ebs ecology

Goyder South Hybrid Renewable Energy Facility - Stage 1

Pygmy Blue-tongue Lizard (Tiliqua adelaidensis) Offset Management Plan

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29 September 2023

Version 5

Prepared by EBS Ecology for Neoen Australia Pty Ltd

Document Control					
Revision No.	**Date issued**	**Authors**	**Reviewed by**	**Date Reviewed**	**Revision type**
1	05/01/2023	EBS Ecology	Dr T. How	05/01/2023	Draft
2	05/01/2023	EBS Ecology	Dr T. How	05/01/2023	Final
3	06/06/2023	EBS Ecology	Dr T. How	06/06/2023	Final
4	15/09/2023	EBS Ecology	Dr T. How	15/09/2023	Final
5	29/09/2023	EBS Ecology	Dr T. How	29/09/2023	Final

Distribution of Copies			
Revision No.	**Date issued**	**Media**	**Issued to**
1	05/01/2023	Electronic	Inès Béchameil, NEOEN Australia Pty Ltd.
2	05/01/2023	Electronic	Inès Béchameil, NEOEN Australia Pty Ltd.
3	06/06/2023	Electronic	Inès Béchameil, NEOEN Australia Pty Ltd.
4	15/09/2023	Electronic	Inès Béchameil, NEOEN Australia Pty Ltd.
5	29/09/2023	Electronic	Inès Béchameil and Ralph Mitchell, NEOEN Australia Pty Ltd.

EBS Ecology Project Number: EX220805 (previously E90101K)

CITATION: EBS Ecology (2023) Goyder South Hybrid Renewable Energy Facility - Stage 1 Pygmy Blue-tongue Lizard (Tiliqua adelaidensis) Offset Management Plan. Report to Neoen Australia Pty Ltd. EBS Ecology, Adelaide.

Cover photograph: A Pygmy Blue-tongue Lizard at the entrance of it's burrow.

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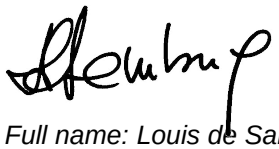
DECLARATION OF ACCURACY

Declaration of Accuracy

In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulation 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this decision.

Signed:



Full name: Louis de Sambucy
Position: Managing Director
Organisation: Goyder Wind Farm 1 Pty Ltd; Goyder Wind Farm 1B Pty Ltd; and Goyder Wind Farm Common Asset Pty Ltd
EPBC Referral Number: 2021/8958; 2021/8957; 2021/8959
Name of Action Management Plan this document and declaration refers to: Goyder South Hybrid Renewable Energy Facility – Stage 1 Pygmy Blue-tongue Lizard (Tiliqua adelaidensis) Offset Management Plan.
Date: 29 September 2023

GLOSSARY AND ABBREVIATION OF TERMS

BDBSA	Biological Databases of South Australia
brumation	A state of torpor (see torpor) exhibited by reptiles.
Business day	A day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.
CEMP	Construction Environmental Management Plan
Clear / Clearing / Clearance	The cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation.
cm	centimetres
Commencement of the action / Commence the action	The first instance of any specified activity associated with the action including **clearing** and **construction**. **Commencement of the action/Commence the action** does not include minor physical disturbance necessary to: i. undertake pre-clearance surveys or monitoring programs; ii. install signage and /or temporary fencing to prevent unapproved use of the project area; iii. protect environmental and property assets from fire, weeds and pests, including installation of temporary fencing, and use of existing surface access tracks; iv. install temporary site facilities for persons undertaking pre-commencement activities so long as these are located where they have no **impact** on the **protected matters**; or v. undertaking geotechnical investigations if it causes only minor physical disturbance and is required well in advance of most site works to inform design.
Commence operation / Commencement of operation	2021/8959: The first instance the transmission line and substation are used for commercial purposes.
Commission / Commissioning	All activities, including turning of turbines, after the components of the first complete wind turbine are installed. The date on which **commission/commissioning** commences is the first date on which the blades of the first completed wind turbine start rotating.
Construct / Construction	The erection of a building or structure that is or is to be fixed to the ground and wholly or partially fabricated on-site; the alteration, maintenance, repair or demolition of any building or structure; preliminary site preparation work which involves breaking of the ground (including pile driving); the laying of pipes and other prefabricated materials in the ground, and any associated excavation work; but excluding the installation of temporary fences and signage.
Cth	Commonwealth

