is estimated to be 1,200,000 km², while the area of occupancy (AOO) is estimated to be 30,000 km² (DCCEEW, 2023b). Figure 6 shows the distribution of the Hooded Robin (south-eastern) across Australia (DCCEEW, 2023b). The subspecies Hooded Robin (south-eastern) can be found in the south-eastern region of Australia from far south-east Queensland to Yorke Peninsula, South Australia, excluding Tasmania (DCCEEW, 2023b).

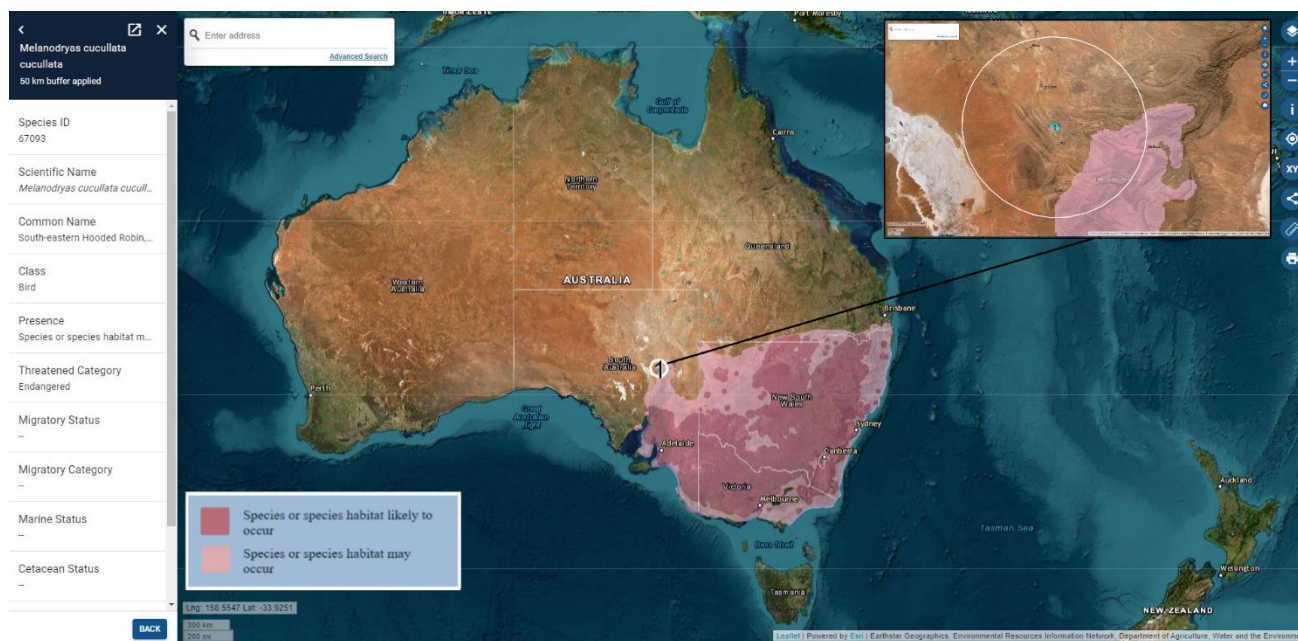


Figure 6: Modelled distribution of the Hooded Robin (south-eastern) in Australia.

Source: PMST 2023

According to DCCEEW (2023c), the habitat critical to the survival of the Hooded Robin (south-eastern) includes:

- Dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas.
- Structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.
- Standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging.
- Moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat.

The species avoid woodlands with tall trees or dense tree cover but sometimes occur in tall, dense heaths with scattered open areas. There is no prime habitat for the Hooded Robin within the PEL 650 or the proposed Stage 1 Commercial Development area (T&M Ecologists 2018a).

The BDBSA output from NatureMaps and ALA suggest that there have been no records of the Hooded Robin (south-eastern) within the Stage 1 Project Area or the PEL 650, and there are no records within 10 km or 50km buffer from the project area boundary (See Figure 7) (ALA, 2023b; DEW, 2023a). The species has not been observed or detected during the previous ecological field surveys within PEL 650 and PPL 269 (T&M Ecologists 2018a, b; Jacobs 2020, 2021). The closest BDBSA record is from approximately 300 km away of the PPL 269 (DEW, 2023a). No known important population is likely to occur within Stage 1 project area.

The species is considered unlikely to occur within the PEL 650 or within PPL 269.

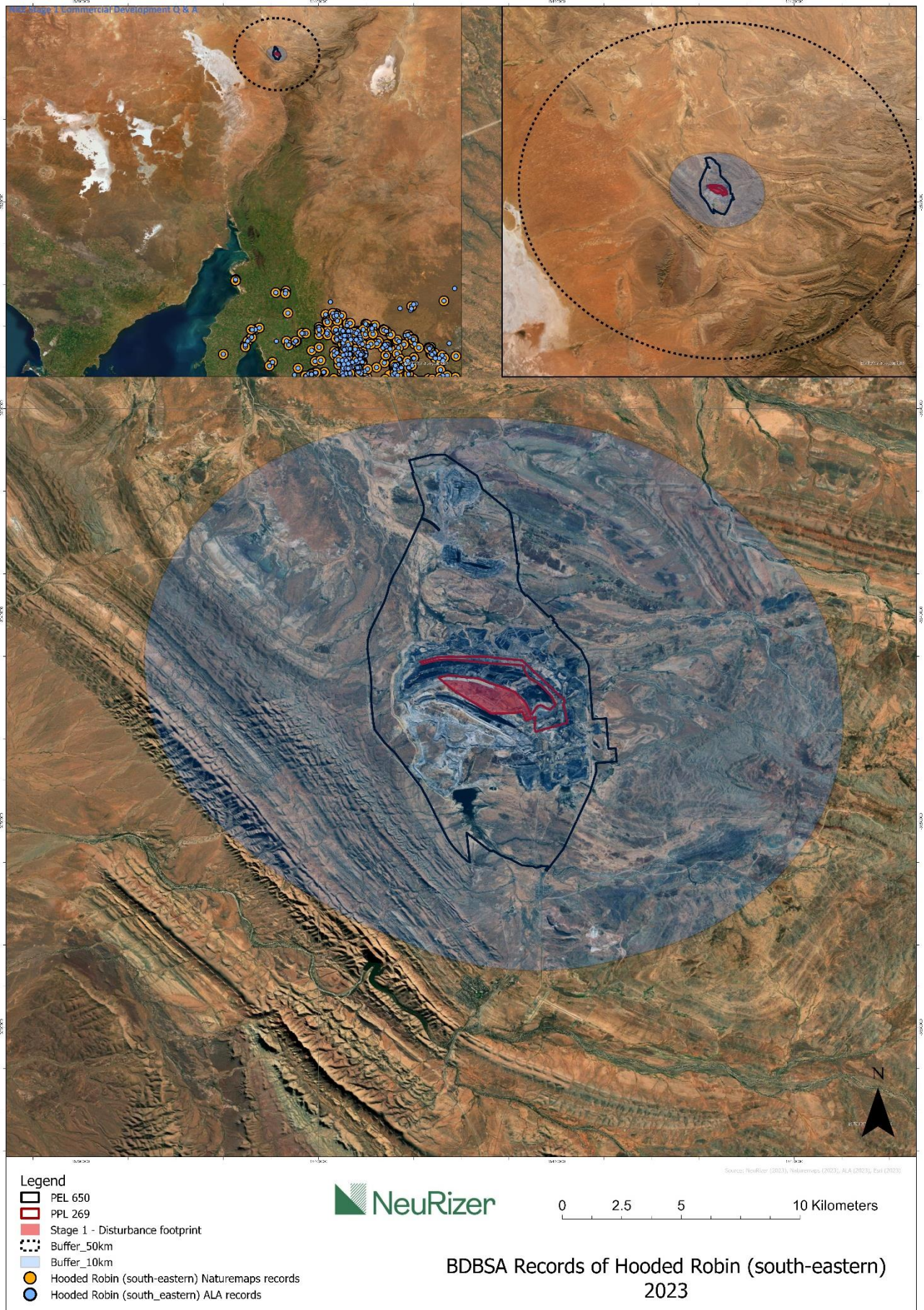


Figure 7: BDBSA Records the Hooded Robin (south-eastern) 2023

4.1.5.3 Blue-winged Parrot (*Neophema chrysostoma*)

This slender parrot is listed as a vulnerable species under the EPBC Act (DotE, 2023c). The output of the PMST suggests that the species is likely to occur within the 50 km and 10 km buffer area of the PPL 269. The extent of occurrence (EOO) for the species is approximately 170,000 km², while the area of occupancy (AOO) covers an area of around 11,000 km², although it may range between 9,000 to 19,000 km² (DCCEEW, 2023c).

Figure 8 shows the distribution of the Blue-winged Parrot across Australia (DCCEEW, 2023c). This species is considered a partial migrant, with preferred breeding areas including mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and, on some occasions, far areas of the south-east of South Australia, and the north-western, central and eastern parts of Tasmania. The main decline in annual reports of sightings of this species are from the core, breeding range during the breeding season (September-January) in Southern Victoria and Tasmania (DCCEEW, 2023c; BirdLife International, 2023b). Though the reason for these declines is not clear, they are considered likely due to habitat loss and changes in habitat quality (DCCEEW, 2023c). Annual reporting rates of the species are considered too low for analysis in the non-breeding range of inland New South Wales, South Australia and Queensland (BirdLife International, 2023b).

