Goyder North Wind Farm

Targeted Flinders Ranges Worm-lizard Survey Report

Final

June 2025

umwelt

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Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Neoen Australia Pty Ltd

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Acknowledgement of Country

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Document Status

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Abbreviations

Term	Description
DCCEEW	Department of Climate Change, Energy the Environment and Water
DEH	Department for Environment and Heritage
DE	Development Envelope
DF	Disturbance Footprint
EBS Ecology	Environment and Biodiversity Services Pty Ltd – trading as EBS Ecology (now Umwelt).
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FLB	Flinders Lofty Block
FRWL	Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*)
GNREF	Goyder North Renewable Energy Facility
GNWF	Goyder North Wind Farm
GRZ	Goyder Renewables Zone
ha	hectare(s)
IBRA	Interim Biogeographical Regionalisation of Australia
km	kilometre(s)
MDD	Murray Darling Depression
MNES	Matter(s) of National Environmental Significance
Neoen	Neoen Australia Pty Ltd
NPW Act	*National Parks and Wildlife Act 1972* (South Australian)
OTL	Overhead Transmission Line
PBTL	Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*)
SA	South Australia(n)
SCAP	State Commission Assessment Panel
spp.	Species (plural)
Umwelt	Umwelt Australia Pty Ltd
VA	Vegetation Association
WF	Wind Farm

Glossary

Term	Description
Development Envelope (DE)	A 'buffered' version of the Disturbance Footprint that represents the spatial extent within which the Disturbance Footprint is expected to occur.
Disturbance Footprint (DF)	A 'buffered' version of the Disturbance Footprint that represents the spatial extent within which the Disturbance Footprint is expected to occur.
Important Population	A population that is necessary for a species long-term survival and recovery, including populations identified as such in recovery plans, and / or that are: • key source populations for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and / or • populations that are near the limit of the species range.
Project Area	Goyder North Wind Farm Project Area including OTL.
The Project	Goyder North Wind Farm.
Significant Impact(s)	Impacts which are important, notable, or of consequence, having regard to their context or intensity, and assessed within the framework of the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (DotE, 2013).

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Appendix A Flinders Ranges Worm-lizard Survey Sites

1.0 Introduction

Neoen Australia Pty Ltd (Neoen) is developing the Goyder North Renewable Energy Facility (GNREF) as a part of its wider Goyder Renewables Zone (GRZ) concept. As a part of this concept, the Goyder South Hybrid Renewables Energy Project was granted Development Approval in 2021, and *Environment Protection and Biodiversity Conservation* (EPBC) Approval in July 2022 (Stage 1A EPBC/2021/8958; Stage 1B EPBC/2021/8957), with construction of Stage 1 beginning in 2022, consisting of 412 megawatts of wind turbine power generation.

Given the scale of the GNREF Project, it is proposed to be constructed in stages. Neoen is currently progressing the development of a 600-megawatt wind farm, Goyder North Wind Farm (GNWF), north of the township of Burra, in the Goyder Regional Council within the mid-north of South Australia (the Project). The Project incorporates an Overhead Transmission Line (OTL) which traverses approximately 48 kilometres (km) south, to the existing Bundey Substation, near Robertstown (**Figure1.1**).

Preliminary ecological assessments, including a desktop assessment (EBS Ecology, 2024) and native vegetation surveys, have identified a number of Matters of National Environmental Significance (MNES) listed under the EPBC Act, which are likely to occur within the Project Area. Of these, the Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*) (FRWL), listed as nationally Vulnerable, was identified as known to occur within the Project Area.

The GNWF Project received planning consent from the State Commission Assessment Panel (SCAP) in October 2024. Additionally, an EPBC Referral (2024/09929) was submitted to the Commonwealth Department of Climate Change, Energy the Environment and Water (DCCEEW) to address potentially significant impacts to MNES, including FRWL. The EPBC referral has been deemed a controlled action and will be assessed further by the Preliminary Documentation pathway under Section 95A(2) of the EPBC Act. Subsequently, the Project design layout was amended, and a Referral variation with updated design was submitted in March 2025.

Item 2d) of the Preliminary Documentation asked for additional information on the FRWL. Specifically:

> *2 d) For the FRWL, confirm the likely presence and abundance of the species within the Disturbance Footprint and Development Envelope and adjacent areas subject to direct and indirect impacts by providing the results of targeted field surveys. Provide robust justifications of any conclusions in relation to the absence of the species.*

Umwelt were engaged by Neoen to undertake targeted FRWL surveys in the GNWF, within the proposed Disturbance Footprint and Development Envelope of the Project Area.

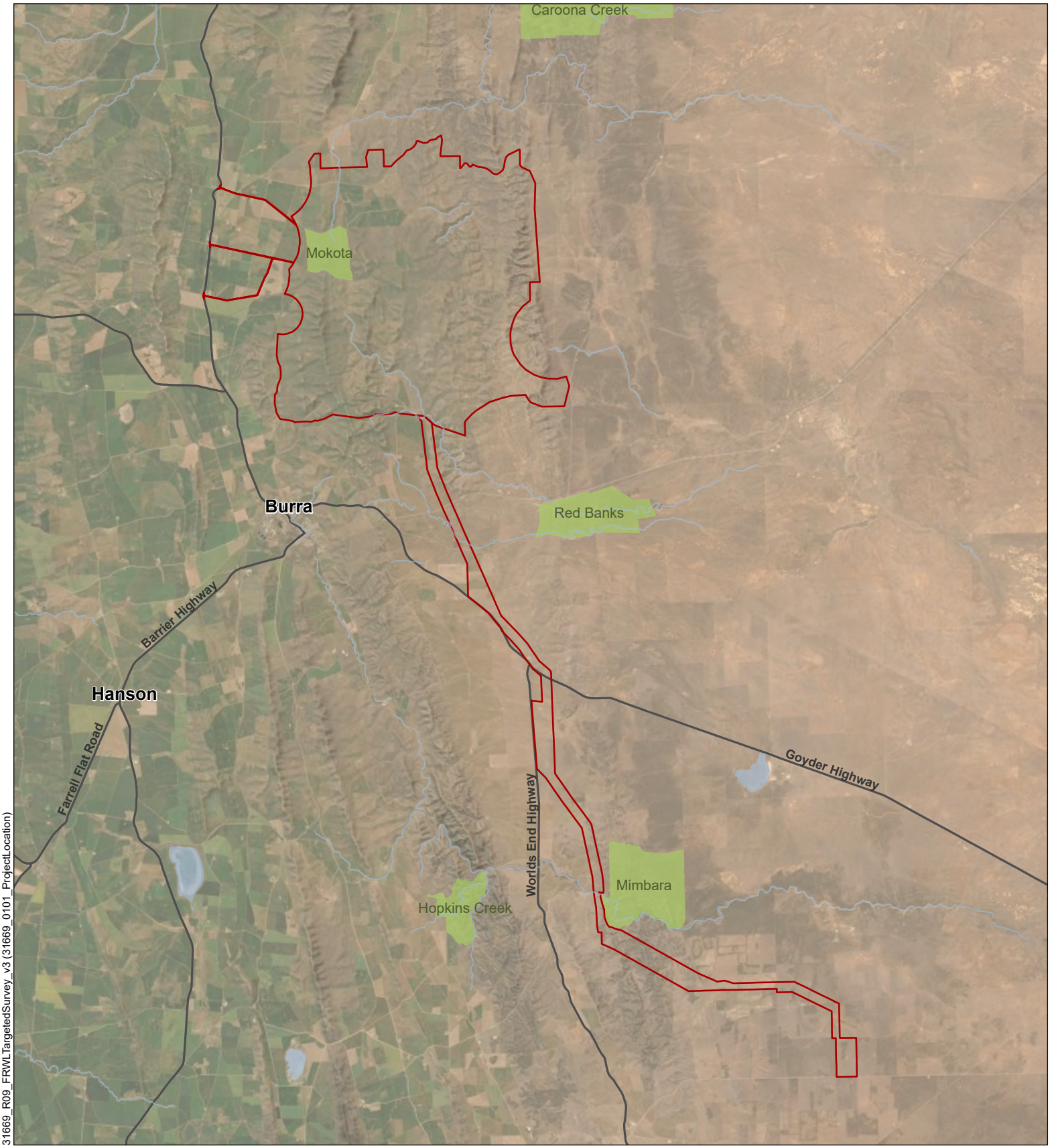
1.1 Objectives

The objectives of the targeted FRWL survey were to:

- Define and delineate potentially suitable FRWL habitat in the Project Area.
- Determine the distribution and abundance of FRWL within the current proposed Disturbance Footprint and Development Envelope within the Project Area.

- Inform the location of FRWL 'hotspots' and identify areas of the Disturbance Footprint which may need to be or micro-sited to avoid or minimise potential impacts to this species.
- Provide information on the potential consequences of the GNWF Project for this species to inform the Preliminary Documentation.

Figure 1.1 Location and Regional Context of the GNWF Project Area



GNWF Project Area
NPW reserve
Waterbody
Watercourse
Main road

31669_R09_FRWLTargetedSurvey_v3 (31669_0101_ProjectLocation)

umwelt

Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 10:03 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

N

0 2.5 5 km

2.0 Background

2.1 Project Area

The proposed GNREF is located north-east of Burra and east of the Mount Bryan township in the Regional Council of Goyder. GNWF incorporates a portion of the broader GNREF and includes an OTL which travels approximately 48 km south from the Wind Farm (WF) site to an existing substation at Bundey.

The Interim Biogeographical Regionalisation of Australia (IBRA) is a landscape-based approach to classifying the land surface across a range of environmental attributes. The GNWF primarily occurs within the Flinders Lofty Block (FLB) bioregion, with approximately 9.5 km of the southern end of the OTL within the Murray Darling Depression (MDD) bioregion.

Within the FLB, the Project Area is divided across four IBRA subregions (Blocks): Burra Hill, Terowie, Hansen and Mongolata. In these Blocks the GNREF is dominated by ridges, plains, and undulating low hills, with rocky outcrops that fall away to low foot slopes and drainage channels at regular intervals. Native vegetation is comprised predominantly of native grasslands, with large tracts of Iron-grass (*Lomandra* spp.) in the middle and eastern sections. Remnant mallee woodland associations occur along the eastern side of the site, where they drop steeply into chenopod dominated plains.