DAWE	Department for Agriculture, Water and the Environment (Australian Government) (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australian Government)
Declared weed	A plant that is regulated under the *Landscape South Australia Act 2019* due to its threat to primary industry, the natural environment and public safety.
Department	The Australian Government agency responsible for administering the **EPBC Act**. At the time of writing this PBTL OMP, DCCEEW is the **Department**.
DEW	Department for Environment and Water (South Australian Government)
DoE	Department of the Environment (now DCCEEW) (Australian Government)
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (Australian Government; now DCCEEW)
EBS Ecology	Environment and Biodiversity Services Pty Ltd – trading as EBS Ecology
Environmental Management Plan Guidelines	The *Environmental Management Plan Guidelines*, Commonwealth of Australia 2014.
environmental offset	A measure that compensates for the residual adverse impacts of an action on the environment (DSEWPC 2012a).
Environmental Offsets Policy	the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, Commonwealth of Australia 2012, or any subsequent official revision produced by the **Department**.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth).
EPBC Offset	An environmental offset to compensate for residual significant impacts.
Goyder South Hybrid Renewable Energy Facility	A renewable energy development located between Burra and Robertstown in the Mid North of South Australia. The Goyder South Hybrid Renewable Energy Facility includes the proposed actions described in the EPBC Act referrals 2021/8957, 2021/8958, 2021/8959 and 2021/8960 (as shown in Figure 1).
Goyder South	Goyder South Hybrid Renewable Energy Facility
GPS	Global Positioning System (a satellite based radionavigation system)
Guide to providing maps and boundary data for EPBC Act projects	The *Guide to providing maps and boundary data for EPBC Act projects*, Commonwealth of Australia 2021.
ha	hectare(s)

Impact	2021/8957: (verb) means to cause any measurable direct or indirect disturbance or harmful change as a result of any activity associated with the action. 2021/8958: (verb) means any event which has the potential to, or does, impact on one or more **protected matter**. 2021/8959: (verb) means to cause any measurable direct or indirect disturbance or harmful change as a result of any activity associated with the action.
IUCN	International Union for Conservation of Nature
km	kilometre(s)
Legal securing mechanism	**T**he legal agreement and/or legally binding mechanism under relevant South Australian state legislation, or equivalent, adopted to provide enduring protection for the offsets against development incompatible with conservation.
LSA Act	*Landscape South Australia Act 2019*
m	metre(s)
Minister	The Australian Government Minister administering the **EPBC Act** including any delegate thereof.
mm	millimetres
MNES	Matters of national environmental significance
MW	Megawatt
NEOEN	NEOEN Australia Pty Ltd
NPW Act	*National Parks and Wildlife Act 1972* (South Australian)
OMP	Offset Management Plan
Operation	2021/8957 and 2021/8958: All activities that occur after the components of the final wind turbine generator are installed. 2021/8959: the usage of the transmission line and substation for the purposes of transforming and/or redistributing electric current.
PBTL	Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*)
PBTL OMP	Goyder South PBTL Offset Management Plan
PBTL Recovery Plan	*Recovery Plan for the Pygmy Bluetongue Lizard Tiliqua adelaidensis* (Duffy *et al.* 2012)
PCC	Pre-clearance check: A detailed and targeted environmental field survey of the proposed infrastructure construction footprint prior to the commencement of ground disturbance works, to identify environmental issues (such as the presence of fauna, particularly threatened fauna, or waterways) that require management prior to and during construction works.
PCQM	Point-centred Quarter Method

Plan(s)	Any of the documents required to be prepared, approved by the **Minister**, implemented by the approval holder and published on the **website** in accordance with the EPBC Act conditions of approval for 2021/8957, 2021/8958 & 2021/8959 (includes action management plans and/or strategies).
Project	The Goyder South Project (incorporating Stage 1A, Stage 1B and the Overhead Transmission Line and Substation West)
Project Area	The area (or boundary) in which the Project will be located, as shown in mapping.
Project Owner	NEOEN Australia Pty Ltd
Protected matter(s)	A matter protected under a controlling provision in Part 3 of the **EPBC Act** for which the 2021/8957, 2021/8958 and 2021/8959 approvals have effect.
residual impact	The remaining, unavoidable impacts (DSEWPC 2012a).
SA	South Australia / South Australian
SEB	Significant Environmental Benefit
Secure / secured / securing	To execute a legal agreement and/or legally binding mechanism under relevant South Australia state legislation, or equivalent, to provide enduring protection for the offsets against development incompatible with conservation.
Significant impact	**Significant impacts** are **impacts** which are important, notable, or of consequence, having regard to their context or intensity, and assessed within the framework of the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1*, Commonwealth of Australia 2013.
sp.	species (singular)
spp.	species (plural)
SPRAT	Species Profile and Threats
Torpor	A state of decreased physiological activity in an animal, usually by reduced body temperature and metabolic rate, which enables animals to survive extended cold periods, particularly the winter months.
Website	A set of related web pages located under a single domain name attributed to the approval holder and available to the public.
WTG(s)	Wind Turbine Generator(s)

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1 INTRODUCTION

NEOEN Australia Pty Ltd (NEOEN) is contracted by Goyder Wind Farm 1 Pty Ltd; Goyder Wind Farm 1B Pty Ltd; and Goyder Wind Farm Common Asset Pty Ltd to ensure compliance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approvals on behalf of the Goyder South Hybrid Renewable Energy Facility (the Goyder South Project; the Project). EPBC Act approval has been obtained to clear Pygmy Blue-tongue Lizard (PBTL; *Tiliqua adelaidensis)* habitat within the Stage 1A (EPBC 2021/8958), Stage 1B (EPBC 2021/8957) and Common Asset (Overhead Transmission Line (OTL) and Substation) (EPBC 2021/8959) components of the Project. The clearance of PBTL habitat is likely to have a residual significant impact on the PBTL. As such, NEOEN propose to establish and implement on-ground offset areas to offset impacts and achieve a measurable conservation gain for the PBTL, which is listed as Endangered under the EPBC Act.