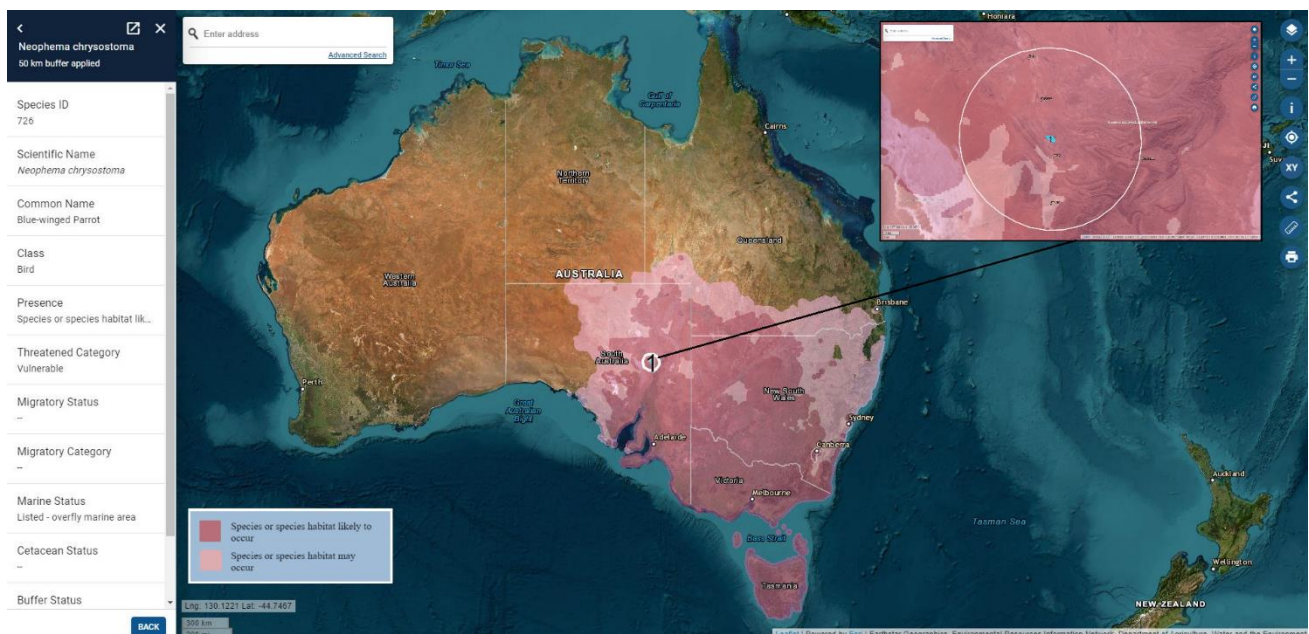


Figure 8: Modelled distribution of the Blue-winged Parrot in Australia.

Source: PMST 2023

The Blue-winged Parrot can occupy a range of habitats from coastal, sub-coastal and inland areas to semi-arid zones comprising of grasslands, grassy woodlands and semi-arid chenopod shrubland, though the species shows a preference toward grasslands and grassy woodlands near wetlands around the coast and in semi-arid zones, as they feed on a variety of grasses (native and introduced), herbs and shrubs at, or near the ground. The species habitat also includes Eucalypt forests and woodlands and live or dead trees and stumps with suitable hollows within the breeding range (DCCEEW, 2023c; Birdlife International, 2023b).

Habitat critical to the survival of the blue-winged parrot comprises areas that include (DCCEEW, 2023c):

- 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.

Although the species could be seen in habitat type known within the PEL 650, previous studies have determined that the species is more likely seen flying fast overhead (T&M Ecologists 2018a). The habitat within PEL 650 is not generally considered to be prime habitat for the species (T&M Ecologists 2018a), and the very small areas of potential habitat in the PEL 650 mean this species is considered unlikely to be present (T&M Ecologists 2018b). Therefore, the species is unlikely to occur in PPL 269, which is within PEL 650.

The BDBSA output from NatureMaps and ALA suggest that there have been no records of the Blue-winged Parrot within the Stage 1 Project Area (PPL 269) in the last 50 years (See Figure 9) (ALA, 2023c; DEW, 2023a), and the species has not been observed or detected during the previous ecological field surveys within Stage 1 project area (T&M Ecologists 2018a, b; Jacobs 2020, 2021).

The species has been documented within the 10 km and 50 km buffer of the Stage 1 study area. The closest BDBSA record within the PEL 650 is from approximately 4 km south of the PPL 269 and was recorded in August 2021 (data source: eBird Australia), during the winter season in the Leigh Creek Coal Retention Dam (DEW, 2023a). However, this species was not recorded during the survey conducted by ecologists within the PEL 650 at the same time (Jacobs, 2021). The next closest records, which are outside of the PEL 650, are approximately 3 km west and 12 km east of the PPL 269 in May 2012 and June 2003 respectively.

The native vegetation within the project site is highly disturbed due to previous mining operations and activities, with small patches of vegetation remaining within the historical coal mining site that lacks connectivity with habitats outside of the PEL 650. There are no records of this species from BDBSA in the last 50 years, and there were no records of this species being identified during recent ecological surveys within the Stage 1 Project Site (PPL 269). As such, the species is considered unlikely within the Stage 1 Commercial Development area.

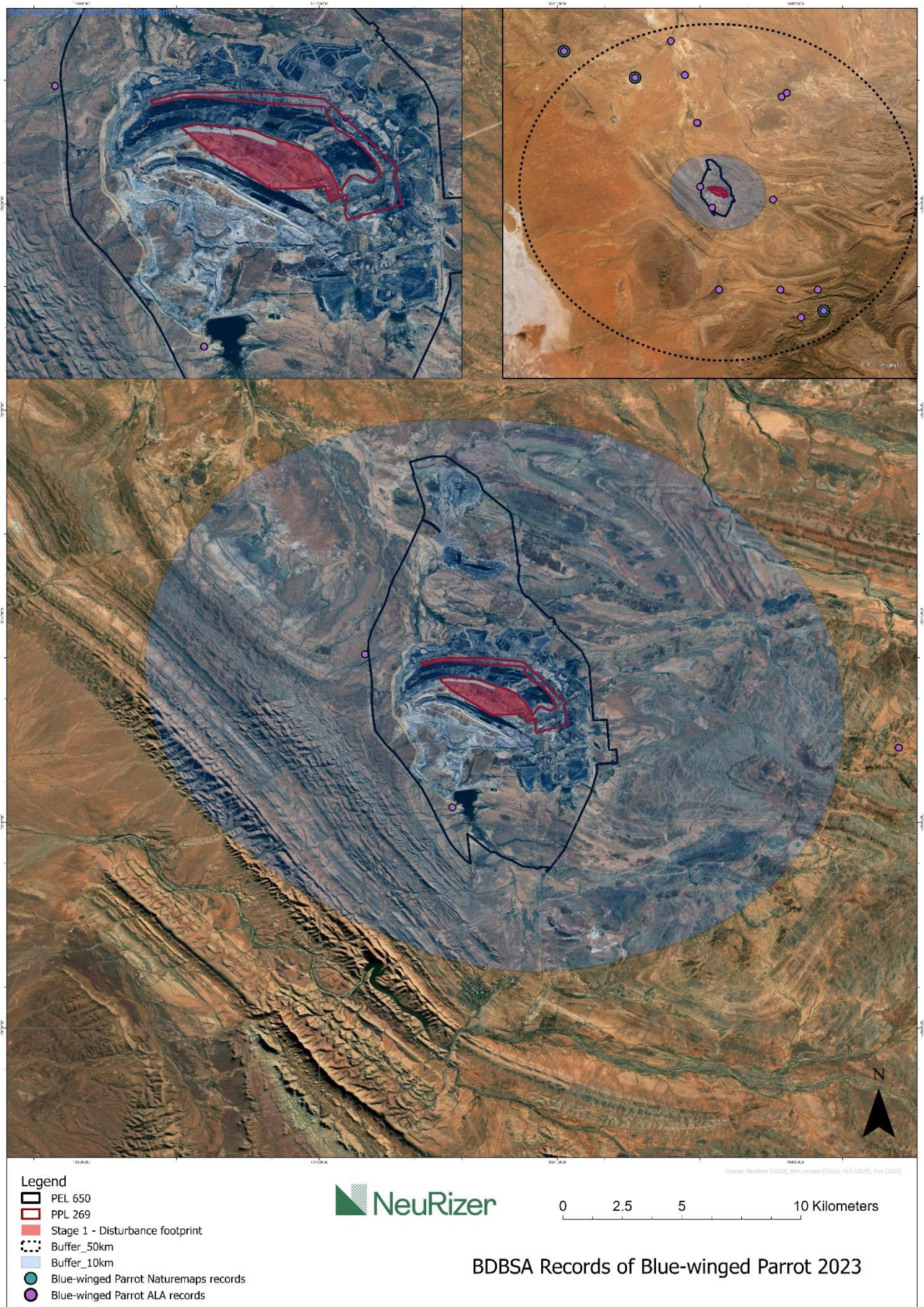


Figure 9: BDBSA Records of Blue-winged Parrot 2023

4.1.5.4 Diamond Firetail (*Stagonopleura guttata*)

This is an Australian native bird with a vulnerable status under the EPBC Act (DotE, 2023d). The PMST output suggest that “the species or species area” may occur within the 50 km buffer, but that it is not likely to occur within a 10 km buffer, or within the PPL 269. The extent of occurrence (EOO) for the species is estimated to be 1,500,000 km², while the area of occupancy (AOO) is estimated to be 25,000 km² (DCCEEW, 2023d).