The OTL traverses low grassy hills and plains, chenopod dominated plains, and an area of the steep, mallee dominated Hallelujah Hills, before dropping again into chenopod shrublands and mallee plains in the MDD (Sutherlands subregion).

The Project Area occurs within the agricultural region and comprises marginal grazing land on the western edge of Goyder's Line, which has a long history of agricultural use predominantly for pastoral grazing of sheep and cattle, and dryland cropping. Native vegetation has been historically cleared in some areas and elsewhere degraded by the long history of agricultural use.

A total of 23 native vegetation associations have been mapped across the GNREF (WF and OTL) of which 21 associations are being impacted in the current GNWF Disturbance Footprint.

2.2 Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*)

2.2.1 Conservation Status

The Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*) was listed as Vulnerable under the EPBC Act on 16 July 2000. Species information has predominantly been obtained from:

- *Approved Conservation Advice for Aprasia pseudopulchella (Flinders Ranges Worm-lizard)* (DEWHA, 2008)

The most recent (2017) assessment under the IUCN Red List of Threatened Species (Fenner, Hutchinson, McDonald, & Robertson, 2018) lists the species as Least Concern on the basis that it has a relatively wide range, it is common and is subject to no major threats at present. The IUCN listing states that while it has been considered a threatened species in Australian and State legislation, surveys since 1996 have found that the species is quite common and adaptable.

2.2.2 Description and Ecology

This species is a small, worm-like burrowing lizard with poorly developed hindlimb flaps. It has a grey-brown body flecked with median longitudinal bars on the dorsal scales, giving the appearance of longitudinal lines, merging into a reddish-brown terminal half of the tail. The species has a cryptic nature, being difficult to detect as it spends its time sheltering in soil beneath stones and rotting stumps and woody debris in the daytime, only becoming active above the surface at nighttime when it hunts for prey (Australian Government, 2011), feeding almost entirely on larvae and pupae of ants and termites (DEWHA, 2008). It may feed only infrequently and only in warmer months of the year.

2.2.3 Distribution and Habitat

The FRWL is endemic to South Australia, where it is associated with the Flinders Lofty Block (FLB), from which it is known from the Flinders Ranges of South Australia, extending south to the western slopes and northern and central Mount Lofty Ranges, and the northern suburbs of Adelaide (Cobbler Creek) (Cogger, 1993). The Approved Conservation Advice does not identify any important populations of the species.

The FRWL is known to occur in open woodland, native tussock grassland, riparian habitats and rocky isolates, preferring stony soils or clay soils with a stony surface (DEWHA, 2008). No critical habitat requirements are documented in the Approved Conservation Advice for the species (DEH, 2008). However, the known important habitat features are summarised in **Table 2.1**.

Table 2.1 Habitat Requirements for the Flinders Ranges Worm-lizard

Species	Habitat Requirements	Critical Habitat
Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*)	• Open woodland, native tussock grassland, riparian habitats and rocky isolates. • Stony or clay soils with a stony surface. • Shelters in the soil beneath stones and rotting stumps.	The conservation advice for this species does not define any critical habitat.

2.2.4 Previous Known Occurrence in the Project Area

During spring 2024, one FRWL was detected at GNWF under a large flat rock, opportunistically flipped during targeted Iron-grass Natural Temperate Grassland surveys. Additionally, historical Biological Databases of South Australia (BDBSA) records occur, with 61 observations in a 5 km Search Area between 1965 and 2024.

Potentially suitable habitat, based on the description in the Conservation Advice been broadly mapped within the Project Area based on the vegetation associations present in the Project Area. This mapping does not consider the presence of stony soil surface, however there are large areas containing rocky surface covering and / or woody debris within the Project Area.

This mapping found that majority of the Project Area was considered suitable habitat for this species based on the broad description of habitat in the Conservation Advice (i.e. woodland, native tussock grassland, riparian habitats and rocky isolates where there are clay soils with a stony surface), apart from where paddocks had been cropped and rocks removed.

The vegetation mapping indicates there is a total of 13,631.84 ha of potentially suitable habitat in the GNWF Project Area.

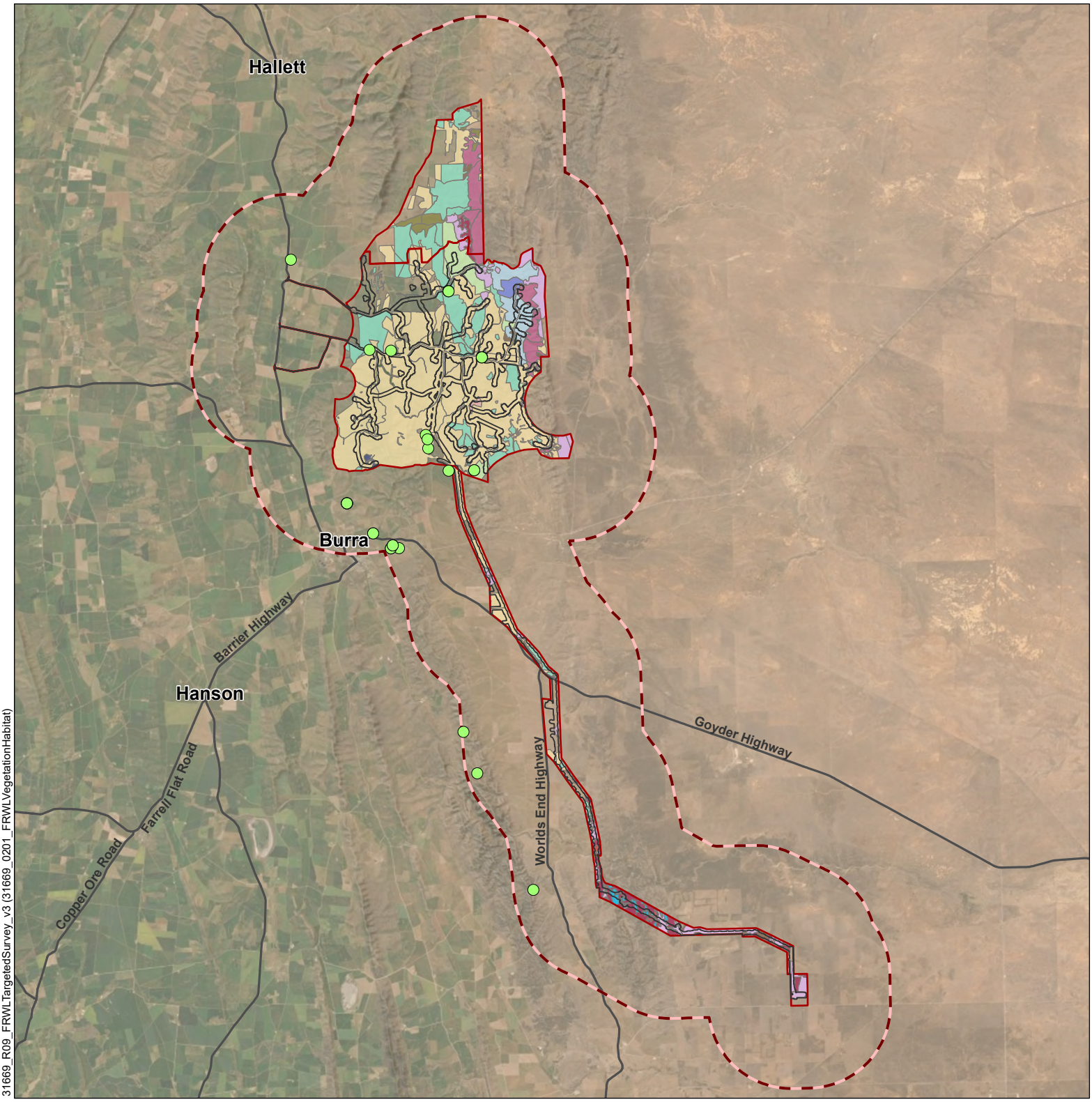
Of this, a maximum of 412.40 ha is inside the GNWF Project Disturbance Footprint, potentially impacted by the Project. With 3,269.65 ha inside the GNWF Project Development Envelope, providing a buffer to the Disturbance Footprint but with the potential to also be impacted. Previously mapped suitable habitat for FRWL is presented in **Table 2.2** and **Figure 2.1.**

Table 2.2 Previously Mapped Suitable Habitat for Flinders Ranges Worm-lizard in GNWF

Distribution and Habitat Requirements (DEWHA, 2008)		Suitable Vegetation Associations (VAs)	GNWF DF (ha)	GNWF DE (ha)	GNWF (ha)
IBRA Bioregion	**FLB**				
Habitat Requirement	Open woodland, native tussock grassland, riparian habitats, and rocky isolates. The species prefers stony or clay soils with a stony surface where it shelters beneath stones and rotting timber.	VA1	19.95	161.51	725.89
		VA2	5.36	44.17	453.77
		VA3	1.49	15.52	119.53
		VA4	0.06	0.07	0.07
		VA5	0.08	11.08	18.00
		VA6	12.43	219.24	1932.13
		VA7	0.00	0.00	4.02
		VA8	1.17	5.79	28.37
		VA9	16.71	109.37	544.57
		VA10	0.67	12.58	33.16
		VA11a	348.92	2,594.14	9,491.48
		VA11b	1.50	24.05	74.66
		VA13	0.07	3.82	13.91
		VA14	0.05	2.48	10.33
		VA15	0.03	0.80	33.16
		VA16	2.07	24.48	42.56
		VA17	0.00	0.90	1.38
		VA19	1.84	39.56	104.85
		Total	**412.4**	**3,269.56**	**13,631.84**

The distribution of this species is likely to be significantly more limited than the above estimates suggest due to the requirement for a rocky surface layer, which is not present across all areas of each of the suitable vegetation associations.