As these impacts cannot be fully avoided or mitigated, an environmental offset is required in accordance with the EPBC Act, which is referred to as an EPBC Offset, to compensate for the residual impact on PBTL. Individual EPBC Offsets are required for Stage 1A, Stage 1B, and the Common Asset (OTL and Substation), and are proposed to be achieved via the establishment and implementation of on-ground PBTL Offset Areas that aim to provide a measurable conservation gain for the PBTL. As such, this *Goyder South Hybrid Renewable Energy Facility – Stage 1 Pygmy Blue-tongue Lizard (Tiliqua adelaidensis) Offset Management Plan* (PBTL OMP) has been prepared to guide the establishment, implementation and management of the three PBTL EPBC Offsets.

This PBTL OMP provides background information on the Goyder South Project, relevant EPBC Act approval conditions, relevant policies and documents, general information on PBTL, known and/or potential threats to PBTL, occurrence of PBTL within the Goyder South Project Area and residual significant impacts to PBTL associated with the Goyder South Project. Then it provides details on the proposed PBTL Offsets, including calculation of the required offsets, information on the proposed PBTL Offset Areas, protection of the proposed PBTL Offset Areas, known and/or potential threats to the PBTL Offset Areas and consistency with the EPBC Offsets Policy. Lastly, this PBTL OMP details the specific management aspects and associated management actions to establish, implement, manage and monitor the PBTL Offsets and PBTL Offset Areas to ensure that a measurable conservation gain is achieved for the PBTL.

2 BACKGROUND

NEOEN is developing the Goyder South Project between Burra and Robertstown in the Mid North of South Australia (SA). The Project combines wind, solar and energy storage in one integrated project and will be capable of delivering a steady, reliable, dispatchable output of power throughout the day and night. The Goyder South Project will generate more than 4,800,000 MWh of power annually and is comprised of:

- A wind farm of up to 163 turbines with a capacity of up to 1200 Megawatts (MW), a maximum hub height of 121 metres (m), a maximum blade length of 78 m and an overall maximum height (tip height) of 199 m;
- A solar farm (across two sites) of up to 3000 hectares (ha) of solar panels with a capacity of up to 600 MW;
- An energy storage facility (lithium-ion battery) with a capacity of up to 900 MW / 1,800 MWh (2 hours);
- Associated infrastructure for connection to the electricity grid including three substations, access tracks, underground connection cabling and overhead transmission lines;
- Permanent operations and maintenance compounds;
- Temporary construction compounds for both wind and solar components, including concrete batching plants; and
- A number of meteorological masts (in addition to those already on the site) to record wind speed and other meteorological data, both pre- and post- construction.

As the Goyder South Project will total up to $3 billion in investment, NEOEN propose to implement the Project in stages, with each stage having its own legal entity, construction contracts and financing packages. An overview of each stage currently proposed for development, along with the corresponding EPBC approvals sought and obtained is outlined in Table 1. Note that a variation to the conditions attached to the EPBC Act approval for the Common Asset (Overhead Transmission Line (OTL) and Substation) was received, as outlined in Table 1.

Table 1. Current proposed stages and corresponding EPBC approvals for the Goyder South Project.

Project Stage / Proposed Action	Legal Entity	EPBC Referral Reference	EPBC Referral Decision	Date EPBC Approval Received
Stage 1A (38 WTGs and associated infrastructure)	Goyder Wind Farm 1A Pty Ltd	2021/8958	Controlled Action	5/07/2022
Stage 1B (37 WTGs and associated infrastructure)	Goyder Wind Farm 1B Pty Ltd	2021/8957	Controlled Action	15/08/2022
Common Asset (OTL and Substation)	Goyder Wind Farm Common Asset Pty Ltd	2021/8959	Controlled Action	22/08/2022
			Variation of conditions attached to approval	Variation received 19/12/2022
Battery	NEOEN Australia Pty Ltd	2021/8960	Not a Controlled Action	N/A

Each of the currently proposed stages of the Project are shown in Figure 1. Other components of the Goyder South Project, including the remaining wind farm areas, the two solar farms, overhead transmission lines and substations are considered to be potential future stages as they are not currently commercially viable and there is currently no immediate prospect of these components/stages proceeding to construction.

As outlined previously, an individual PBTL EPBC Offset is required for each of Stage 1A, Stage 1B and the Common Asset (OTL and Substation), to compensate for the residual impact on PBTL. However, no PBTL EPBC Offset is required for the Battery.