Figure 10 shows the distribution of the Diamond Firetail across Australia (DCCEEW, 2023d). The species can be found in south-eastern mainland Australia, from Queensland to the Eyre Peninsula in South Australia, and about 300 km inland from the sea (BirdLife International, 2023c).

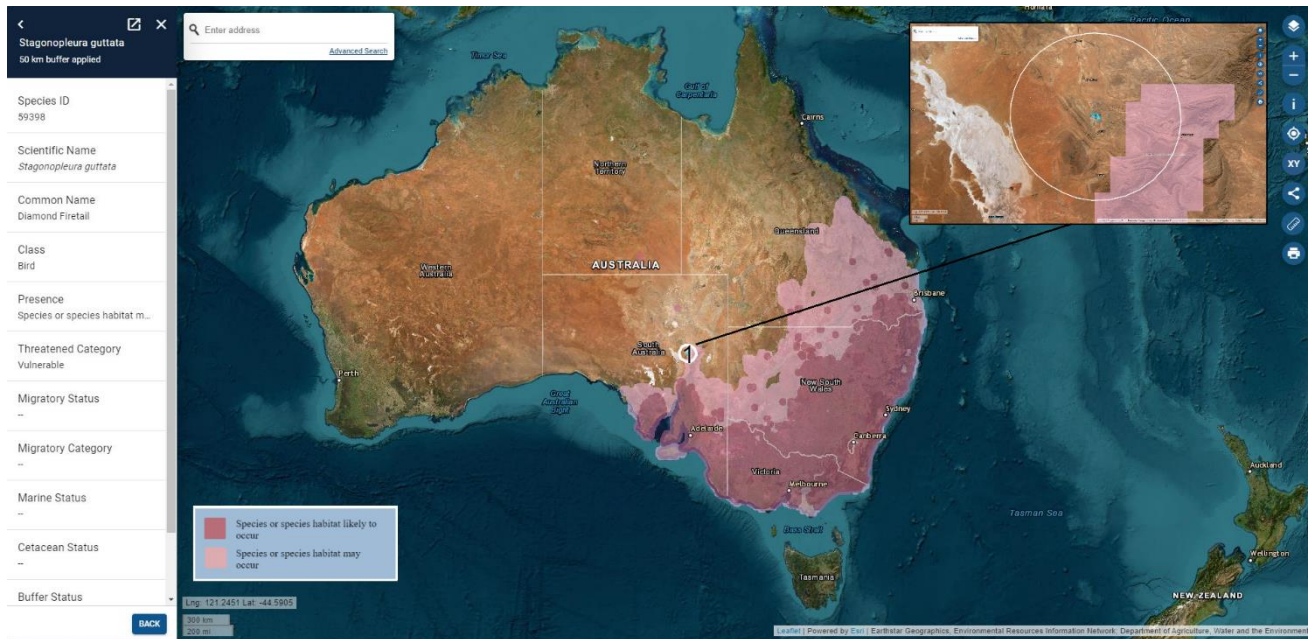


Figure 10: Modelled distribution of the Diamon Firetail in Australia.

Source: PMST 2023

The Diamond Firetail appear to be sedentary (DEECCW, 2023d) and the species habitat includes woodlands, open forests, grasslands with scattered trees, and other lightly-timbered habitats such as farmland and vegetation along watercourses (ALA, 2023d). Other important habitat includes the drooping she-oak (*Allocasuarina verticillata*) within the Mt Lofty Ranges. The species’ habitat preference includes areas with low leaf litter cover but high grass cover, low tree density and few large logs (DCCEEW, 2023d).

The BDBSA output from NatureMaps and ALA suggest that there have been no records of the Diamond Firetails within the Stage 1 Project Area (PPL 269) or within a 50 km buffer of the PPL 269 in the last 50 years (See Figure 11) (ALA, 2023d; DEW, 2023a), and the species has not been observed or detected during the previous ecological field surveys within Stage 1 project area (T&M Ecologists 2018a,b; Jacobs 2020, 2021).

The closest BDBSA record from the PPL 269 within the PEL 650 is over 90 km northeast recorded in 1973 (DEW, 2023a). The next closest record is over 170 km south from Stage 1 project site PPL 269 boundary recorded in 1998. The species is considered unlikely to occur in PEL 650 or Stage 1 project site (PPL 269).

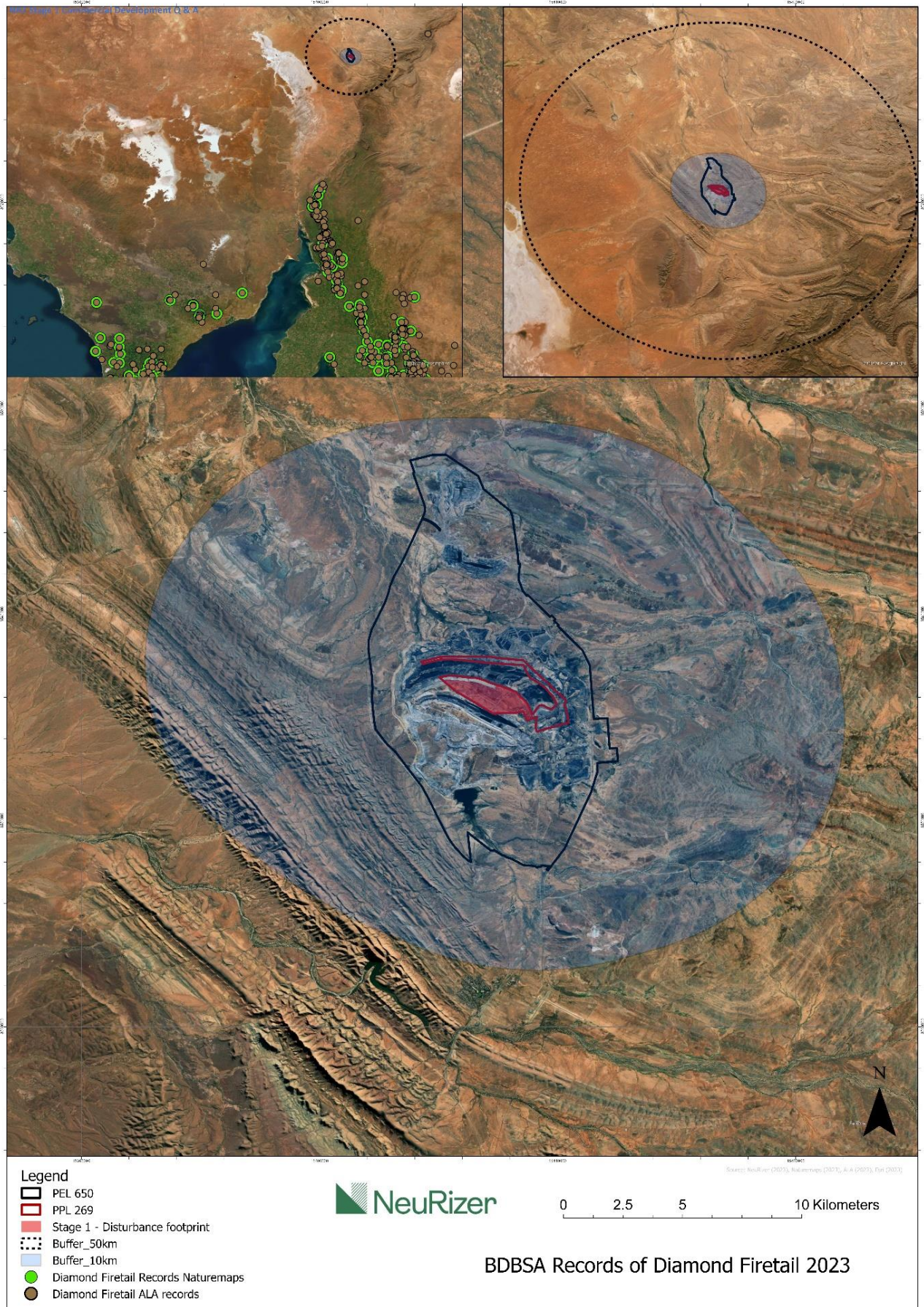


Figure 11: BDBSA Records of the Diamond Firetail 2023

4.2 EPBC Likelihood and Significant Impact Assessment

As summarised in the previous sections, the EPBC PMST search output indicated the potential for four additional EPBC listed species to occur within a 50 km buffer and a 10 km buffer of the Stage 1 commercial development project site. An assessment of whether these species are likely to occur within the Stage 1 project area (PPL 269) is provided below in Table 4.

Based on the likelihood assessment for the four highlighted species undertaken with information obtained during the desktop review, it is considered that only two additional EPBC Threatened species (fauna) have the potential to occur within PEL 650. However, none of the identified species are likely to occur within the Stage 1 project area (PPL 269) based on the likelihood of occurrence criteria provided in Section 3.2. Future project stages of the NRUP outside of the PPL 269 will be subject to a separate assessment and further ecological investigations.