Figure 2.1 FRWL Habitat Based on Native Vegetation Mapped Within GNREF



31669_R09_FRWLTargetedSurvey_v3 (31669_0201_FRWLVegetationHabitat)

- GNREF
- Search Area
- Development Envelope
- Flinders Ranges Worm-lizard record (BDBSA)

Flinders Ranges Worm-lizard habitat

- VA1: *Eucalyptus porosa +/- E. gracilis* woodland over Chenopods
- VA2: Smooth Barked mixed mallee
- VA3: *E. porosa* low woodland over *Schlerophyllous* shrubs
- VA4: *Acacia pycnantha* tall shrubland over grass
- VA5: *Maireana aphylla* low shrubland
- VA6: Lomandra Grassland
- VA7: *Acacia spilleriana* Shrubland
- VA8: *Eucalyptus leucoxylon ssp. Pruinosa* (Inland South Australian Bluegum) Open Woodland
- VA9: *Maireana rohrlachii* open shrubland
- VA10: *Allocasurina verticillata* over native grasses and herbs
- VA11a: Native grassland
- VA11b: Native grassland and emergent trees
- VA12: Mixed Chenopod shrubland
- VA13: *Hakea leucoptera ssp. leucoptera* tall shrubland
- VA14: *E. camaldulensis* Riparian Woodland
- VA15: *Juncus sp.* sedgeland in minor drainage pipe
- VA18: Mixed Mallee over Chenopods and native grasses
- VA19: *Dodonaea lobulata* shrubland on rocky hills
- VA20: *Alectryon oleifolius* Low Woodland over Chenopods

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Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 10:01 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

0 2.5 5 km

N

3.0 Method

3.1 Field Survey

A five-day field survey was completed from 31 March to 4 April 2025, by two ecologists, with experience in the active searching methods for the target reptile species.

Survey methods were based on those described in the *Survey guidelines for Australia's threatened reptiles* (Australian Government, 2011). Some minor variations to these methods were made, based on specific site conditions and observer's experiences in detecting the target species.

All accessible areas that were mapped as potentially suitable habitat for Flinders Ranges Worm-lizard were surveyed within Disturbance Footprint. Areas of the Development Envelope and broader GNWF Project Area were also mapped where potentially suitable habitat was observed while traversing the site

The survey was undertaken using diurnal hand searches, with searches undertaken systematically within defined survey quadrats and on transects, as summarised in **Table 3.1**.

The location of areas searched for Flinders Ranges Worm-lizards (the survey effort) are indicated on the map in **Figure 4.1.**

Table 3.1 The Methods Used for the Flinders Ranges Worm-lizard Suvey

Recommended Methods[1]	Survey Methods
Searches should be restricted to areas of relatively homogenous habitat	All surveys were undertaken in areas previously mapped as suitable habitat, according to vegetation association. Habitat suitability was further assessed on site, with surveys targeted to homogenous areas of stony cover. Where habitat variables such as stone cover density or vegetation cover differed, additional survey quadrats and transects were established to capture the range of potentially suitable habitat types in the Project Area.
Stone cover density rather than fixed area should determine survey quadrat size. 150 – 200 rocks need to be turned to be confident of determining species presence	Transects – were conducted throughout the Project Area and within the Mallee Woodlands where potentially suitable habitat was identified. Ten walking transects were surveyed, with a minimum of 150 rocks or rotting logs turned during each transect. Quadrats – at areas of suitable habitat, an approximate20 m x 20 m quadrat was established, within which a minimum of 150 suitable rocks (at least 10 cm diameter) were turned in each quadrat, with more turned if the area was extremely rocky. Where there was a lower density of rocks, additional area was covered outside of the quadrats until at least 150 rocks had been turned. A total of 52 survey quadrats were surveyed. Each quadrat was photographed, and its location recorded using FieldMaps. If a FRWL or skin was observed, its location was recorded on FieldMaps and the handheld GPS device. After turning a rock, it was placed back as close as possible to its original position, in such a way so as not to harm any FRWL or other species present.
Search success likely to be highest in spring and early summer on warm (not hot) days, preferably after a period of rainfall	The survey occurred in autumn, outside of the optimal spring / summer period.

Recommended Methods[1]	Survey Methods
During late autumn and winter, surveys should occur on clear sunny days as warming of rocks appears to attract lizards to the soil surface.	Weather during the survey represented the ideal autumn survey conditions for the FRWL. This included mild to warm days and mostly sunny mornings and afternoons, refer to **Section 4.1**.

[1] ***Survey guidelines for Australia's threatened reptiles*** (Australian Government, 2011).

3.2 Permits

Surveys were undertaken under the following permits:

- Scientific Research Permit No. K25613-27 (Department of Environment, Water and Natural Resources).
- Wildlife Ethics Committee Permit No. 27/2022 (Wildlife Ethics Committee).
- Scientific Licence No. 158 (Animal Welfare, National Parks and Wildlife SA).

3.3 Limitations

3.3.1 Survey Limitations

The survey was targeted to the area of the proposed Disturbance Footprint and Development Envelope in the Project Area, to determine FRWL locations and suitable habitat. Not all habitat across the GNWF Project Area were able to be mapped in detail during the field survey. Habitat suitability and risk assessment mapping has only been possible in areas that were surveyed and extrapolated further afield where visibility permitted. As such, the mapping of suitable rocky surface covering is approximate and unlikely to delineate the exact boundaries of suitable habitat There are likely to be additional areas of suitable rocky surface covering in the Project Area which were not assessed during the targeted survey.

Where possible, surveys were undertaken in conditions favourable to the task at hand, however, given the timeframes and requirement for advance planning, this is not always possible. The results of the survey represent the number of FRWL detected within a select survey area at the time of the survey (March / April 2025). Little is known about the movements of FRWL within the landscape on a short- or long-term basis, including home range, dispersal of young, seasonal movements and landscape requirements (i.e. aspect, elevation, soil depth). The survey results provide an indication of the use of rocks in the landscape at a point in time but may not indicate the actual impact to this species in the future due to daily and / or seasonal movements.

Targeted FRWL surveys were based on the design layout of the Disturbance Footprint current at the time of survey (March 2025). If the design layout and bounds of the GNWF Disturbance Footprint and Development Envelope are further refined, the confidence in habitat mapping may be lower. The FRWL are cryptic species that are difficult to detect, even in areas where their presence is known. Non detection of species in areas of suitable habitat is not necessarily indicative of their absence.

The *Survey Guidelines for Australians Threatened Reptiles* (Australian Government, 2011) does not indicate the number of stones per unit area (i.e. per hectare) of suitable habitat which is likely to be required to determine presence of the species. The recommendation for a minimum of '150 – 200 stones' per search plot is problematic.

While this number of rocks may be suitable to determine presence of FRWL in small patches of suitable habitat, where rocky cover extends over tens or hundreds of hectares, the significance of 150 – 200 rocks per plot diminishes significantly.

3.3.2 Spatial Limitations

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

Datum: Geocentric Datum of Australia 2020 (GDA2020).

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

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

4.0 Field Survey Results

4.1 Survey Conditions

The survey was undertaken in early autumn (31 March to 4 April 2025). Weather conditions leading up to and during the survey were consistent with the ideal conditions for autumn survey periods (**Section 3.1**). Weather during the survey period consisted of cool overnight and morning temperatures, followed by mild to warm, sunny afternoon periods, and low wind speeds. One day of the field survey was overcast in the morning, clearing to partly cloudy with high relative humidity (81%) later in the day.

The closest operating weather station to the Project Area is at Clare (station number: 21131), located approximately 35 km to the west. Maximum daytime temperatures ranged from 20.0˚C on 4 April to 27.7˚C on 2 April (**Table 4.1**). No rain was recorded in the week prior or during the field survey (BOM, 2025), however, there was some evidence of recent minor rainfall (4 mm on 21 March), with a flush of green apparent on the western hills of GWNF.

Table 4.1 Weather Conditions During Field Survey

Date	Min °C	Max °C	Comment
31 March 2025	11.6	22.3	Warm, sunny, clear
1 April 2025	12.7	26.0	Warm, sunny, clear
2 April 2025	11.8	27.7	Warm, sunny, clear
3 April 2025	7.4	21.4	Overcast in the morning, partly cloudy, clearing in the afternoon
4 April 2025	8.2	20.0	Cool, clear morning, warming to mild and sunny by mid-morning

4.2 FRWL Observations

Fifty-two search quadrats and ten additional transects of varying length were surveyed for suitable FRWL habitat within the Project Area (**Figure 4.1** and **Appendix A**). Based on the criteria of turning a minimum of 150-200 rocks per quadrat, an estimated 9,300 to 12,400 potentially suitable rocks were turned during the survey period, with walking transects totalling approximately 33.68 kilometres between the two observers.

A total of five individual FRWL (**Photo 4.1**and **Photo 4.2)** were observed during the survey period, and twenty shed skins (**Photo 4.3**). The live Flinders Ranges Worm-lizards were recorded at Q1, T2, Q5, Q14 and Q33. The additional locations where FRWL and shed skins were observed are shown on the map in **Figure 4.1.**

All FRWL were located beneath rocks and within or close to ant and termite tunnels (**Photo 4.4)**. The rocks that FRWL were found under were partly embedded in the soil, generally with a flat bottom surface (**Photo 4.3**). Rocks containing FRWL varied considerably in size, however, the smallest rock under which a FRWL was found measured approximately 12 cm in diameter. All FRWL were found alone under the rocks.

All but one FRWL were recorded on a north-facing slope during sunny, mild midday conditions. The exception was a single FRWL located on a hilltop during a late, overcast afternoon.

The FRWL and shed skins were all recorded in rocky grasslands, with no records being found within the Mallee Woodlands located in the northwest corner of the Project Area. The species is not known to occur in those parts of the Project Area outside the FLB IBRA Bioregion as shown in **Figure 4.1**, however no survey effort was targeted here to confirm, and habitat is generally considered unsuitable.