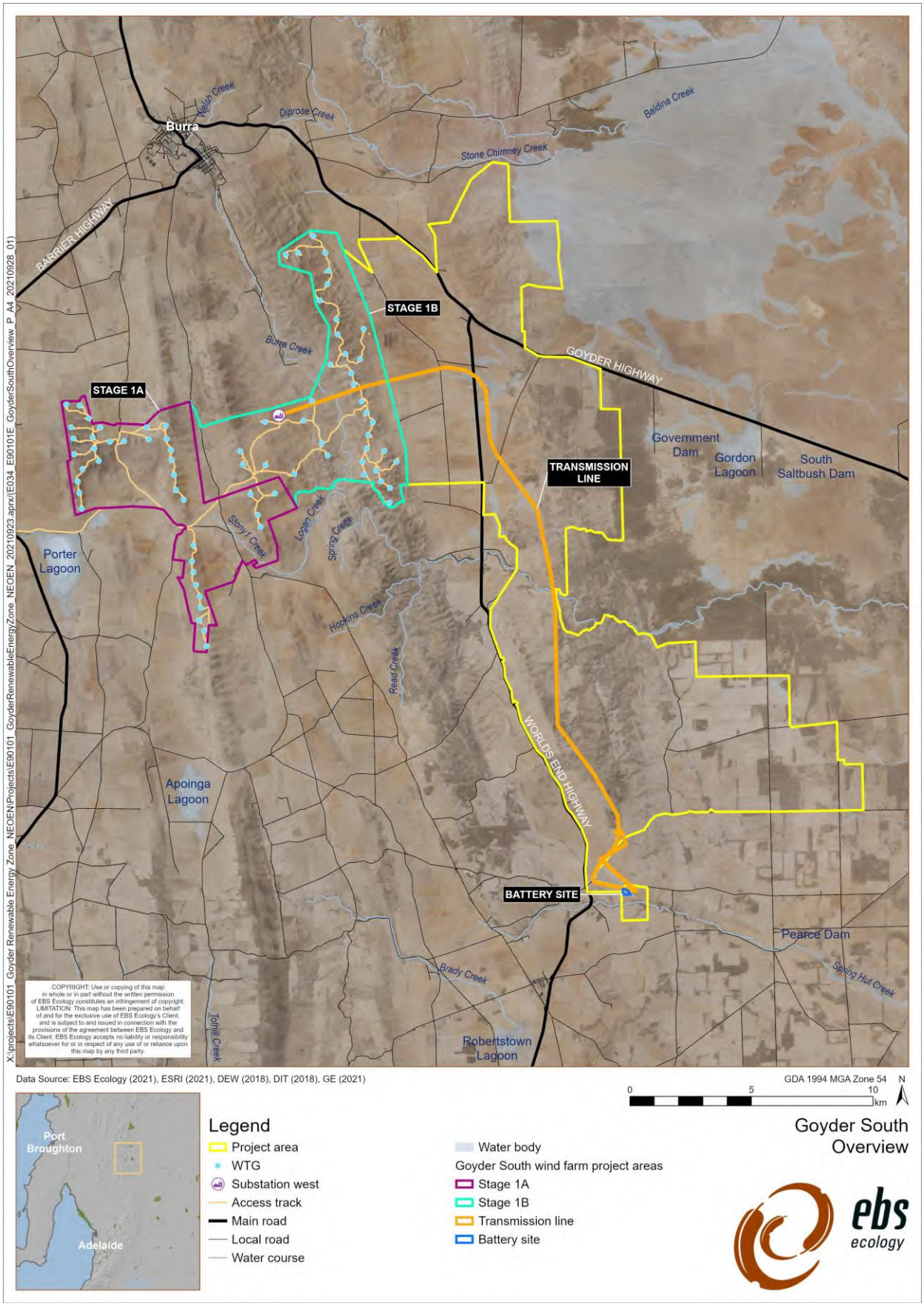

Figure 1. Current proposed stages of the Goyder South Project.

2.1 Previous reports

The following reports and documentation should be referred to for important background and supporting information:

- *Goyder South Hybrid Renewable Energy Facility Flora and Fauna Assessment* (EBS Ecology 2020)
- *Goyder – Pygmy Bluetongue Lizard Survey March 2021* (EBS Ecology 2021)
- *Goyder South Hybrid Renewable Energy Facility: Stage 1A Preliminary Documentation* (EPBC 2021/8958) (EBS Ecology 2022a)
- *Goyder South Hybrid Renewable Energy Facility: Stage 1B Preliminary Documentation* (EPBC 2021/8957) (EBS Ecology 2022b)
- *Goyder South Hybrid Renewable Energy Facility: Overhead Transmission Line and Substation West Preliminary Documentation (EPBC 2021/8959)* (EBS Ecology 2022c)
- *Goyder South Hybrid Renewable Energy Facility OTL and Substation EPBC Approval Variation Request (EPBC 2021/8959)* (EBS Ecology 2022e)
- *Goyder Wind Farm Construction Environmental Management Plan* (CEMP) (Succession Ecology 2023a)
- *Flora and Fauna Management Plan: Goyder South Hybrid Renewable Energy Facility Sub-Stage A: Windfarm Stages 1A and 1B* (FFMP) (Succession Ecology 2023b)
- *Goyder South Hybrid Renewable Energy Facility PBTL Management Plan* (EBS Ecology 2023)
- *Goyder South Hybrid Renewable Energy Facility PBTL Translocation Plan* (EBS Ecology 2022d)