Table 4: Likelihood and Significant Impact Assessment for the additional identified EPBC Species

Scientific Name	Common Name	EPBC Status ¹	NRP Status ²	Likelihood of occurrence in project area (PPL 269)	Comments (Records/ previous surveys)
Birds					
<i>Aphelocephala leucopsis</i>	Southern Whiteface	Vu	No listed	Unlikely	<p>PMST suggests the species, or species area, is likely to occur in the Project area.</p> <p>The species has been recorded within PEL 650 (DEW, 2023a). However, there have been no BDBSA records within the Stage 1 Project Site (PPL 269) in the previous 50 years. The areas within PEL 650 and PPL 269 are not prime habitats for the species (T&M Ecologist, 2018a) and, as described in the Jacobs's report (2022), the native vegetation within the PEL 650 and PPL 269 is highly disturbed, patchy and not well connected to habitats that occur outside the historical coal mine areas.</p> <p>The species has not been recorded in the Stage 1 project area in previous field surveys (T&M Ecologist 2018a, b; Jacobs 2019, 2021).</p> <p>The species is considered unlikely to occur within the Stage 1 Commercial Development project area based on available information and likelihood of occurrence criteria.</p>
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (South-eastern)	E	(Subspecies <i>cucullata</i>) R	Unlikely	<p>PMST suggests the species, or species area, is likely to occur within a 50 km buffer from Stage 1 project area boundary, but not within 10 km buffer of the Stage 1 project area, or within PEL 650 or PPL 269.</p>

Scientific Name	Common Name	EPBC Status ¹	NRP Status ²	Likelihood of occurrence in project area (PPL 269)	Comments (Records/ previous surveys)
					<p>There have been no records of the species within the PEL 650 or the study area in the last 50 years (PPL 269), including during recent surveys of the project area (T&M Ecologists 2018 a, b; Jacobs 2019, 2021)</p> <p>Given the lack of BDBSA records and the species not being recorded in previous field surveys, the species is considered unlikely to occur within the Stage 1 project site.</p>
<i>Neophema chrysostoma</i>	Blue-winged parrot	Vu	V	Unlikely	<p>PMST output suggests the species, or species area, is likely to occur within the 50 km and 10 km buffer area of Stage 1 project area.</p> <p>The habitat of the species within PEL 650 is not generally considered to be prime habitat for the species (T&M Ecologists 2018a). In the last 50 years, the species has only been recorded once within the PEL650 (DEW, 2023a) however, this species has not been recorded during previous field surveys of the Stage 1 project area (T&M Ecologists 2018a, b; Jacobs 2019, 2021).</p> <p>The vegetation present on the project site is unsuitable for the species given the current level of disturbance, size of patches of vegetation, and lack of connectivity to large expanses of preferred habitat outside of the areas previously disturbed within Stage 1 project area for coal mining activities.</p> <p>The species is considered unlikely to occur within the Stage 1 project area.</p>
<i>Stagonopleura guttata</i>	Diamond Firetail	Vu	V	Unlikely	<p>The PMST output suggests that the Diamond Firetail may occur within the 50 km buffer, but it is not likely to occur within a 10 km buffer or within the PEL 650 or PPL 269.</p> <p>No BDBSA records have been documented in the PEL 650 or Stage 1 project area in the last 50 years (DEW, 2023a). The species has not been observed or recorded during previous field surveys of PEL 650 and</p>

Scientific Name	Common Name	EPBC Status ¹	NRP Status ²	Likelihood of occurrence in project area (PPL 269)	Comments (Records/ previous surveys)
					<p>Stage 1 project area (PPL 269) (T&M Ecologists 2018a, b; Jacobs 2019, 2021).</p> <p>Given the lack of recent records and the species not being recorded in previous field surveys, it is considered unlikely to occur at the Stage 1 project site.</p>

¹EPBC Act status codes; CE = Critically Endangered, E = Endangered, Vu = Vulnerable, CD = Conservation Dependent

²South Australian National Parks and Wildlife Act 1972 Status: Endangered (E); Vulnerable (V); Rare (R)

4.3 Potential for impacts on fauna and flora associated with the Stage 1 Project

NRZ considers that the information provided in the previous environmental assessments for the Stage 1 Commercial Development are relevant to assessing potential impacts on the newly identified EPBC listed threatened species, as previous ecological surveys included identification and recording of any species observed either visually or audibly. Likewise, the previous and current desktop review included information about EPBC and NRP species relevant to the project site and a review of available BDBSA State-wide. The assessment of environmental risk previously undertaken for Stage 1 Commercial Development considered impacts on fauna and flora (native and conservation species). None of the newly identified EPBC threatened species are considered likely to occur on the Stage 1 project site and there have not been any BDBSA or field records of any of the species within the Stage 1 Project area.

This section presents relevant information from previously undertaken environmental risk assessments for the Stage 1 Commercial Development provided in **Attachment 1, Attachment 15, Attachment 25, Attachment 27** and **Attachment 28** relevant to Fauna and Flora, as well as presenting relevant information included in the previous assessment on potential direct and indirect impacts on EPBC threatened species undertaken by Jacobs (2022), which is **Attachment 16**.

A decline or deterioration of the ecological condition within the PEL 650 or Stage 1 Project site as a result of the proposed activities is highly improbable due to the historical conditions of the area. These conditions include over 70 years of mining activities in the PEL 650 and PPL 269, coupled with historic anthropogenic disturbance across the Stage 1 project area, which provides no suitable habitat for EPBC listed species, groundwater dependent ecosystems or water-dependent ecosystems.

4.3.1 Potential impacts to fauna and fauna

Potential impacts to flora and fauna from Stage 1 Commercial Development project, as described in **Attachment 1, Section 6**, arise mainly from:

- earthworks associated with construction and rehabilitation of below and above ground infrastructure including well sites and access tracks;
- spills or leaks associated with storage and handling of fuel, chemicals and produced water;
- activity outside designated / approved areas;
- presence of personnel, lighting, general site activity and road use;
- storage, handling and disposal of waste.

4.3.1.1 Earthworks

Localised impacts to native vegetation and wildlife habitats, including disturbance or injury to fauna, could potentially occur due to earthworks from access tracks and Project site construction activities.

However, the Stage 1 Commercial Development proposed site has been highly disturbed, and no vegetation of conservation significance is present. Impacts to vegetation and wildlife habitats will not be significant or long term. Note that any clearance of native vegetation will be subject to a Significant Environmental Benefit (SEB) offset requirements under the Native Vegetation Act 1991.

Any direct impacts to fauna will be short term and localised. No direct impacts are expected upon the EPBC threatened species as none of the identified species are likely to occur on Stage 1 project site.

As the activities may impact degraded habitat, which forms an extremely small proportion of available habitat in the region, the activities are not likely to have any significant impact on fauna habitats or populations.

- Risk mitigation measures and management

Any sites disturbed during Project activities will ultimately be rehabilitated in accordance with standard regulatory criteria to ensure that visual impact is minimised, revegetation of native species occurs and that sites are left in a clean, tidy and safe condition.

Earthworks and movement of vehicles and machinery can also result in the introduction or spread of weeds. Standard measures will be implemented to minimise this risk (e.g. vehicles and equipment will be cleaned and washed down where necessary) before commencing work at site or after operating in an area of known weed infestation). If project activities result in the introduction or increased densities of pest plants, a weed control plan will be developed and implemented in consultation with the land manager and the relevant Landscape Officer where appropriate.

Earthworks and the use of unsealed roads have the potential to generate dust across the Stage 1 area. Earthworks for construction and rehabilitation will be limited in scale and short term. Potential impacts due to dust emissions are low as these are likely to be less than those from previous mining operations and there are no sensitive receptors within the proposed area of operations. Dust control measures (e.g. water spraying) will be implemented where required. Vehicle speeds will be restricted at the site across all PPL 269.

With the application of these control measures the localised impact would be reduced with no significant impact beyond the Stage 1 project site boundary.

The key management measures for earthworks in relation to fauna and flora are summarised below:

- All activities will be confined to designated areas, with signage and fencing (where required) installed to delineate approved areas and any restricted areas while minimising areas of new disturbance.
- Where possible, existing roads, tracks and disturbed areas are used to prevent damage of native vegetation. Any roads proposed to be constructed through the gasifier area/ stage 1 project area would be subject to consultation with DEM-MRD. Details of the final access roads will be provided in the Activity Notification.
- Driver behaviour and vehicle speed limits included in compulsory induction to avoid collision with fauna.
- Traffic and journey management procedures to be followed.
- Pre-disturbance site inspection undertaken to document existing conditions.
- Earth moving equipment and drilling rigs are cleaned and inspected before commencing work at site or after operating in areas of known weed infestations.
- Imported material (e.g. gravel or road base) sourced from areas considered to be weed /disease free.
- If project activities result in the introduction or increased densities of pest plants, a weed control plan will be developed and implemented in consultation with the land manager and the relevant Landscape Officer where appropriate.
- Drill mud sumps will be fenced off to prevent animals from entering the sumps.
- Drill mud sumps designed and constructed to allow trapped animals to escape up one side of the sump (escape ramp).
- Drill mud sumps monitored regularly to ensure no animals become trapped.

4.3.1.2 Spills or leaks of fuel or chemicals

Potential damage to native vegetation could arise from spills of fuel or chemicals on Stage 1 project site. As noted in section 4.3.1.1, habitats and vegetation within the Stage 1 Project site are highly disturbed and no vegetation of conservation significance is present, which limits the potential for impacts. Also, there is little likelihood that a spill or leak could impact vegetation that is undisturbed, has high environmental value or is of conservation significance within the PPL 269 and/or the PEL 650 in areas outside of approved work areas.

Surface plant and well design will be undertaken in accordance with Australian and applicable International Standards. Design will include over pressure protection measures, and ongoing operational asset and well integrity management procedures and plans will minimise the likelihood of losses of containment of syngas or produced liquids. Tanks and chemical storage will be appropriately bunded to contain spills or leaks.