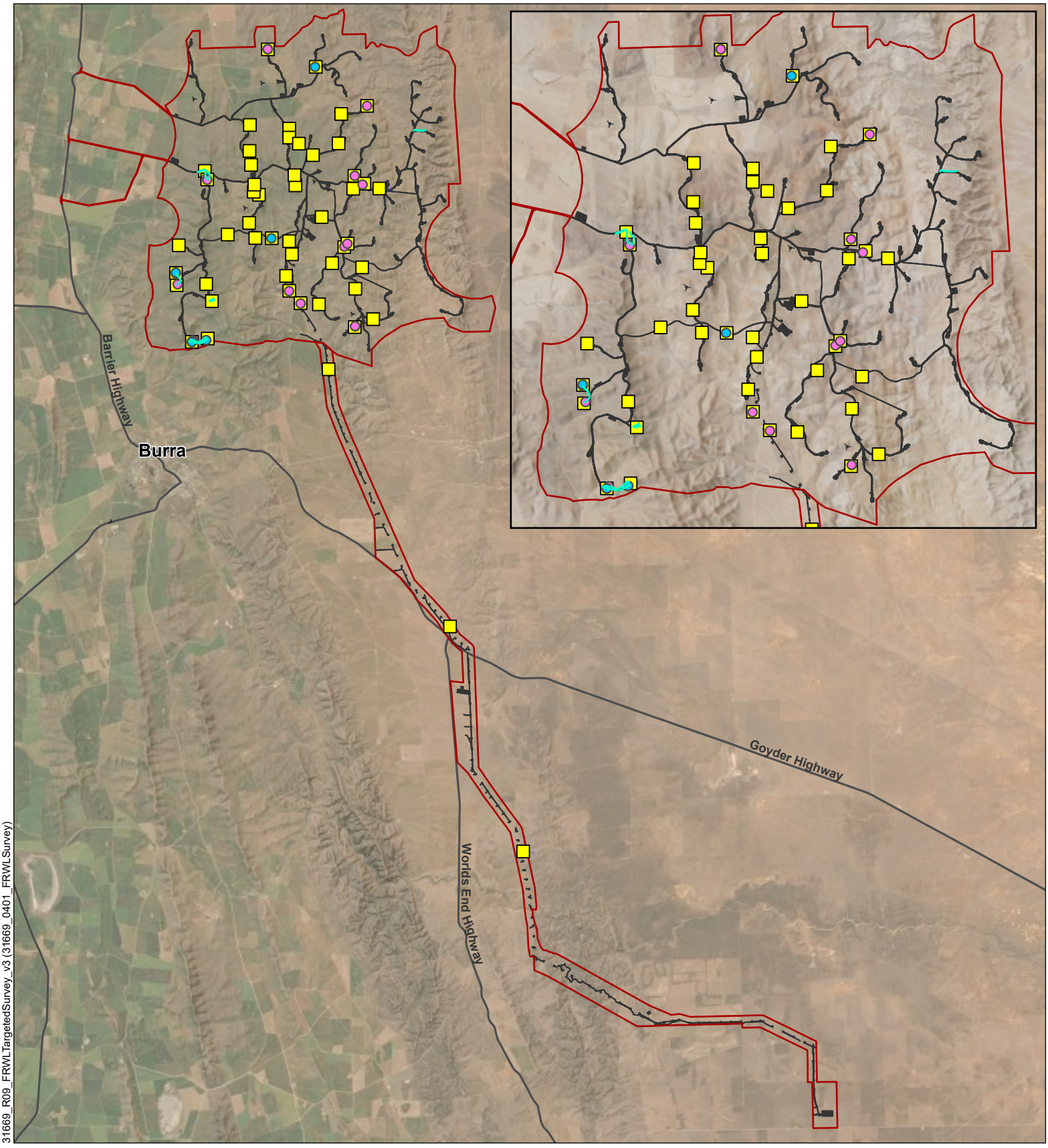
Photo 4.1 Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*) Found During the Survey

Photo 4.2 All FRWLs were Located Beneath Lightly Embedded Rocks

Photo 4.3 The Shed Skin of a FRWL Found Beneath a Rock

Photo 4.4 Most FRWL and Shed Skins were Found Near Ant and Termite Tunnels as Shown Above

Figure 4.1 Location of Flinders Ranges Worm-lizards and shed skins records across the Project Area



GNWF Project Area

Disturbance Footprint

Flinders Ranges Worm-lizard survey

- FRWL
- FRWL skin
- Survey quadrat location
- Survey Transect

31669_R09_FRWLTargetedSurvey_v3 (31669_0401_FRWLSurvey)

Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 10:03 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

N

0 2.5 5 km

4.3 Other Fauna Species Recorded During the Survey

The targeted FRWL survey also recorded nine non-targeted reptile species:

- Adelaide Delma (*Delma molleri*) (**Photo 4.5**)
- Bynoe's Gecko (*Heteronotia binoei*)
- Common Dwarf Skink (*Menetia greyi*)
- Lined Earless Dragon (*Tympanocryptis petersi)*
- Northern Tawny Dragon (*Ctenophorus modestus*) (**Photo 4.1**)
- Shingleback Lizard (*Tiliqua rugosa*)
- South-eastern Morethia Skink (*Morethia boulengeri*)
- Saltbush Morethia Skink (*Morethia adelaidensis*)
- Bearded Dragon (*Pogona* sp.) (not identified to species, juvenile, escaped before identification).

All species were detected beneath rocks turned while searching for FRWL. None of these species are listed as threatened under South Australian or Commonwealth legislation.

Photo 4.5 Adelaide Delma (*Delma molleri*)

Photo 4.6 Northern Tawny Dragon (*Ctenophorus modestus*)

4.4 Flinders Ranges Worm-lizard Distribution in the Project Area

4.4.1 Known and Possible Habitat

Across the Project Area an estimated 706.14 ha of known and 2,446.66 ha of possible habitat for the FRWL has been identified and mapped, within a refined area of vegetation previously mapped as providing potentially suitable habitat for FRWL based on the available literature (see **Section 2.2.3** and **Section 2.2.4,** and indicated on **Figure 4.2** and **Figure 4.3** as 'FRWL Vegetation Habitat').

Habitat suitability mapping was undertaken for the data collected during the field survey, based on the parameters shown in **Table 4.2**. Polygons were established while in the field to broadly indicate the areas of contiguous rocky surface covering (i.e. potentially suitable habitat). These polygons were further separated based on the location of fences, property boundaries or other relevant landscape features which may influence the suitability of habitat beyond the surface covering (i.e. grazing impacts).

Where records of FRWL or FRWL sign (such as skin) observed during the field survey, and/or historical FRWL intersected a polygon with stony surface mapping, the polygon was determined as Known habitat.

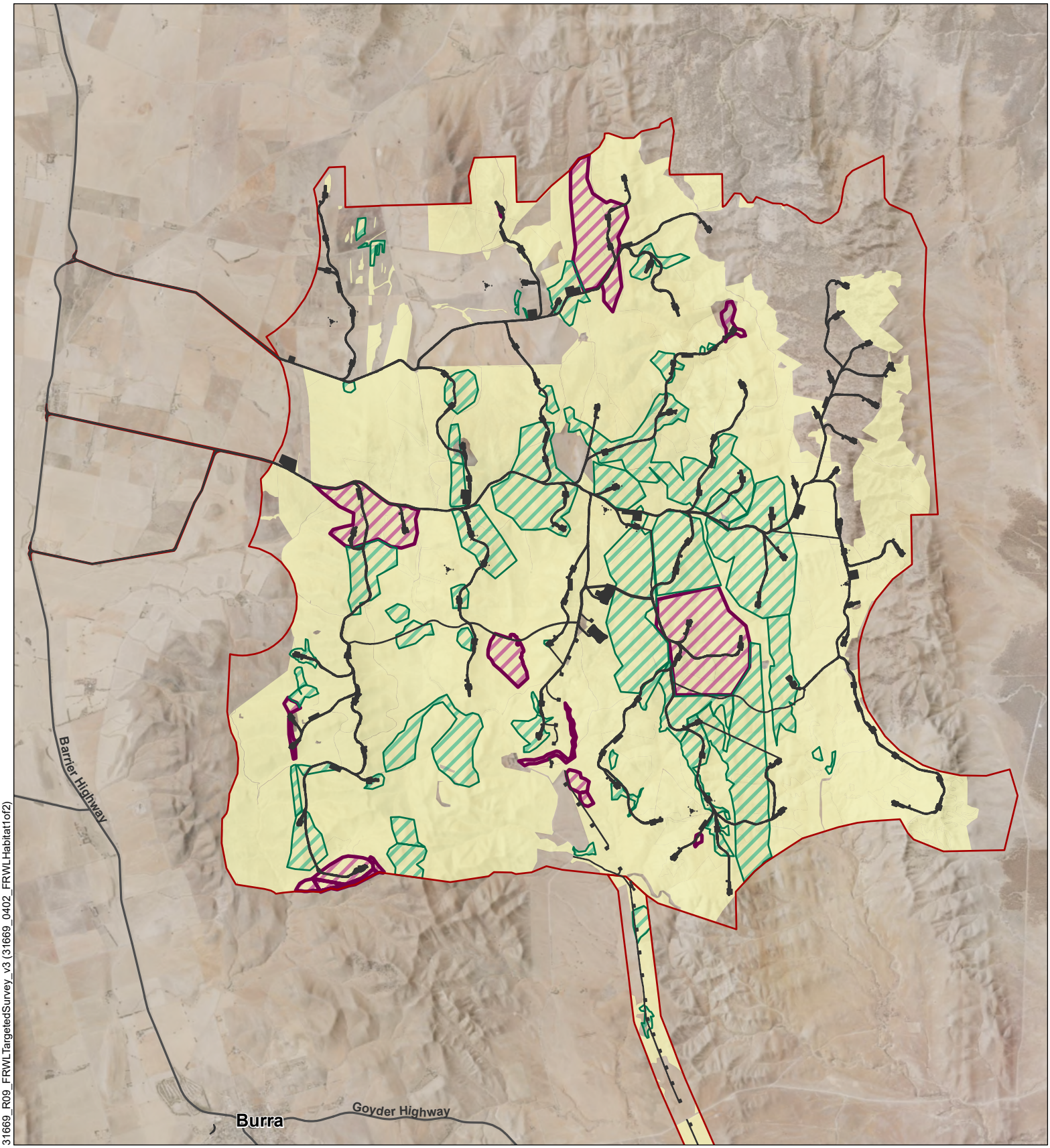
Possible FRWL habitat was mapped if no FRWL or skins were found within an area, but the habitat was otherwise considered to provide suitable surface covering and habitat for this species.

Unlikely FRWL habitat was recorded in areas lacking suitable rock sizes and areas containing dense ground cover vegetation, or areas outside of the known range of the species such as in the MDD Bioregion. These areas were not specifically mapped but are represented by previous vegetation habitat mapping.