2.2 EPBC Act approval conditions

The Stage 1A (2021/8958), Stage 1B (2021/8957) and Common Asset (OTL and Substation) (2021/8959) EPBC Act approvals have specific conditions of approval outlining the requirement for environmental offsets and in particular, an Offset Management Plan (OMP) to compensate for residual significant impacts to the PBTL. As such, this document has been prepared to satisfy the requirement for an OMP and outline the environmental offsets that will be implemented to compensate for residual impact to the PBTL associated with the Goyder South Project. The conditions of approval associated with the OMP are presented in Table 2, along with references to sections within this report with corresponding information.

Table 2. Relevant conditions of Approval for Stage 1A (2021/8958), Stage 1B (2021/8957) and the Common Asset (OTL and Substation) (2021/8959 – variation 19/12/2022).

Stage 1A (2021/8958)	Reference in this PBTL OMP	Stage 1B (2021/8957)	Reference in this PBTL OMP	Common Asset (OTL and Substation) (2021/8959) (variation 19/12/2022)	Reference in this PBTL OMP
Construction/clearance limits 1. To minimise **impacts** to **protected matters**, the approval holder must not: **clear** more than 8.04 ha of **Pygmy Blue-tongue Lizard habitat** within the **project area**;	N/A – provided for general information.	**Construction/clearance limits** **1. To minimise impacts to protected matters**, the approval holder must not: **clear** more than 2.61 ha of **Pygmy Blue-tongue Lizard habitat** within the **project area**;	N/A – provided for general information.	**Impact limits** **2.** The approval holder must not: ab) clear more than 3.88 ha of **Pygmy Blue-tongue Lizard habitat** within the **project area**;	N/A – provided for general information.
Environmental offsets *Offset Management Plan* 6. To compensate for residual **significant impacts** to the **Pygmy Blue-tongue lizard** and the **Iron-grass Natural Temperate Grassland of South Australia TEC**, the approval holder must submit to the **Department** for the **Minister's** approval an Offset Management Plan (OMP) within 6 months of the date of this approval. The OMP must:	This document is the PBTL OMP. A separate document is the INTG TEC OMP.	**Environmental offsets** 5. To compensate for residual **significant impacts** to the **Pygmy Blue-tongue lizard**, the approval holder must submit to the **Department** for the **Minister's** approval an Offset Management Plan (OMP) within 6 months of the date of this approval. The OMP must:	This document is the PBTL OMP. A separate document is the INTG TEC OMP.	**Environmental offsets** *Offset Management Plan* 4. To compensate for residual **significant impacts** to the **Iron-grass Natural Temperate Grassland of South Australia TEC**, **Pygmy Blue-tongue Lizard**, and any other **protected matters**, the approval holder must submit to the **Department** for the **Minister's** approval an Offset Management Plan (OMP) within 6 months of the date of this approval. The OMP must:	This document is the PBTL OMP. A separate document is the INTG TEC OMP.
a. be consistent with the **Environmental Management Plan Guidelines**;	Section 2.4.1	a. be consistent with the **Environmental Management Plan Guidelines**;	Section 2.4.1	a. be consistent with the **Environmental Management Plan Guidelines**;	Section 2.4.1
b. include a reference to the **EPBC Act** approval conditions to which the OMP refers;	This table.	b. include a reference to the **EPBC Act** approval conditions to which the OMP refers;	This table.	b. include a reference to the **EPBC Act** approval conditions to which the OMP refers;	This table.
c. include summary information on the residual **significant impacts** to the **Pygmy Blue-tongue Lizard** and the **Iron-grass Natural Temperate Grassland of South Australia TEC** that will be compensated for by the offset(s);	Section 3.6	c. include summary information on the residual **significant impacts** to the **Pygmy Blue-tongue Lizard** that will be compensated for by the offset(s);	Section 3.6	c. include summary information on the residual **significant impacts** to the **Iron-grass Natural Temperate Grassland of South Australia TEC, Pygmy Blue-tongue Lizard**, and any other **protected matters**, that will be compensated for by the offset(s);	Section 3.6