The migration of Chemicals of Potential Concern from underground gasifiers is covered in Section 4.3.2.3 on groundwater.

Access to fuel, chemicals and produced fluids could also present a potential hazard for wildlife. Access to fuel, chemicals and produced fluids will be prevented by storing and handling them appropriately in designated, bunded areas and implementing immediate containment and clean-up if any spills occur. Emus and kangaroos are occasionally present on site and stock-proof fencing will be erected around storage areas.

- Risk mitigation measures and management

This risk will be minimised by appropriate storage, handling and spill response in accordance with relevant standards and guidelines including AS 1940 and EPA guideline Liquid Storage Management - Bunding and Spill Management (updated May 2016). Fuel and chemicals will be stored in designated areas with appropriate secondary containment as required (e.g. lined, bunded areas or on self-bunded pallets). Any spills will be immediately cleaned up and any contaminated material removed off-site for appropriate treatment or disposal.

Note that any activity which has the potential to cause site contamination to underlying groundwater will be assessed in accordance with the guidance provided in the National Environment Protection (Assessment of Site Contamination) Measure (1999) and the current South Australian Guidelines for the Assessment & Remediation of Site Contamination (2018).

Any Stage 1 Commercial related activities are likely to be small in scale with limited opportunity to impact areas of PEL 650 external to the Telford basin. Also the low volumes of chemicals stored or used would be effectively managed on-site preventing potential impacts within or outside the project area. Consequently, the level of risk has been assessed as low.

If larger scale spills, that cannot be immediately contained or cleaned up occur, they would be assessed consistent with the requirements of the National Environment Protection Measure (NEPM) and, where required, remediated in accordance with relevant guidelines (e.g. EPA guidelines). Hazardous materials will be transported and disposed in accordance with appropriate standards and legislative requirements, including the Australian Dangerous Goods Code. Appropriate spill response equipment and SDS will be available on site for all fuels and chemicals used on site.

Key management measures regarding storage and handling of fuel and chemicals to prevent and control spills or leaks of fuel, drilling muds and chemicals of potential concern (COPC) are summarised below:

- No major refuelling outside of designated refuelling/servicing areas.
- Drip trays used when refuelling vehicles on the drill pads.
- All hydrocarbons and chemicals are to be stored in accordance with applicable standards and guidelines (e.g. AS 1940, EPA guideline Liquid Storage Management - Bunding and Spill Management, and the Australian Dangerous Goods Code (ADG).
- Spills and leaks are reported immediately and clean up actions initiated.
- Drilling muds contained in sumps.
- Where applicable process water stored in a pond designed and constructed with regard to EPA Guideline 509/18 Wastewater lagoon construction.

- Any areas of contamination are remediated in accordance with criteria developed with the principles of the NEPM for contaminated sites, and in consultation with DEM and EPA.
- Contaminated soil will either be treated in-situ or removed for treatment and or disposal at an EPA approved facility.
- A record of all spill/leak events and their corrective actions are maintained.
- Emergency/spill response procedures in place and appropriate spill response equipment is available on site.
- Training on fuel and chemical handling and emergency response procedures and implemented and reviewed periodically.
- Periodic review and exercise of response equipment and procedures to ensure preparedness is carried out.

4.3.1.3 Activities outside designated / approved areas

Activities outside designated or approved areas have the potential to impact vegetation and fauna. However, activities will be restricted to Stage 1 project site within PPL 269.

- Risk mitigation measures and management

All activities will be confined to designated areas within the Stage 1 project site, with signage and fencing (where required) installed to delineate approved areas and any restricted areas. Moreover, the disturbed nature of vegetation and habitats within the Telford Basin, means that any impact from activities outside designated / approved areas would be of very limited consequence.

Impact to natural vegetation and habitats from Project related activities outside of the Telford Basin will be minimised to areas where permits have been approved after conducting Flora and Fauna surveys.

4.3.1.4 Presence of personnel, lighting and general site activity and road use

Potential impacts to vegetation and fauna could arise from the presence of personnel, lighting and general activity on the Stage 1 project site. Use of roads and tracks could also result in injury or death of small numbers of fauna. Impacts will be localised and are not expected to have any significant impact on fauna populations, particularly given the disturbed nature of vegetation and habitats present within the Telford Basin.

Construction and operational activities outside of the Telford Basin will have minimal impacts on flora and fauna, due to the scale of the operation and existing speed limits.

- Risk mitigation measures and management

Work area clearances, journey management plans and permitting will be implemented to reduce the impact of activities to flora and fauna. As described in section 4.3.1.1, details on driver behaviour and on site vehicle speed limits will be included in the compulsory induction, and traffic and journey management procedures will be followed.

4.3.1.5 Waste management

Inappropriately managed waste has the potential to result in localised disturbance or contamination that could affect fauna or flora present on site. Measures to ensure the secure storage and handling of waste will be implemented as outlined below. Covered bins will be used to prevent native fauna and pest animals accessing or spreading waste.

- Risk mitigation measures and management

Measures to ensure the secure storage and handling of waste will be implemented in accordance with the relevant legislation and guidelines. Waste management will be undertaken with regard to the key elements of the *Environment Protection (Waste to Resources) Policy 2010* for waste produced and disposed of within the

licence area and in compliance with the *Environment Protection (Movement of Controlled Waste) Policy 2014* if transported and disposed of outside of the licence area.

All sewage (e.g. for campsite) will be treated on site and disposed in accordance with the South Australian Public Health (Wastewater) Regulations 2013 or to the satisfaction of the Department of Health and Wellbeing. Approved environmental treatment units will be utilised where practical and appropriate. Alternatively, sewage and grey water will be collected in an approved holding tank, periodically emptied and removed for disposal by a licensed contractor.

Waste generation will be minimised where practical and all wastes will be stored securely and transported to licenced disposal or recycling facilities using licenced waste contractors. Waste streams will be segregated on site and collected and stored in covered bins or enclosed holding tanks before being transported to appropriate facilities for reuse / recycling (where possible) or disposal. Waste management practices on site will be guided by the principles of the waste hierarchy (i.e. avoid, reduce, reuse, recycle, recover, treat, dispose). Furthermore, storage methods to be applied on site for the project will consider issues such as scavenging animals, to avoid scattering and potential impacts on wildlife.

4.3.1.6 Risk Assessment on impacts on flora and fauna

NeuRizer has been the operator of the site for the past 7 years (2017-2023) since the operation of the pre-commercial demonstration plant. During this time, any of the additional identified EPBC species (See Section 4.1.5) have never been identified within the PPL 269. The project is unlikely to result in a significant impact on any of the vulnerable species. Therefore, the level of risk to flora and fauna has been assessed as low for these potential hazards (See **Attachment 1, Section 6**).

4.3.2 Assessment of potential impacts on EPBC threatened species

The following sections intend to address and provide key information on the potential for direct or indirect impacts to any of the newly identified EPBC listed species. This section should be read in conjunction to section 4.3.1 for a better understanding of potential impacts on fauna species and mitigation measures that will be implemented for the proposed Stage 1 Commercial Development project.

4.3.2.1 Vegetation

As described in **Attachment 16, Section 6.1**, no direct or indirect impacts as a result of vegetation clearance are expected upon EPBC threatened species. No 'Core' or 'Prime' native vegetation for conservation species is known to occur within the Stage 1 Commercial Development area, and any core or prime vegetation outside of Stage project area (PPL 269) will not be cleared as part of the proposed activities.

No vegetation of conservation significance is present in the proposed impact areas for Stage 1 – Commercial Development since the site has been subject to heavy disturbance relating to previous coal mining activities (Jacobs, 2022). In addition, any vegetation clearance is subject to clearance approvals, and any impact on native vegetation will be short term, localised and not in areas of 'preferred' habitat for this species.

As such, the newly EPBC listed threatened species are not likely to be significantly impacted by vegetation clearance or any potential impact that may arise from degradation of habitat as a result of the Stage 1 project activities.

4.3.2.2 Surface Water

Any potential impact to surface water is expected to be minor and localised within the PPL 269 due to the local topography, the limited presence of water courses within the Stage 1 Commercial Development project site, and the internal nature of drainage within the mine (**Attachment 16, Section 6.2**).

As described in **Attachment 1, Section 6**, impacts on sensitive receptors, including any potential fauna, from water contamination is unlikely. Surface water is inferred to remain within the Telford Basin given the

likelihood of mine pits acting as groundwater depressions and the reduced surface water runoff contributions from the ranges due to interception by the earthen walls. Section 3.3 of the CSM (**Attachment 15**) and Section 10.2 of the Mine Closure Plan (MCP) (**Attachment 26**) presents the surface water characteristics and monitoring history. In summary, the historical mine activities and activities associated with mine closure have modified the surface water environment significantly where *"there are no permanent rivers or creeks within the site footprint, with surface water movement comprising mainly sheet flow, supported by a network of small draining lines. Closure scenarios were developed for surface water management within the extents of the current operation, including management of flows from and around waste landforms, mine infrastructure, haul roads, access roads and mine pits.*

Flood protection elements are designed for the 1,000-year ARI (for mine closure plan). It is proposed that the pits and waste landforms areas be protected with earthworks, channelling and bunds to divert naturally occurring surface water around the mine operation elements. Direct rainfall volumes over the pits and internal contributing catchments will be captured in the pits" (MWH, 2016).