Table 4.2 Habitat Suitability Mapping

Likelihood	Description	Disturbance Footprint (DF)	Development Envelope (ha)	Project Area (ha)
Known	FRWL record (recent, historical or sign) intersects with suitable vegetation association and stony surface covering polygon.	35.17	251.17	706.14
Possible	Habitat mapped as being suitable vegetation association and with stony or other suitable surface covering.	122.39	885.06	2,446.66
	Total	157.56	1,136.23	3,152.80

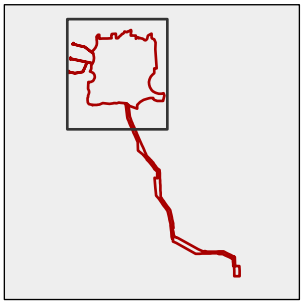
Figure 4.2 Flinders Ranges Worm-lizard habitat mapped across the Project Area (1 of 2)



GNWF Project Area
Disturbance Footprint
FRWL Vegetation Habitat

Flinders Ranges Worm-lizard Habitat

Known
Possible



Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 9:55 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

N

0 1 2 km

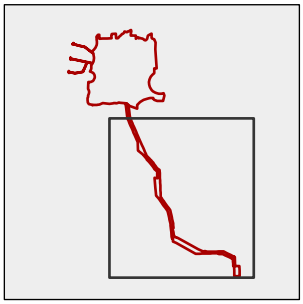
31669_R09_FRWLTargetedSurvey_v3 (31669_0402_FRWLHabitat1of2)

Figure 4.3 Flinders Ranges Worm-lizard habitat mapped across the Project Area (2 of 2)

GNWF Project Area
Disturbance Footprint
FRWL Vegetation Habitat

Flinders Ranges Worm-lizard Habitat

Possible



31669_R09_FRWLTargetedSurvey_v3 (31669_0403_FRWLHabitat2of2)

Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 9:55 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

N

0 1 2 km

4.4.2 Habitat Condition and Quality

Although large areas of the Project Area were mapped as having suitable stony surface covering, the perceived quality of habitat varied significantly across the Project Area, with variables such as rainfall, soil type, grazing pressure, grass covering and stone cover characteristics (density, type/ size of rock, spacing) determining the perceived habitat quality.

The higher rainfall, western and central slopes of the Project Area had fewer grazing pressures and resulting higher grass cover compared to other areas of the Wind Farm. Soil composition in this part of the Project Area was typically clay, and therefore ideal for FRWL to burrow down into. Where rocks were present, a high proportion were observed to have termite and ant nests present underneath them, providing an abundant food source for the FRWL. Rocky outcrops are present on top of hills, usually forming belts along the ridges, then fall away to low foot slopes and drainage channels at regular intervals. Loose rocks from these outcrops are present down the slopes of the hills, with many small to medium rocks lightly embedded into the clay soil. As a result of these features, habitat quality in these western areas was typically classified as good to high, having met the FRWL habitat requirements.

The quality of habitat on the eastern side of the Project Area was assessed as generally low to moderate, with little to no grass cover amongst the stony areas. Use of the land was predominantly heavy grazing by livestock and some cropping. Soil conditions in this part of the Project Area were sandy and dry at the surface, due to long periods of no rain, strong grazing pressures and resulting lack of grass cover. As a result of this the soil is light and fine, easily disturbed by wind, making it poor habitat for FRWL to burrow down into. Termite and ant nests were found to be less commonly observed, compared to the western side of the Project Area, potentially resulting in a decrease in food source for the FRWL. Similarly to the western side, rocky outcrops are present on top of the hills, that then fall away to low foot slopes and drainage channels. Loose rocks cover the slopes down to the gullies, with many rocks laying on top of the soil, and only some embedded into the soil. Where rocks lay on top of the soil, habitat was considered possible but low quality, while rocks that were embedded in the soil had the habitat classified as moderate and high quality.

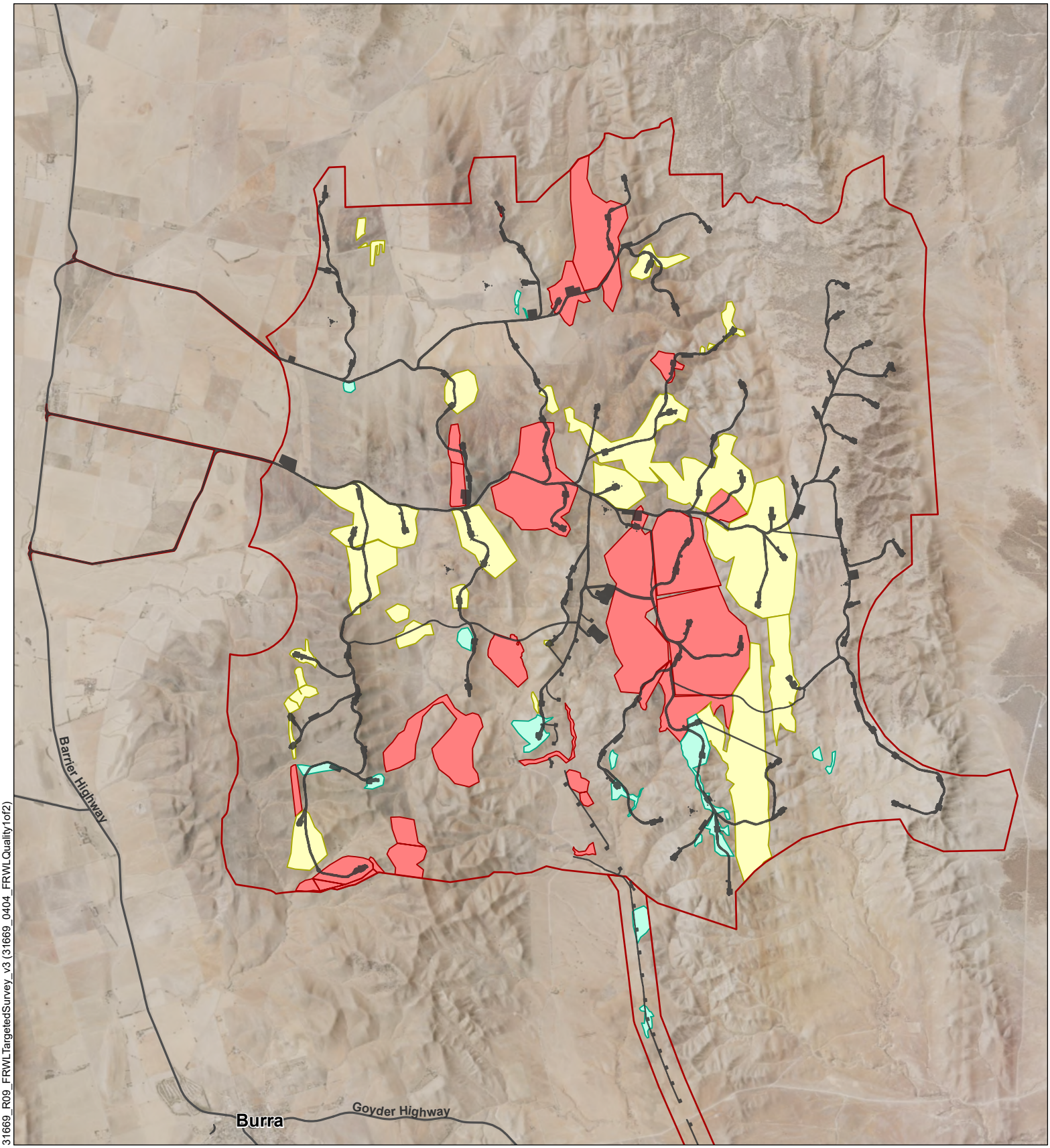
Mallee Woodlands, located in the northeastern corner of the Project Area, were surveyed with a 750 m transect in which rotting woody debris was turned over. Stone cover was very low in the woodlands, with fallen tree branches and trunks being the only potential shelter for Flinders Ranges Worm-lizard. The soil in the Mallee Woodlands was poor, with dry, silty soils, with a high litter component, resulting in suboptimal conditions required for burrowing FRWL. Fallen timber was observed to have been already eaten by termites, with dry soils underneath and low termite activity. The abundance of termite and ant nests were observed to be lower compared to other parts of the Project Area, where grasslands were more widespread. Heavy grazing by livestock and feral animals, such as goats, has impacted the grassland cover found throughout the Mallee Woodlands, which in turn has contributed to sandy, poor soil conditions.

Figure 4.5 detail the areas of low, moderate and high-quality habitat mapped within the Project Area. Habitat quality assessments were subjective and relative to the conditions present across the Project Area, and thus, high quality habitat in GNWF may not represent ideal habitat for the species in the broader region.

Table 4.3 FRWL Habitat Quality

Quality	Description	Disturbance Footprint (DF)	Development Envelope (ha)	Project Area (ha)
Low	Heavy grazing resulting in low to no grass cover and exposed soil, with a range of stony surface coverings, or; Stony surface covering sparse to absent or comprising unsuitable rocks such as small, scattered surface rocks or shale.	18.87	134.33	203.76
Moderate	Range of grassland conditions but with moderate to high cover of suitable stones and presence of termites / ants detected.	72.75	531.63	1,430.98
High	Grassland in good condition with low grazing, regular cover of suitable sized, lightly embedded rocks, clay soil, high termite/ant activity under suitable rocks.	65.94	470.27	1,518.03
	Total	157.56	1,136.23	3,152.77

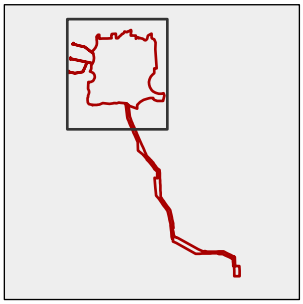
Figure 4.4 FRWL Habitat Quality Mapped Across the Project Area (1 of 2)



GNWF Project Area
Disturbance Footprint

Habitat Quality

High
Moderate
Low



Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 9:57 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

N

0 1 2 km

31669_R09_FRWLTargetedSurvey_v3 (31669_0404_FRWLQuality1of2)

Figure 4.5 FRWL Habitat Quality Mapped Across the Project Area (2 of 2)

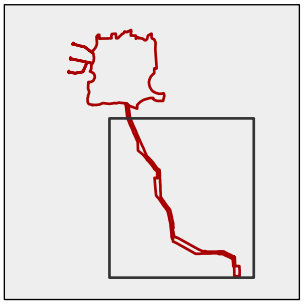
GNWF Project Area

Disturbance Footprint

Habitat Quality

Moderate

Low



31669_R09_FRWLTargetedSurvey_v3 (31669_0405_FRWLQuality2of2)

Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 9:57 AM
Created by: sophie.haswell

GDA2020 MGA Zone 54

N

0 1 2 km

5.0 Discussion

The targeted FRWL survey results indicate that not all areas previously mapped as potential FRWL habitat, across the Disturbance Footprint, the Development Envelope and Project Area, are likely to provide suitable habitat to support the species. The survey also confirmed that some areas previously mapped as potential FRWL habitat based off VAs present in the Project Area, represent unlikely habitat for the species, due largely low density of embedded rocks present, unsuitable soil type and lack of suitable food resources.