d. identify a suitable environmental offset(s) to compensate for residual **significant impacts** to the **Pygmy Blue-tongue lizard** and the **Iron-grass Natural Temperate Grassland of South Australia TEC** that meets the requirements of the **Environmental Offsets Policy** to the satisfaction of the **Minister**;	Section 4 (including sub-sections)	d. identify a suitable environmental offset(s) to compensate for residual **significant impacts** to the **Pygmy Blue-tongue lizard** that meets the requirements of the **Environmental Offsets Policy** to the satisfaction of the **Minister**;	Section 4 (including sub-sections)	d. identify a suitable environmental offset(s) to compensate for residual **significant impacts** to the **Iron-grass Natural Temperate Grassland of South Australia TEC, Pygmy Blue-tongue Lizard**, and any other **protected matters**, which meets the requirements of the **Environmental Offsets Policy** to the satisfaction of the **Minister**;	Section 4 (including sub-sections)
		e. include the size of the proposed offset(s) in hectares, maps that visually describe the location and the accurate boundaries of the offset(s), in accordance with the **Guide to providing maps and boundary data for EPBC Act projects**, and detailed baseline habitat quality information on the proposed offset(s);	Section 4 (including sub-sections)	e. include the size of the proposed offset(s) in hectares, maps that visually describe the location and accurate boundaries of the offset(s), in accordance with the **Guide to providing maps and boundary data for EPBC Act projects**, and detailed baseline habitat quality information on the proposed offset(s);	Section 4 (including sub-sections)
e. include detailed baseline habitat quality information on the proposed offset(s);	Section 4 (including sub-sections)	f. specify the nature and timing of the proposed legal mechanism to **secure** the offset area(s), with proposed contingency measures for if the specified legal mechanism is not established within the specified timeframe;	Section 4.7	f. specify the nature and timing of the proposed legal mechanism to **secure** the offset area(s), with proposed contingency measures for if the specified legal mechanism is not established within the specified timeframe;	Section 4.7
f. commit to achievable ecological benefits and provide timeframes for their achievement;	Section 6.1 and Section 6.3 (including sub-sections)	g. commit to measurable and achievable ecological benefits and provide timeframes for their achievement;	Section 6.1 and Section 6.3 (including sub-sections)	g. commit to measurable and achievable ecological benefits and provide timeframes for their achievement;	Section 6.1 and Section 6.3 (including sub-sections)
g. detail how the offset(s) will be protected, and ecological benefits maintained;	Section 4.7 and Section 6.1 (including sub-sections)	h. detail how the offset(s) will be protected, and how ecological benefits will be maintained once achieved;	Section 4.7 and Section 6.1 (including sub-sections)	h. detail how the offset(s) will be protected, and how ecological benefits will be maintained once achieved;	Section 4.7 and Section 6.1 (including sub-sections)
h. describe the monitoring program(s) to be implemented that will determine progress towards attainment of and maintenance of the ecological benefits at the proposed offset(s), which must include: i. measurable performance indicators to monitor attainment of the ecological benefits; ii. trigger values for corrective actions; and iii. the timing and frequency of monitoring to detect trigger values and changes in the performance indicators.	Section 6.5 (including sub-sections)	i. detail a monitoring program which will determine progress towards achievement and maintenance of the ecological benefits of the proposed offset(s), which must include: i. measurable performance indicators to monitor the progress of the offset towards the achievement of the ecological benefits; ii. trigger values for corrective actions; and iii. the timing and frequency of monitoring to detect trigger values and changes in the performance indicators.	Section 6.5 (including sub-sections)	i. detail a monitoring program which will determine progress towards achievement and maintenance of the ecological benefits of the proposed offset(s), which must include: i. measurable performance indicators to monitor the progress of the offset towards the achievement of the ecological benefits; ii. trigger values for corrective actions; and iii. the timing and frequency of monitoring to detect trigger values and changes in the performance indicators.	Section 6.5 (including sub-sections)