Any impacts to surface waters are expected to be localised within PPL 269 given the limited presence of water courses within the Stage 1 Project area and the local topography. Moreover, surface water sources providing 'suitable' and 'preferred' habitat to conservation species (all located outside of PPL 269) are not expected to be directly or indirectly negatively impacted by Stage 1 Commercial Development. Given the low potential for impacts and management measures proposed to be implemented (See **Attachment 1, Section 6.3 & Attachment 16, Section 6.2**), significant impacts in relation to surface water were not expected upon EPBC species listed as threatened.

4.3.2.3 Groundwater

There are no groundwater aquifers above or near the proposed gasifiers within the Stage 1 project area, and the formations surrounding the gasifiers within the Stage 1 project area report very low hydraulic conductivity and act as aquitards (**Section 5, Attachment 15**), so there is no significant regional groundwater flow through the formation. The gasifiers will be operated at a pressure less than the hydrostatic pressure, creating a localised low groundwater pressure zone within the gasifier, ensuring a groundwater pressure gradient towards the gasifier. These site characteristics and control measures present a few of the many favourable site attributes to mitigate mobilisation of contaminants and reduce risks associated with ISG operation. Section 8 of the Hydrogeological Conceptual Site Model (CSM) (NeuRizer, 2022) (**Attachment 15**) provides an evaluation of the Stage 1 project against the preferred attributes for a ISG project made by Camp and White 2015 (**Attachment 21**) in their ISG Hazard Screening Checklist.

Given the limited vertical connectivity between the Telford Gravels and underlying geological formations in the Telford Basin and the impermeable nature of these geological formations, the geological formations are considered isolated from the remaining receiving environment. The Main and Upper Series pits are the most likely receptors in the unlikely event that any COPCs migrate from the gasifier chambers. The Pits are reported to be sinks for groundwater flow both within the Basin aquitards and also, importantly, for the Basement aquitard/aquifer.

Moreover, the MCP analytical modelling by MWH 2016 (refer to Appendix F of the publicly available MCP) (and revised by Stantec 20181 (refer to Appendix UUU of the publicly available MCP)) indicates the Upper and Main Series Pits within the PEL 650 are likely to remain permanent evaporative sinks (for the Basement) and it is likely that there are no groundwater impacts from the mining pits at a distance of more than 500m, especially north of the Main Series pit. AWE results from the 2013 and 2015 assessments confirm the near basin groundwater sink effects of the pits, and indicate that the propagation of impacts associated with the Main Series pit and over 70 years of mine activity is less than 100m (Figure 5-28 and Figure 5-31, **Attachment 1**). The two figures indicate the Telford Basin hydrogeology is dominated by the Main and Upper Series pits; however, has little impact to the regional groundwater beyond the basin margins.

In addition, it is unlikely that groundwater movement will be away from the Basin within PEL 650 given:

- the Basin materials in contact with the Basement (and surrounding the gasifiers) have very low hydraulic conductivity and are considered aquitards (**Section 5, Attachment 15**).

- A minimum of 80m of aquitard separating the base of the Main Series Coal and the Basement in the PPL 269 area (**Section 4.2.3, Attachment 15**).
- Gasifiers are operated at a pressure below hydrostatic where groundwater flow is towards the gasifier.
- PCD monitoring has confirmed the development of a groundwater gradient towards the gasifier (**Section 6.6, Attachment 15**).

The latest 3D geomechanical modelling (See **Attachment 27**) also demonstrates that the amount of subsidence for Stage 1 would be negligible and it would only be over a small area. Modelling also showed that the stress release fractures formed besides and above the gasifier chamber would have a limited extent and would not propagate to the surface. This along with the gasifier operating at below hydrostatic pressure would ensure that any groundwater that exists, would flow towards the gasifier and not away from it (Clark, 2022).

Section 4.3.2, 4.4.4 and 4.4.5 of the CSM (**Attachment 15**) also describes how packer testing on the main fault (Master Fault) reported any faults or fractures will anneal and seal themselves over time due to the fine grained and ductile nature of the matrix material in the rocks above the proposed gasifiers.

Based on the information above, there is low likelihood of groundwater being impacted by the Stage 1 Commercial Development activities and there is negligible subsidence on Stage 1 project.

Moreover, there are no 'known' Groundwater Dependent Ecosystems (GDEs) within PEL 650 (BOM, 2021), and no potential GDEs have been identified within Stage 1 Commercial Development area or the Telford basin (See **Attachment 1, Section 5.6.8; Attachment 16, Section 6.7; Attachment 15, Section 5.7**). In summary, a review of the GDE Atlas data and other information indicates the following:

- With respect to aquatic GDEs, no such potential GDEs were identified within the PPL 269 or within the Telford Basin. Low to moderate potential aquatic GDEs were identified in ephemeral creek lines to the south and portions of the retention dam, north east and low laying "floodplain" of Leigh Creek north of the Telford Basin.
- With respect to terrestrial GDEs, no known terrestrial GDEs have been identified in the area within or surrounding the Telford Basin. No potential GDEs have been identified within PPL 269. A small portion of low potential GDEs (chenopod shrubland) has been identified in a portion of the old Leigh Creek, which was cut off during retention dam construction, in the southern portion of the Telford Basin and separated from PPL 269 by the Upper Series pit and waste rock dumps. Low to high potential for chenopod shrubland terrestrial GDEs has been identified to the south, west and north of the Telford Basin. High potential for Acacia and chenopod shrubland terrestrial GDEs has been identified north of the Telford Basin.
- No subterranean GDEs were identified.

The assessment done for **Attachment 1** and **Attachment 15** assumes Atlas information is relevant for the modification to the surface flow systems given the long-term presence of the mine.

Given the lack of dependency of the identified EPBC listed species on groundwater, the lack of TECs dependent on natural discharge of groundwater within the PEL 650 and PPL 269, the lack of GDEs within the Telford basin and the low potential for groundwater to be impacted by Stage 1 project activities, no significant potential indirect or direct impacts are likely upon the newly identified EPBC species as a result of groundwater contamination.

4.3.2.4 Traffic and transport

Traffic survey studies were conducted by the Department for Infrastructure and Transport (DIT) on behalf of NeuRizer (formerly Leigh Creek Energy) over a period of five months, between September 2019 - February 2020. The survey areas included the Outback Highway north of Leigh Creek (count site 5593) and south of the Aerodrome Road (count site 8195) located south of Leigh Creek as indicated in below. The data showed an average daily two-way traffic volume of 280 and 150 vehicles per day at the northern and southern sites, respectively.

The existing road network within the region is already heavily used by the transport, mining, oil and gas and pastoral industries and the incremental change as a result of the Stage 1 Project is not likely to be significant (See **Attachment 1, Section 5.14**).

During the construction phase, which is expected to last approximately 12 months, various types of machinery will be used for the construction of the wells, small-scale power station and associated infrastructure. The contractor will identify all construction plant and equipment for each phase of the work package. Most of the construction traffic will be concentrated within the Leigh Creek mining site.

During the operational phase there will be a relatively small amount of traffic generated by the power plant and the gasifiers development and operations. Drilling of the gasifier wells will continue during the operational phase and to this end will involve worker transportation and movement of waste. The existing road network will be able to safely handle the incremental increase in traffic during this phase.

To reduce the risk, different measures to mitigate the risks to the public will be in place including signage near the site entrance, and no public access beyond mine gate. Likewise, access to Stage 1 project site will be restricted during operations, and compliance with relevant speed limits and restrictions are to be observed on public roads. All required authorisations (e.g. DIT, police) are to be obtained where required for significant activities (e.g. movement of oversize loads) on public roads. Appropriately licenced and competent contractors will be used.

For potential impact on flora and fauna (fauna collision), driver behaviour and vehicle speed limits are included in compulsory induction and traffic and journey management procedures will be followed.

Interaction between vehicles and EPBC listed fauna are expected to be unlikely, noting that core habitat for EPBC listed species are outside the Stage 1 Commercial Development area. In addition, it is unlikely that fauna would be significantly impacted as a result of the minor increase in traffic for the Stage 1 Commercial Development construction and/or operation (See **Attachment 16, Section 6.3, pp. 19-21**).

4.3.2.5 Soil and Land

Most of the landform and ground surface within the coalfield in PEL 650 has been heavily disturbed and modified by over 70 years of open cut coal mining activities. The pits within the coalfield are surrounded by extensive mine spoil piles and waste rock dumps. Other earthworks have also been undertaken extensively across the coalfield site, including construction of the retention dam and numerous berms around the site to modify water flows, and construction of numerous access tracks. Two quarries (now water-filled) are located south of the Lobe B Upper Series Pit.

Proposed construction and soil-based activities associated with the Stage 1 Commercial Development are limited to areas that are already heavily disturbed within the PPL269 with limited native vegetation present. Risk to soils and land has been assessed as low (**Attachment 1, Section 4.7**). Furthermore, preferred habitat areas for EPBC listed species are not connected via contiguous vegetation corridors to smaller disturbed patches of species with the PPL 269. As such, EPBC listed threatened species are not expected to be directly or indirectly impacted as a result of soil-based activities (e.g earthworks) or changes to local topography.

4.3.2.6 Air Quality

Air quality in the broader region is expected to be typical of a remote rural environment and influenced by a range of activities such as:

- dust from stock and vehicle movements or high winds
- vehicle and equipment exhaust fumes.