The possible and known habitat areas mapped during this targeted survey, are not necessarily contiguous patches of suitable habitat, as some areas had no to low density of rocks for a distance before becoming rocky again. The survey did not allow for this micro-scale mapping of suitable habitat, and therefore, areas of suitable habitat are likely to be overestimated.

Most areas of possible and known habitat have clay soils and extensive rock and grassland cover, providing the FRWL with suitable soil for burrowing into and sheltered areas to traverse and disperse amongst those habitat areas.

Areas not mapped as possible or known habitat were classified as unlikely due to no or low density of rocks, having heavily grazed grasslands or sandy unstable soils. Heavily grazed rocky grasslands were observed to have fewer ant and termite nests, presumably due to less food resources, and more exposure to the elements, resulting in less cover for FRWL to safely disperse. Despite their poor condition at the time of the survey, it is noted that an improvement to conditions, such as rainfall and /or reduction in grazing pressure may increase the suitability of habitat in some areas where stony cover occurs. For this reason, all areas with observable stony cover have been mapped at a minimum, as possible habitat for FRWL.

Although most individuals were found on a north-facing slope, FRWL were also all located during similar weather conditions during midday (i.e. mild, sunny periods during the warmest part of the day). This is likely to represent the ideal autumn survey conditions for the species. Given that some areas were surveyed outside this ideal time, during cool, and overcast early mornings, the non-detection of FRWL elsewhere may be due in part to weather conditions and time of day, rather than their absence from a site/area. The detection of other signs of presence, for example shed skin of FRWL, is considered a proxy for presence of FRWL.

5.1 Disturbance Footprint Impact

The Disturbance Footprint results in an estimated maximum direct impact of 157.56 ha of potentially suitable habitat for the FRWL including 35.17 ha of known habitat (i.e. contiguous patches of suitable habitat intersecting with known records of the species) and 122.39 ha of possible habitat. Both permanent and temporary clearance is considered equally impactful for this species as disturbance to the soil surface, and therefore displacement of stony surface covering is considered a permanent impact to this species.

The quality of habitat being impacted includes up to 65.94 ha of high-quality habitat, 72.75 ha of moderate-quality habitat and 18.87 ha of low-quality habitat, based on the criteria outlined in **Table 4.3**.

The number of individuals impacted in this area is unknown, however, presumed to be low based on the low detection rate observed during the field survey (FRWL to rock ratio of 1:1860 to 1: 2,480 based on live specimens or 1: 372 to 1: 496 including live specimens and shed skins). Given their small size, it is assumed the ability to mobilise away from any construction activities is limited. The boundary of FRWL habitat is arbitrary. It does not end at a definite point and cannot be mapped from aerial imagery. Therefore, the area calculated as impacted FRWL habitat by the linear Disturbance Footprint is likely to be a slight overestimation, where the impact is at the boundary of suitable habitat.

Neoen has prioritised the placement of the Disturbance Footprint in already disturbed areas such as existing access tracks, where possible to minimise disturbance to FRWL, other threatened species and native vegetation. Areas surrounding existing access tracks are likely to be already disturbed (i.e. through dust emissions), so by placing the Disturbance Footprint in these locations, it has reduced the likely potential impact on FRWL habitat further. Other indirect impacts may include noise and vibration disturbance and degradation of habitat from weed incursion.

5.2 Regional Context

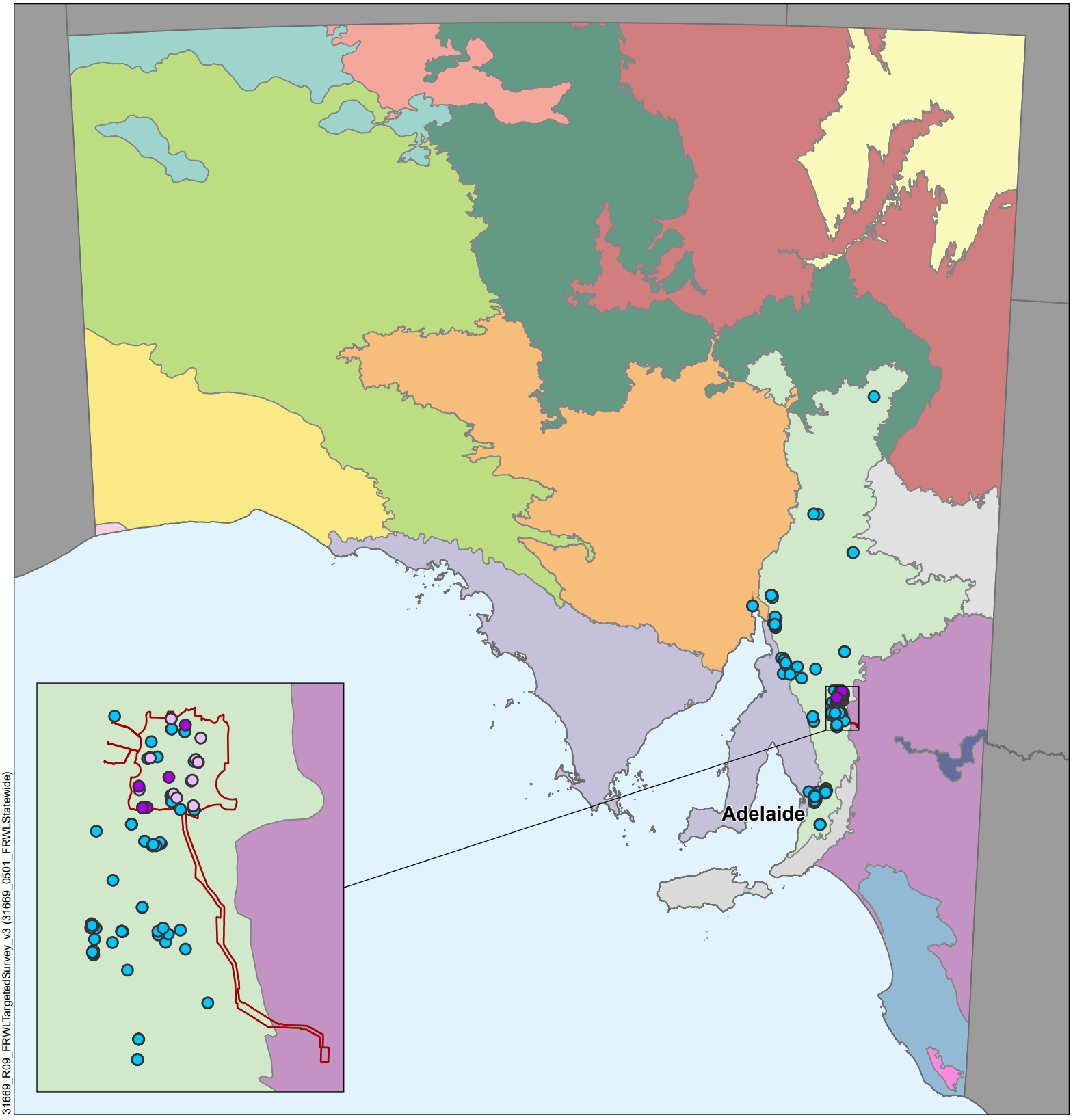
The FRWL has a limited distribution in South Australia. Within the Project Area, the species does not occur in the Murray Mallee subregion but is considered Least Concern and Stable / No Change in the rest of the Project Area. Further afield, in the Mount Lofty Ranges it is considered Rare and in Probable Decline, however in the rest of its known range it is considered Stable (**Table 5.1**).

Table 5.1 Regional Assessment (DEW 2025) for Flinders Ranges Worm-lizard

IBRA Subregion	Status Description	Trending	Area of potential habitat being impacted (ha) for the Project
Olary Spur	Least Concern	Stable / No Change	23.73 ha
Broughton	Least Concern	Stable / No Change	133.83 ha
Southern Flinders	Least Concern	Stable / No Change	Not Present in Project Area
Mount Lofty Ranges	Rare	Probable Decline	Not Present in Project Area
Northern Flinders	Rare	Stable / No Change	Not Present in Project Area
Central Flinders	Rare	Stable / No Change	Not Present in Project Area
Murray Mallee	Does Not Occur	NA	NA

Across its range, the known FRWL populations are disjunct, with populations occurring, from south to north) in the northern suburbs of Adelaide, around Burra, inland from Port Pirie, Mount Remarkable National Park, Mount Brown Conservation Park and from the Ikara-Flinders Ranges National Park (**Figure 5.1**).

Figure 5.1 Regional Context of all Flinders Ranges Worm-lizard recorded in South Australia



GNWF Project Area

Flinders Ranges Worm-lizard record (ALA)

Flinders Ranges Worm-lizard record (Umwelt)

Flinders Ranges Worm-lizard skin (Umwelt)

IBRA Region

- Central Ranges
- Channel Country
- Eyre Yorke Block
- Finke
- Flinders Lofty Block
- Gawler
- Great Victoria Desert
- Hampton
- Kanmantoo
- Murray Darling Depression
- Naracoorte Coastal Plain
- Nullarbor
- Riverina
- Simpson Strzelecki Dunefields
- Southern Volcanic Plain
- Stony Plains

31669_R09_FRWLTargetedSurvey_v3 (31669_0501_FRWLStatewide)

umwelt

Data Source: Umwelt (2025), ESRI (2025), DEW (2022), DIT (2022) Neoen (2025)
Date Exported: 1/10/2025 9:59 AM
Created by: sophie.haswell

GDA2020 South Australia Lambert

0 100 200 km

N

5.3 Significant Impact Assessment

A Significant Impact Assessment for the FRWL, based on the Disturbance Footprint and known information on the extent and occurrence of the species, finds that no significant impact is likely.