i. include an assessment of risks to achieving the ecological benefit(s) and what risk management strategies will be applied to address these;	Section 6.4	j. include an assessment of risks to achieving the ecological benefit(s) and what risk management strategies will be applied to address these;	Section 6.4	j. include an assessment of risks to achieving the ecological benefit(s) and what risk management strategies will be applied to address these;	Section 6.4
j. specify how and at what frequency offset(s) management results, monitoring program findings and assessments of ecological benefits will be reported to the **Department** and the public;	Section 6.3.9	k. specify how and at what frequency offset(s) management results, monitoring program findings and assessments of ecological benefits will be reported to the **Department** and the public;	Section 6.3.9	k. specify how and at what frequency offset(s) management results, monitoring program findings and assessments of ecological benefits will be reported to the **Department** and the public;	Section 6.3.9
k. propose corrective actions to ensure ecological benefits are attained or maintained, if trigger values are reached or performance indicators not attained;	Section 6.3.11	l. propose corrective actions if trigger values are reached, or if performance indicators are not attained, to ensure ecological benefits are achieved and maintained once achieved;	Section 6.3.11	l. propose corrective actions, if trigger values are reached, or if performance indicators are not attained, to ensure ecological benefit (sic) are achieved and maintained once achieved;	Section 6.3.11
l. include links to referenced **plans** and applicable conditions of approval (including State approval conditions), if any; and	Section 2.1	m. include links to referenced plans and applicable conditions of approval (including State approval conditions), if any; and	Section 2.1	m. include links to referenced **plans** and applicable conditions of approval (including State approval conditions), if any; and	Section 2.1
m. specify and justify the period for which the OMP will be implemented.	Section 6.3.1	n. justify and specify the period for which the OMP will be implemented.	Section 6.3.1	n. specify and justify the period for which the OMP will be implemented.	Section 6.3.1
The approval holder must not commence **commissioning** until the OMP has been approved by the **Minister** in writing. The approval holder must implement the approved OMP for the period specified in the approved OMP.	N/A	The approval holder must not commence **commissioning** until the OMP has been approved by the **Minister** in writing. The approval holder must implement the approved OMP for the period specified in the approved OMP.	N/A	The approval holder must not **commence operation** until the OMP has been approved by the **Minister** in writing. The approval holder must implement the approved OMP for the period described in the approved OMP.	N/A
7. If the OMP (required under Condition 6) has not been approved by the **Minister** in writing within 18 months of the date of this approval, and the **Minister** notifies the approval holder that the submitted OMP is not suitable for approval, the **Minister** may, at least 2 months after so notifying the approval holder, approve a version of the OMP revised by the **Department**.	N/A	6. If the OMP (required under Condition 5) has not been approved by the **Minister** in writing within 18 months of the date of this approval, and the **Minister** notifies the approval holder that the submitted OMP is not suitable for approval, the **Minister** may, at least 2 months after so notifying the approval holder, approve a version of the OMP revised by the **Department**.	N/A	5. If the OMP (required under Condition 4) has not been approved by the **Minister** in writing within 18 months of the date of this approval, and the **Minister** notifies the approval holder that the submitted OMP is not suitable for approval, the **Minister** may, at least 2 months after so notifying the approval holder, approve a version of the OMP revised by the **Department**.	N/A
8. The approval holder must provide written evidence to the **Department** that the offset site(s) required under the approved OMP has/have been acquired and secured within 12 months of the OMP approval date. The written evidence must identify the **legal securing mechanism** by which each offset site will be permanently protected for conservation.	N/A	7. The approval holder must provide written evidence to the **Department** that the offset site(s) required under the approved OMP has/have been acquired and **secured** within 12 months of the OMP approval date. The approval holder must provide written evidence to the **Department** identifying the **legal securing mechanism** by which each offset site will be permanently protected for conservation within 10 business days of **securing** the offset.	N/A	6. The approval holder must provide written evidence to the **Department** that the offset site(s) required under the approved OMP has/have been acquired and secured within 12 months of the OMP approval date. The approval holder must provide written evidence to the **Department** identifying the **legal securing mechanism** by which each offset site will be permanently protected for conservation within 10 **business days** of **securing** the offset.	N/A
Note: The approval holder may choose to submit separate Offset Management Plans (OMPs) for the **Pygmy Blue-tongue Lizard** and the **Iron-grass Natural Temperate Grassland of South Australia TEC** instead of a single OMP.	The approval holder has chosen to do this.				
Note: The approval holder may choose to combine the OMPs required as conditions of approval for other proposed elements of the **Goyder South Hybrid Renewable Energy Facility** for the same **protected matters**. In this case, the approval holder must clearly demonstrate how the offset requirement(s) for each individual proposed element is being met and identify unique offset area(s) for each approved action geospatially.	The approval holder has chosen to do this.	**Note:** The approval holder may choose to combine the OMPs required as conditions of approval for other proposed elements of the **Goyder South Hybrid Renewable Energy Facility**. In this case, the approval holder must clearly demonstrate how the offset requirement(s) for each individual proposed element is being met and identify unique offset area(s) for each approved action geospatially.	The approval holder has chosen to do this.	**Note:** The approval holder may choose to combine the OMPs required as conditions of approval for other proposed elements of the G**oyder South Hybrid Renewable Energy Facility**. In this case, the approval holder must clearly demonstrate how the offset requirement(s) for each individual proposed element is being met and identify unique offset area(s) for each approved action geospatially.	The approval holder has chosen to do this.