Air quality in the vicinity of the Leigh Creek Coalfield is also likely to be influenced by:

- dust generation from spoil dumps and mining / rehabilitation activities

- particulates, vapour and combustion emissions from spontaneous combustion of mine spoil dumps. The pits are surrounded by mine spoil dumps which are known to spontaneously combust releasing particulates and sulphurous and phenolic odours.

Emissions modelling (**Attachment 25**) was undertaken for Stage 1 Commercial Development project, including nitrogen dioxide (NO₂), carbon monoxide (CO), particulates (PM_{2.5} and PM₁₀), hydrogen sulphide (H₂S), and sulphur dioxide (SO₂).

For the evaluation of air quality impacts, and the assessment of compliance for the proposed operations, the predicted maximum ground level concentrations from the dispersion modelling were assessed against the South Australian Air Quality Environment Protection Policy (Air EPP) ground level concentration assessment criteria. Since there is very little ambient air quality monitoring data available for regional/remote locations in South Australia, ambient air quality data from metropolitan EPA air quality monitoring stations were selected for the assessment. Considering that the NRUP is located in a remote, less populated, location the background data as included can be considered as conservative. The air quality impact assessment concluded that:

- The predicted ground level concentrations of NO₂, CO, PM show no concern at the nearest sensitive receptors.
- The results from the H₂S emissions from the various operation scenarios show that there are no exceedances predicted of the H₂S toxicity criterion. The frequency of occurrence of H₂S ground level concentrations above the Air EPP H₂S odour criterion is in the order of 2 to 3 % with the assumption of continuous emissions. This shows that there is risk for odour impacts from the operations at the nearest sensitive receptors, but that the estimate is that there is a low risk of this occur.
- The highest SO₂ ground level concentrations and impact area are predicted for SO₂ emission from the T/OX. This is due to the vertical discharge velocity from the being low (average less than 1 m/s). Overall, the predicted maximum SO₂ ground level concentrations at the nearest sensitive receptors show large margins to the Air EPP assessment criteria which indicates low risk and show no concern.
- The PM emissions from the operations are from combustion sources. The predicted maximum PM ground level concentrations at the nearest sensitive receptors are close to the background values and show no concern.

Attachment 1, Section 6.6 contains an assessment on potential impacts to air quality during construction and operational phases arising from dust generation from earthworks and site activities (vehicular movement), combustion exhaust emissions (e.g. small-scale power plant, diesel generators and compressors), greenhouse gas emissions, syngas release from non-routine venting and syngas leaks. **Attachment 1, Section 6.6** also contains information about mitigation measures on air quality.

With the implementation of the proposed mitigation and management measures the air emissions associated with both the construction and operational phases of the Stage 1 Project will not result in a degradation of the ambient air quality. Subsequently, terrestrial flora and fauna will not be impacted, and any odour associated with the Project activities is unlikely to be evident at sensitive receptors. The residual environmental risk has been assessed as low in relation to dust, combustion, greenhouse emissions, syngas releases and leaks, and explosion or fire (see **Attachment 1, Table 6.1**).

It is also noted that the pilot plant project (Pre-Commercial Demonstration) using ISG within the PPL269 demonstrated low to nil exceedances of Air Environmental Protection Policy (EPP) (Leigh Creek Energy, 2018). Dust and emission control measures are also to be implemented (See **Attachment 1, Section 5.10 & Section 6.6**), for which any reduction in air quality will be localised and temporary, with no significant impact beyond the Stage 1 Commercial Development site boundary.

Based on the information available, a significant direct or indirect impact as a result of air quality is not expected upon the newly identified EPBC threatened and/or migratory species.

4.3.2.7 Noise and Vibration

The existing noise environment in the region is typical of sparsely populated regional and pastoral areas, with generally low levels of background noise dominated by natural sources (e.g. wind, animals and insects) and intermittent background noise from traffic on the nearby Outback Highway. Mining activities, including blasting, would have influenced the noise environment in proximity to the mine prior to closure. Ongoing mine closure activities by the current rehabilitation monitoring operator are expected to generate intermittent noise (e.g. from heavy machinery operation), with locations and noise levels dependent on the activities being undertaken.

Sources of noise for Stage 1 project activities will come from conventional industrial building techniques for site preparation, foundation pouring, and erection of structural steel and the ongoing operation of the facility and the 5MW powerplant. All the equipment shall have a maximum allowable Sound Pressure Level (SPL) of 85 dB(A) at 1 m.

Expect the following major intermittent noise sources result from:

- Cold Vent: As the cold vent will be reused from the PCD it is safe to use the following noise data: <93 dB(A) at the base of the vent stack and <85dB(A) at 20 m away from the stack.
- Compressed Air Blowdown: Not yet procured, but in the absence of firm information we assume the same as the cold vent. (<93 dB(A) at the base of the vent and <85dB(A) at 20 m away).

At worst either of these could vent and create noise for up to 24hrs.

Equipment will be operated and maintained in accordance with specifications in order to minimise noise emissions. Limited numbers of wildlife are present and site noise will not have a significant impact.

Generally, noise levels are unlikely to be higher than those associated with previous mining and commercial related activities. Noise emissions generated at the site during the operational phase will be localised and are not likely to have a significant impact on any sensitive receptors. See **Attachment 1, Section 6.13** for details about risk mitigation measures and management of noise and vibration.

See Figure 12 for an indication of the location noise sources relative to the Stage 1 Project area (yellow polygon).



Figure 12: Indication of Location of proposed noise sources within PPL 269

While birds can be affected by noise impacts, they can adjust their hearing and masking depending on the frequency and duration of noise sources (Jacobs, 2022). Whilst there may be short-term impacts to common species that occur within the Stage 1 Project area, it is considered that threatened species that have not been recorded in previous field surveys within PPL269, with the BDBSA record occurring ~4 km from these noise sources, are unlikely to be impacted. According to Jacobs (2022), “the Stage 1 Project area would be similar to Zone 4 or beyond Zone 4 boundaries from noise sources, where Zone 2 represents highway noise (93dBA) and Zone 4 represents highway noise that falls below ambient noise levels” as described in Dooling and Popper (2007). Dooling and Popper (2007) also suggest that, based on laboratory evidence, damage to birds hearing as a result of noise impacts, occurs when there is continuous noise above 110 dB(A) SPL or single blast noises over 140 dB SPL (125 dB SPL for multiple blasts).

The noise levels from site activities as a result of Stage 1 activities (including the small-scale power plant) are unlikely to be readily noticeable or distinguishable over background noise (such as wind or vehicles on the Outback Highway) by the identified EPBC listed species since these species are not expected to occur within the PPL 269. Given the proposed noise impacts are not greater than 110 dBA and noise will not occur in core or prime habitat or known locations of identified threatened species, significant impacts upon the newly listed EPBC species are considered unlikely.

Potential negligible noise impacts to EPBC fauna are likely to be temporary only, and significant impacts to EPBC species as a whole is not expected.

4.3.2.8 Poisoning and bioaccumulation

Potential direct or indirect impacts on listed EPBC species as a result of poisoning and/or bioaccumulation of hazardous substances, including impacts to soils and land, surface water, flora and fauna and air quality, has been previously assessed as low. The geological formations within the Stage 1 Commercial Development area are considered isolated from the surface environment as a result of the limited vertical connectivity between underlying geological formations in the Telford Basin and the Telford Gravels, as well as the impermeable

nature of these geological formations. (See **Attachment 16, Section 7.6**). In the highly unlikely event that chemicals of potential concern migrated to the surface, these would be contained and not spread laterally due to the “bath tub” effect arising from former mining operations, so this hypothetical event would not affect habitat (See **Attachment 15**).

5 Conclusions

Based on the desktop review in relation to additional EPBC listed species it has been concluded that:

- There are no EPBC listed flora, EPBC listed migratory or threatened fauna occurring within the proposed Stage 1 project area (PPL 269).
- No new EPBC listed Threatened Ecological Communities (TECs), migratory species or flora were detected across PEL 650 or PPL 269 compared to the EPBC PMST output (search date – 29 June 2022) prepared by Jacobs for the Addendum to winter flora and fauna survey (Jacobs, 2022).
- The four additional species highlighted by the Protected Matters Search Tool (PMST) (50 km buffer and 10 km buffer) are considered unlikely to occur within the Stage 1 project site.
- No vegetation of conservation significance is present in the proposed impact areas for Stage 1 – Commercial Development since the site has been subject to heavy disturbance relating to previous coal mining activities, and none are considered likely to occur.
- No additional identified EPBC listed threatened fauna are likely to be significantly impacted by direct or indirect impacts as a result of the proposed activity (Stage 1 Commercial Development).

6 References

AWE (2013). *Drilling and Aquifer Testing Field Program*. Report prepared for Leigh Creek Energy. September 2013.

AWE (2015). *Stage 2 Lower Series Terrace 1 Dewatering Investigations. 2014 Drilling and Aquifer Testing Program*. Report prepared for Leigh Creek Energy. May 2015.

Atlas of Living Australia (ALA) (2023a). *Aphelocephala leucopsis* (Gould, 1841), accessed at https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/d2e67121-b3b9-4292-84f9-4f070a05b7d4#cite_note-iucn_status_12_November_2021-1 on 14 April 2023.

Atlas of Living Australia (ALA) (2023b). *Melanodryas (Melanodryas) cucullata cucullata* (Latham, 1801), accessed at <https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/f411b7e7-5818-45fc-b3d2-8dfa5ed45f1e#overview> on 14 April 2023.

Atlas of Living Australia (ALA) (2023c). *Neophema (Neonanodes) chrysostoma* (Kuhl, 1820), accessed at <https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/34832b73-b9cb-4e1b-97b3-a6b00ed8c9d8> on 14 April 2023.