Table 5.2 Impact to Flinders Ranges Worm-lizard Assessed Against the Significant Impact Criteria for a Vulnerable Apecies (DotE, 2013)

Significant Impact Criterion	Direct Impact	Indirect Impact	Comments
Lead to a long-term decrease in the size of an important population	No	No	The area surrounding Burra appears to be a stronghold for the FRWL, where there are numerous, scattered recent and historical records of the species occurring, many of which are likely associated with research efforts surrounding the Pygmy Blue-tongue Lizard which often occurs in sympatry with the species (Pelgrim et al. 2014, Hutchinson and Edwards 2000 cited in DEW 2008). Knowledge regarding the species ecology and home range is very limited (DEH, 2008), however, due to their cryptic nature and small size, it is likely they are more abundant / widespread than records suggest. Regardless, due to the physically very small size of the species, it is expected their home range would be extremely localised, resulting in the inability of individuals to migrate away from ground disturbance. No important populations of the species are defined in the Conservation Advice for the species. Given the broadly scattered occurrence of records and widespread habitat in the Project Area, and the location of the Project Area within the centre of their known range, it is unlikely that any localised populations in the Project Area are necessary for the species long term survival and recovery. An estimated potential maximum direct impact area of the Disturbance Footprint 157.56 ha (35.17 ha known and 122.39 ha possible) is proposed. This represents approximately 5.0% of the area of potentially suitable habitat mapped within GNWF more broadly. Indirect impacts from noise and vibration are unknown, while impacts from shadow flicker are unlikely to be relevant to the species due to their nocturnal and subsurface habits. Based on the above information, it is unlikely that the construction of GNWF will lead to a long-term decrease in the size of an important population. Mitigation measures will further ensure that impacts to this species are reduced.
Reduce the area of occupancy of an important population	No	No	The reported AOO for the FRWL is 196 km^2 and EOO of 31,213 km^2 (Chapple, 2017). The impact to species AOO is therefore <0.81% of the reported AOO. Additionally, given the nature of the DF being narrow and linear, it is a low risk that a localised entire population would be impacted, and many individuals would be expected to remain unimpacted in the broader area. Therefore, it is unlikely that the construction of GNWF will reduce the area of occupancy of an important population.

Significant Impact Criterion	Direct Impact	Indirect Impact	Comments
Fragment an existing population into two or more populations	No	No	There are numerous scattered recent and historical records of the species occurring in the area surrounding Burra. Although the species home range may be localised at an individual scale, the nature of the construction of GNWF, being narrow and linearly aligned and avoiding island effects, is unlikely to fragment an existing population.
Adversely affect habitat critical to the survival of a species	No	No	The Conservation Advice does not list any habitat that is critical to the survival of the species. As identified above a maximum of 157.56 ha is proposed to be impacted for the construction of GNWF, which represents approximately 5.0% of the potentially suitable habitat mapped within the Project Area boundary for GNWF (3,152.80 ha).
Disrupt the breeding cycle of an important population	No	No	No important populations are identified for the FRWL. Little is known about the breeding.
Modify, destroy, remove and isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No	No	The Project Area broadly is impacted by agricultural practices including cropping and livestock grazing. The habitat quality is therefore degraded and already subjected to number of ground disturbing activities. The construction of GNWF will not decrease the availability or quality of habitat to the extent the species is likely to decline.
Result in an invasive species that is harmful to a vulnerable species becoming established in the vulnerable species' habitat	No	No	Neoen will ensure that the construction contractor has appropriate weed hygiene measures in place, to be implemented on all construction vehicles prior to entering the site and traversing between properties. Invasive weed species already occur in the site, as it has been utilised for agricultural purposes such as livestock grazing. As such, the area is not considered pristine, and it is unlikely that the works will further assist existing invasive species, nor introduce new ones. Invasive predators (cats and foxes) have already been identified across the Project Area. The works will not result in the establishment of any other pest animal species.
Introduce disease that may cause the species to decline	No	No	There are no known disease or pathogens that may impact the species. Neoen will ensure that the selected construction contractor implements suitable measures to limit and prevent the introduction and spread of introduced plants and pathogens.
Interfere with the recovery of the species	No	No	The construction of GNWF works do not interfere with any proposed recovery actions for the species and does not exacerbate threatening processes that have been identified for the species. Additional survey work undertaken during pre-clearance surveys may assist research priorities to better determine the geographic range of the species and its habitat preferences.

6.0 Recommendations

It is recommended that specific management strategies targeted to avoiding, minimising and mitigating the Project's potential impact on the FRWL be developed and implemented. These strategies should be part of any Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) and may include:

- Pre-construction surveys of the proposed Project infrastructure footprint for FRWL, and relocation of potentially impacted individuals into areas of suitable habitat outside of the proposed clearance area.
- Careful micro siting of infrastructure, based on results of pre-construction surveys, away from areas of high population density and/or known locations of FRWL. Micro siting will need to include additional survey efforts in areas where information is currently lacking.
- Minimising the Disturbance Footprint as far as practicable in FRWL habitat. This may include constructing access roads to the narrowest possible width, turbine hardstands kept to the smallest possible dimensions and incorporating design elements such as routing reticulation along access roads.
- Development and implementation of controls within the CEMP and OEMP to avoid and minimise unintentional and indirect impacts to FRWL during construction and operation of the Project.
- Additional assessments may be required if the design changes and causes impacts in areas which have not been adequately assessed according to the criteria.
- Communicate FRWL (including its importance as an EPBC listed species) and its habitat during construction works project start-up meeting.
- Given the extensive areas of suitable habitat, the cryptic nature of the FRWL and the type of development being proposed, some level of impact on FRWL cannot be avoided. Although a significant impact is not considered likely for this species, preparation and implementation of an offset strategy that provides a benefit to FRWL is likely to be considered favourably from both a State and Commonwealth perspective.

The Project has been referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for determination as to whether it is a controlled action requiring further assessment and approval under the EPBC Act.

7.0 References

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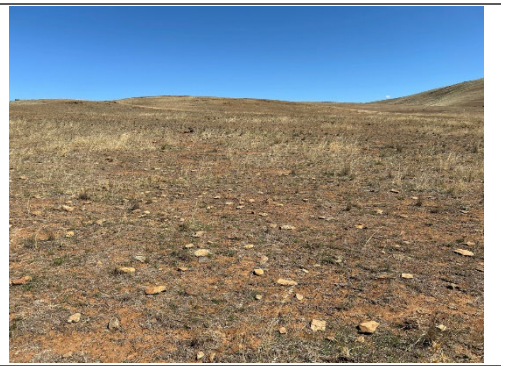
Appendix A

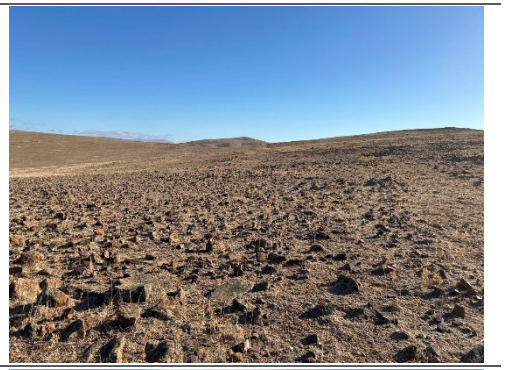
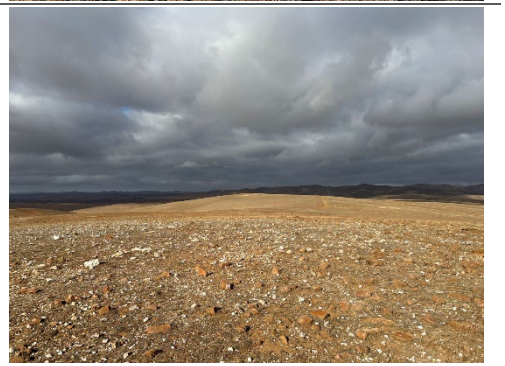
Flinders Ranges Worm-lizard Survey Sites

Table A1. 1 Transects and Quadrats with Evidence of FRWL Occupancy

Survey Quadrat ID	Date	Location		Number of FRWL	FRWL or Skin	Comments	Site Photographs
		Easting	Northing				
Q1	31/03/2025	309405	6277009	1	FRWL	Rocky cover, suitable embedded rocks, surrounded by grassland, termites present.	
T2	31/03/2025	310000	6277084	1	FRWL	Rocky cover, suitable embedded rocks, surrounded by grassland, termites present.	
Q5	30/03/2025	308739	6279854	2	FRWL and Skin	Numerous mid-sized rocks on top of ridge, suitable embedded rocks, surrounded by grassland, termites present.	

Survey Quadrat ID	Date	Location		Number of FRWL	FRWL or Skin	Comments	Site Photographs
		Easting	Northing				
T5	31/03/2025	308814	6279404	1	Skin	Numerous mid-sized rocks on top of ridge, fewer on hill slopes, suitable embedded rocks, surrounded by grassland, termites present.	
Q14	1/04/2025	312708	6281316	1	FRWL	Rocky covering extensive, punctuated by rocky ridges with embedded rocks, surrounded by grassland, termites present.	
Q28	2/04/2025	316681	6286814	1	Skin	Small patch of good rocky habitat, with suitable embedded rocks, surrounded by some poor-quality grassland, termites present.	

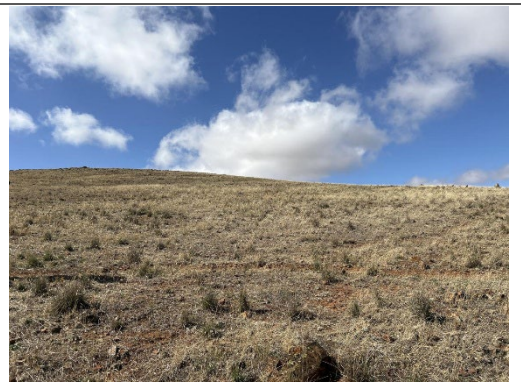
Survey Quadrat ID	Date	Location		Number of FRWL	FRWL or Skin	Comments	Site Photographs
		Easting	Northing				
Q30	2/04/2025	316166	6283910	1	Skin	Rocky covering, suitable embedded rocks, surrounded by grassland, termites present.	
Q33	2/04/2025	314521	6288434	1	FRWL	Rocky covering, suitable embedded rocks, surrounded by grassland, termites present. Historical FRWL record.	
Q34	2/04/2025	312557	6289170	3	Skins	Isolated band of rocks surrounded by minor stony grassland; termites present.	

Survey Quadrat ID	Date	Location		Number of FRWL	FRWL or Skin	Comments	Site Photographs
		Easting	Northing				
Q35	2/04/2025	313440	6279120	1	Skin	Rocky creek bed with steep rocky slopes, suitable rocks with some being embedded. Some grasses, termites present.	
Q37	2/04/2025	315737	6280971	1	Skin	Extremely rocky, suitable embedded rocks surrounded by grassland, termites present.	
Q38	2/04/2025	315863	6281090	1	Skin	Small quartz rocks with some larger embedded ones, minimal grass, termites present.	

Survey Quadrat ID	Date	Location		Number of FRWL	FRWL or Skin	Comments	Site Photographs
		Easting	Northing				
Q43	3/04/2025	316186	6277662	2	Skins	Small patch of rocks, suitable embedded rocks, surrounded by grassland, termites present.	
Q49	3/04/2025	313919	6278606	1	Skin	Small patch of rocks, lots of cow pats, suitable embedded rocks, surrounded by grassland, termites present.	

Table A1. 2 Transects and Quadrats with No Evidence of FRWL Occupancy

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q0	31/03/2025	309944	6284111	Moderate to low. Rocky ridge, many embedded rocks. Photo direction: northwest.	
T1	31/03/2025			Photo direction: south.	

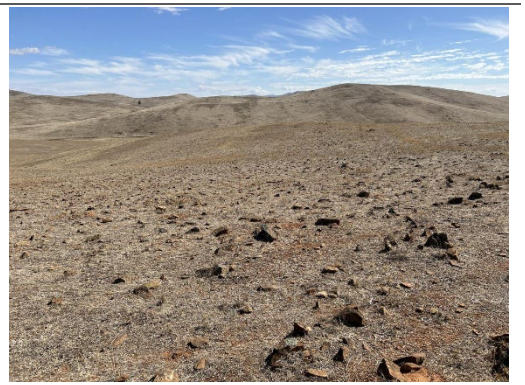
Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q2	01/04/2025	310064	6277151	Exposed, low grass, medium rocks, some outcrop. Photo direction: southwest.	
T2	31/03/2025			Scattered small rocks. Photo direction: south.	

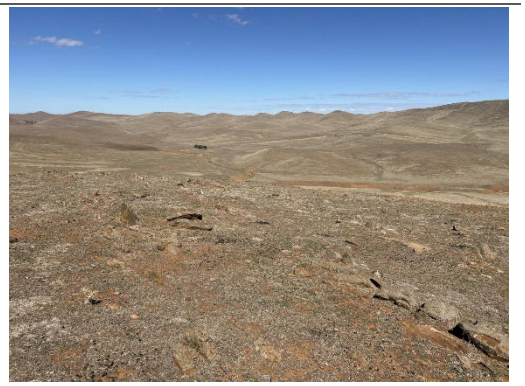
Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q3	02/04/2025	310000	6279415	Moderate habitat. Photo direction: NA.	
Q4	31/03/2025	310238	6278703	Moderate habitat. Photo direction: east.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
T4	31/03/2025			Low quality habitat. Large rocks and small pebbles, few mid-size. sparse and patchy. Photo direction: west.	
T6	31/03/2025			Moderate to good habitat: Lomandra grassland mixed rock sizes, some patchy areas with few rocks. Photo direction: west.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
T7	31/03/2025			Rocky ridge. Photo direction: south.	
Q7	31/03/2025	310042	6283759	Moderate to good habitat. Photo direction: south.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q8	01/04/2025	312192	6283121	Photo direction: southwest.	
T8	31/03/2025			Heavily grazed, but lots of rocks with termites and ants. Photo direction: east.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q9	01/04/2025	311974	6283247	Moderate habitat, mixed rock sizes. Photo direction: NA.	
Q10	01/04/2025	312000	6283544	Small loose surface rocks only. Poor quality habitat. Photo direction: north.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q11	01/04/2025	311784	6281954	Moderate quality, few loose rocks, mostly embedded, but some large suitable. 2x transects mapped, had to spread out to find 200+ rocks. Photo direction: west.	
Q12	01/04/2025	310895	6281469	Photo direction: east.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q13	01/04/2025	312039	6281328	Low quality habitat. 2x separate transects, minimum 150 suitable rocks. Photo direction: west.	
Q15	01/04/2025	313559	6280652	Low quality habitat. Photo direction: NA.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q16	01/04/2025	313444	6281195	Low quality habitat, heavily grazed. Surveyed one larger patch of rocks. Heavily grazed. Photo direction: north.	
Q17	01/04/2025	313706	6283514	Extremely rocky. Photo direction: northeast.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q18	01/04/2025	313667	6283937	Extremely rocky, heavily grazed. Photo direction: northwest.	
Q19	01/04/2025	311865	6284362	Rocky on mid-slopes. Photo direction: northwest.	

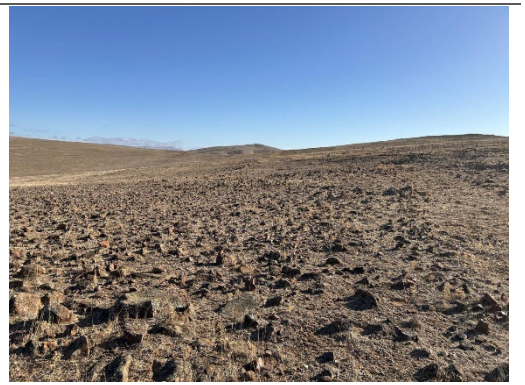
Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q20	01/04/2025	311797	6284944	Good habitat, mixed rock sizes. Photo direction: west.	
Q21	01/04/2025	311813	6286022	Moderate habitat, small to medium scattered loose rocks. Photo direction: north.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q22	1/04/2025	313449	6285870	Quartz rock field. Low quality habitat with lots of embedded rocks. Possible habitat. 2x transects to find suitable rocks. Photo direction: NA.	
Q23	1/04/2025	313446	6285498	Moderate to good habitat, mixed size flat rocks. Photo direction: east.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q24	1/04/2025	313851	6285247	Good quality habitat. Photo direction: north.	
Q25	1/04/2025	314431	6284769	Good habitat but lots of horehound (*Marrubium vulgare*). Photo direction: northeast.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q26	1/04/2025	315497	6285257	Moderate to low habitat quality, rocks sparse but lots of Lomandra and grass cover. Photo direction: north.	
Q27	2/04/2025	315606	6286480	Good habitat, Lomandra grassland on very shaley rock slope. Photo direction: northwest.	

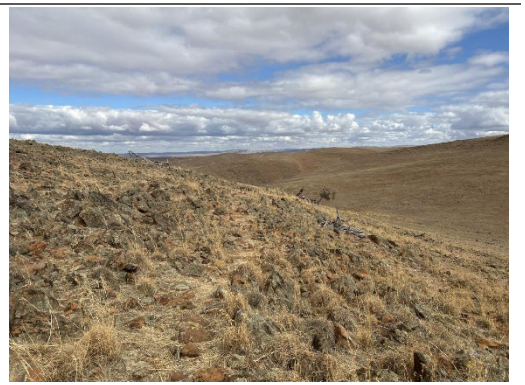
Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q31	2/04/2025	316570	6283585	Patches of excellent habitat. Photo direction: south.	
Q32	2/04/2025	317188	6283383	Moderate to good habitat. Photo direction: north.	

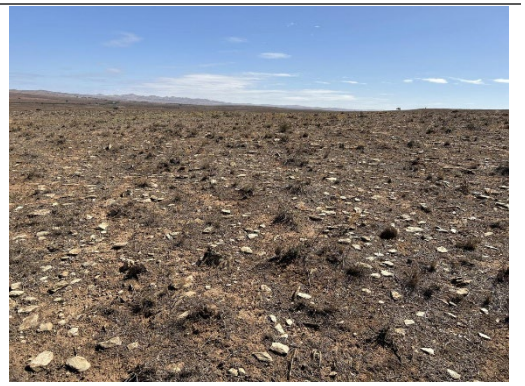
Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q36	2/04/2025	313321	6279753	Rocky ridge isolate. Poor soil quality, loamy rather than clay. Photo direction: south.	
Q37	2/04/2025	315732	6280950	Rocky ridge isolate. Very heavy grazing. Extremely rocky. Photo direction: north.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q39	2/04/2025	314795	6282196	Good habitat, near rocky creek. Photo direction: NA.	
Q40	2/04/2025	310238	6278703	Extremely rocky ridge. Photo direction: north.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q41	03/04/2025	315230	6280281	Photo direction: northeast.	
Q42	03/04/2025	314682	6278573	Low to moderate quality. Loose rocks, small, on steep slope to creek. Photo direction: south.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q45	03/04/2025	316933	6277958	Moderate to good habitat. Photo direction: NA.	
Q46	03/04/2025	316192	6279218	Extremely rocky, low grass cover. Photo direction: south.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q47	03/04/2025	316476	6280107	Rocky slope outcrop with *Cymbopogon* and *Allocasuarina*. Photo direction: south.	
Q48	03/04/2025	308862	6281023	Very grassy, sparse rocks, but good habitat, lots of termites. Nonstandard quadrat due to sparse rock cover. Photo direction: southeast.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q50	04/04/2025	315081	6275877	*Atriplex* plantation, loamy grey soil with shaley rock, may not be suitable. Photo direction: east.	
Q51	04/04/2025	320126	6265193	Moderate to low quality, highly grazed but very rocky. Few termites. Dry and loamy soil. Photo direction: north.	

Survey Quadrat ID	Date	Location		Comments	Site Photographs
		Easting	Northing		
Q52	04/04/2025	323161	6255849	Moderate to low suitability, lots of rocks loose and outcrop but with sandy red soil. Few grasses, lots of shrubs and Lomandra. Photo direction: northeast.	
T10	03/04/2025			Woodland. Lots of woody debris. Soil under logs loose and with leaf litter. Low suitability based on habitat description. Photo direction: east.	

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