Atlas of Living Australia (ALA) (2023d). *Stagonopleura (Stagonopleura) guttata* (Shaw, 1796), accessed at <https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/6e872b58-55d1-443c-a30e-0d90a57e3240> on 14 April 2023

BirdLife International (2022a). *Aphelocephala leucopsis*. The IUCN Red List of Threatened Species 2022: e.T22704748A211249958. <https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T22704748A211249958.en> Accessed on 13 April 2023

BirdLife International (2022b). *Neophema chrysostoma*. The IUCN Red List of Threatened Species 2022: e.T22685194A210989456. <https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T22685194A210989456.en>. Accessed on 13 April 2023.

BirdLife International. (2022c). *Stagonopleura guttata*. The IUCN Red List of Threatened Species 2022: e.T22719660A211542365. <https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T22719660A211542365.en>. Accessed on 13 April 2023.

Bureau of Meteorology (BOM) (2021). Groundwater Dependent Ecosystems Atlas. Accessed July 2021 at <http://www.bom.gov.au/water/groundwater/gde/map.shtml>

Camp, D.W. and White, J.A. (2015). *Underground Coal Gasification: An Overview of Groundwater Contamination Hazards and Mitigation Strategies*. Lawrence Livermore National Laboratory LLNL-TR-668633.

Clark, Dr Ian (2022). *NeuRizer Subsidence Study Stage 1 – May 2022*

Commonwealth of Australia (2023). *List of Threatened Species Amendment (347) Instrument 2023*. F2023L00375. Canberra: Federal Register of Legislation. <https://www.legislation.gov.au/Details/F2023L00375>. In effect under the EPBC Act from 31-Mar-2023.

Clark, Dr Ian (2022). *NeuRizer Subsidence Study Stage 1 – May 2022*

Department for Environment and Water (DEW) (2023a). Biological Databases of South Australia (BDBSA) SuperTables – Overview. <https://www.environment.sa.gov.au/topics/science/information-and-data/biological-databases-of-south-australia> Accessed on 13 April 2023.

Department for Environment and Water (2023b). BDBSA – Species Presence and Absence Observations. Webpage accessed: <https://www.environment.sa.gov.au/topics/science/informationand-data/biological-databases-of-south-australia> Accessed on 13 April 2023.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023a), Conservation Advice for *Aphelocephala leucopsis* (southern whiteface), Canberra. In effect under the EPBC Act from 31-Mar-2023.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023b), Conservation Advice for *Melanodryas cucullata cucullata* (hooded robin (south-eastern)), Canberra. In effect under the EPBC Act from 31-Mar-2023.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023c), Conservation Advice for *Neophema chrysostoma* (blue-winged parrot) Canberra. In effect under the EPBC Act from 31-Mar-2023.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023d), Conservation Advice for *Stagonopleura guttata* (diamond firetail) Canberra. In effect under the EPBC Act from 31-Mar-2023.

Department of the Environment (DotE) (2013). Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia, Australia.

Department of the Environment (DotE) (2023a). *Aphelocephala leucopsis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <https://www.environment.gov.au/sprat>. Accessed Thu, 13 Apr 2023.

Department of the Environment (DotE) (2023b). *Melanodryas cucullata cucullata* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <https://www.environment.gov.au/sprat>. Accessed Thu, 13 Apr 2023.

Department of the Environment (DotE) (2023c). *Neophema chrysostoma* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <https://www.environment.gov.au/sprat>. Accessed Thu, 13 Apr 2023.

Department of the Environment (DotE) (2023d). *Stagonopleura guttata* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <https://www.environment.gov.au/sprat>. Accessed Thu, 13 Apr 2023.

Dooling, R. J. and Popper, A. N. (2007) *The effects of highway noise on birds*. Report prepared for The California Department of Transportation Division of Environmental Analysis.

Jacobs (2019). *Targeted EPBC species and habitat assessment*. PEL 650 Project. Report prepared for Leigh Creek Energy. December 2019. **Attachment 11.**

Jacobs (2021). *PEL 650 Baseline Flora and Fauna Winter Survey*. Report prepared for Leigh Creek Energy. Draft report issued October 2021. **Attachment 12.**

Jacobs (2022). Addendum to Winter Ecology Survey. Report prepared for NeuRizer (formerly known as Leigh Creek Energy). August 2022. **Attachment 16.**

Leigh Creek Energy (2018). *Environmental Impact Report ISG Demonstration Plant*. December 2017. Accessed December 2020 at: <https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00091EIR%20ISG%20PILOT.pdf>

MWH (2016) *Leigh Creek Coal Mine Closure – Groundwater Aspects*. Report prepared for Flinders Power

NeuRizer (formerly known as Leigh Creek Energy) (2020). *Environmental Impact Report, Stage 1 Commercial Development: Leigh Creek Energy Project PPL 269*. December 2020. NeuRizer Limited, Adelaide. **Attachment 1.**

NeuRizer (formerly known as Leigh Creek Energy) (2022). *Hydrogeological Conceptual Site Model*. June 2022. NeuRizer Limited, Adelaide. **Attachment 15.**

T&M Ecologists (2018a). *Flora and Fauna Assessment Leigh Creek PEL 650. January 2018*. Report prepared by T&M Ecologists for Leigh Creek Energy. **Attachment 9.**

T&M Ecologists (2018b). *Flora and Fauna Assessment Leigh Creek Energy Site Investigation Program 1 Area*. December 2018. **Attachment 10.**

APPENDIX A: EPBC PMST output from the boundary of the site with a 50km buffer



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: 12-Apr-2023

[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)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	23
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

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

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

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	7
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [\[Resource Information \]](#)

Name	State	Legal Status	Buffer Status
Natural			
Ediacara Fossil Site - Nilpena	SA	Listed place	In buffer area only

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
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BIRD

Amytornis merrotsyi merrotsyi Short-tailed Grasswren (Flinders Ranges) [86269]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
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Amytornis modestus Thick-billed Grasswren [84121]	Vulnerable	Species or species habitat known to occur within area	In feature area
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Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
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Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
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Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
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Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In buffer area only
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Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
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Scientific Name	Threatened Category	Presence Text	Buffer Status
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area	In buffer area only
FISH			
Mogurnda clivicola Flinders Ranges Mogurnda, Flinders Ranges Purple-spotted Gudgeon [66693]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			
Notomys fuscus Dusky Hopping-mouse, Wilkiniti [125]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Petrogale xanthopus xanthopus Yellow-footed Rock-wallaby (SA and NSW) [66646]	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 known to occur within area	In feature area
PLANT			
Acacia carneorum Needle Wattle, Dead Finish, Purple-wood Wattle [66685]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Acacia menzeli Menzel's Wattle [9218]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Codonocarpus pyramidalis Slender Bell-fruit, Camel Poison [19507]	Vulnerable	Species or species habitat known to occur within area	In feature area
Frankenia plicata [4225]	Endangered	Species or species habitat known to occur within area	In feature area
Pterostylis xerophila Desert Greenhood [7997]	Vulnerable	Species or species habitat known to occur within area	In feature area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

REPTILE

Aprasia pseudopulchella Flinders Ranges Worm-lizard [1666]	Vulnerable	Species or species habitat may occur within area	In buffer area only
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Listed Migratory Species [[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Migratory Terrestrial Species

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 may 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]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
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Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		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
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
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Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area	In buffer area only
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
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Tringa nebularia Common Greenshank, Greenshank [832]		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
Ediacara	Conservation Park	SA	In buffer area only
Witchelina Nature Reserve	Heritage Agreement	SA	In buffer area only

EPBC Act Referrals					[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status	
Controlled action					
Leigh Creek Energy Stage 1 Commercial Development, SA	2021/8953	Controlled Action	Completed	In feature area	
Prominent Hill Copper-Gold Project	2005/2040	Controlled Action	Post-Approval	In buffer area only	
Not controlled action					
Beltana Mineral Exploration	2001/178	Not Controlled Action	Completed	In buffer area only	
Beltana Zinc Mine	2007/3256	Not Controlled Action	Completed	In buffer area only	
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area	
Mining of Zinc Silicate Ore	2008/4587	Not Controlled Action	Completed	In buffer area only	
Mining of zinc silicate ore from the Aroona II Deposit	2007/3699	Not Controlled Action	Completed	In buffer area only	

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

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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

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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

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4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

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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.

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- Other groups and individuals

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APPENDIX B: EPBC PMST output from the boundary of the site with a 10km buffer



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: 12-Apr-2023

[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:	None
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	13
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <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:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened 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 modestus Thick-billed Grasswren [84121]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	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 likely to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may 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			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Petrogale xanthopus xanthopus Yellow-footed Rock-wallaby (SA and NSW) [66646]	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 likely to occur within area	In feature area

PLANT

Codonocarpus pyramidalis Slender Bell-fruit, Camel Poison [19507]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Frankenia plicata [4225]	Endangered	Species or species habitat likely to occur within area	In feature area
Pterostylis xerophila Desert Greenhood [7997]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species [[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Migratory Terrestrial Species

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 may 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]		Species or species habitat known to occur within area	In feature area

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Tringa nebularia Common Greenshank, Greenshank [832]		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
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EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Leigh Creek Energy Stage 1 Commercial Development, SA	2021/8953	Controlled Action	Completed	In feature area
Not controlled action				
Beltana Mineral Exploration	2001/178	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
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Please feel free to provide feedback via the [Contact us](#) page.

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