2.3 Objectives

The objectives of this PBTL OMP are to guide the establishment, implementation and management of the three PBTL EPBC Offsets and ensure the relevant EPBC approval conditions are met. More specific objectives of this PBTL OMP include (but are not limited to):

- Provide general information on the ecology and biology of the PBTL and factors to consider, including known and/or potential threats to the species, when establishing, implementing and managing the offsets;
- outline the residual impacts of the Goyder South Project on PBTL that require environmental offsets;
- outline the type of offsets being implemented;
- outline the calculation of the required offsets and provide the completed Offsets Assessment Guide for each offset required, including further discussion/justification for the figures used to complete the offset calculations;
- outline important details for each offset, including the method of securing and managing the offsets;
- outline the conservation gain to be achieved by the offsets (including positive management strategies that improve the sites and/or avert the future loss or degradation of PBTLs);
- outline the management objectives, implementation responsibilities, management aspects and associated management actions, as well as monitoring and reporting, corrective actions, adaptive management, risk management and the review and update schedule associated with this PBTL OMP; and
- demonstrate how the offsets are consistent with the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy, (DSEWPC 2012a).

2.4 Relevant polices and documents

This PBTL OMP has been prepared in accordance with the following relevant policies and documents:

- *Environmental Management Plan Guidelines* (DoE 2014);
- *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPC 2012a) referred to herein as the EPBC Offsets Policy;
- *EPBC Offsets Assessment Guide* (the guide) (DSEWPC 2012b);
- *How to Use the Offsets Assessment Guide* (DSEWPC undated);
- *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* (Maseyk *et al*. 2017);
- *Recovery Plan for the Pygmy Bluetongue Lizard Tiliqua adelaidensis* (Duffy et al. 2012) referred to herein as the PBTL Recovery Plan;
- *Pygmy Bluetongue Lizards: Best Practice Management Guidelines for Landholders* (Schofield 2006);

- *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DSEWPC 2011);
- *Guidelines for biological survey and mapped data* (Commonwealth of Australia 2018);
- *Guide to providing maps and boundary data for EPBC Act projects* (DAWE 2021).

A brief overview of the Environmental Management Plan Guidelines, the EPBC Offsets Policy and the PBTL Recovery Plan is provided further below.

2.4.1 Environmental Management Plan Guidelines

This PBTL OMP has been prepared in accordance with the Australian Government Department of the Environment Environmental Management Plan Guidelines (DoE 2014). The Environmental Management Plan Guidelines provide general guidance to stakeholders preparing environmental management plans for environmental impact assessments and approvals under Chapter 4 of the EPBC Act.

2.4.2 EPBC Offsets Policy

This PBTL OMP has been prepared in accordance with the EPBC Offsets Policy (DSEWPC 2012a). The EPBC Offsets Policy outlines eight overarching Offset Principles that are applied in determining the suitability of offsets, as follows:

Suitable offsets must:

1. deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action
2. be built around direct offsets but may include other compensatory measures
3. be in proportion to the level of statutory protection that applies to the protected matter
4. be of a size and scale proportionate to the residual impacts on the protected matter
5. effectively account for and manage the risks of the offset not succeeding
6. be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs
7. be efficient, effective, timely, transparent, scientifically robust and reasonable
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced

Information on how the proposed Stage 1A, Stage 1B and Common Asset (OTL and Substation) offsets are consistent with these Offset Principles is provided in Section 5.

2.4.3 PBTL Recovery Plan

The long-term vision of the PBTL Recovery Plan is to achieve down-listing of the PBTL to conservation dependent (Duffy *et al.* 2012). As such, the PBTL Recovery Plan contains seven specific objectives and associated actions, which are outlined in Table 3.

Table 3. PBTL Recovery Plan objectives and associated recovery actions.

PBTL Recovery Plan Objective	PBTL Recovery Plan Recovery Action
Objective 1: Protect existing Pygmy Bluetongue populations and habitat.	Action 1.1. Ensure landholders and relevant agencies are aware of, and protect, known Pygmy Bluetongue populations and their habitat.
	Action 1.2 Encourage private land conservation agreements and other measures to secure protection of Pygmy Bluetongue populations and habitat.
	Action 1.3 Undertake threat and risk assessment of known Pygmy Bluetongue populations.
Objective 2: Clarify distribution and abundance.	Action 2.1 Determine the extent and size of known Pygmy Bluetongue populations.
	Action 2.2 Identify and map potential habitat.
	Action 2.3 Search additional potential habitat for new populations.
Objective 3: Maintain, enhance and increase the area and quality of suitable habitat for Pygmy Bluetongues at known locations.	Action 3.1 Work with landholders to implement Best Practice Management Guidelines.
	Action 3.2 Implement measures to increase suitable Pygmy Bluetongue habitat at known populations.
Objective 4: Monitor populations to evaluate the effectiveness of management and to detect trends which may require a management response.	Action 4.1 Continue to undertake (and refine as required) long-term population monitoring at selected sites.
	Action 4.2 Maintain (and refine as required) systems for data collection and management.
Objective 5: Fill critical knowledge gaps to help guide adaptive management and recovery of the species.	Action 5.1 Prioritise, promote and conduct key research projects needed to guide improved recovery outcomes.
	Action 5.2 Undertake land management trials to refine regimes required to improve habitat quality.
	Action 5.3 Continue efforts to establish a captive breeding population.
Objective 6: Continue to engage the community and form partnership to promote the significance and improved management requirements of the Pygmy Bluetongue Lizards.	Action 6.1 Promote community awareness and ownership of, and involvement in, the recovery of the Pygmy Bluetongue Lizards.
	Action 6.2 Establish a network of local mentors and champions to help drive and promote improved recovery of Pygmy Bluetongue populations and engage the community in recovery activities.
Objective 7: Manage the recovery process through an effective recovery team.	Action 7.1 Maintain an effective recovery team which supports, guides and evaluates the implementation and outcomes of the recovery plan.

Part H of the PBTL Recovery Plan outlines some of the major recommendations from the *Pygmy Bluetongue Lizards: Best Practice Management Guidelines for Landholders* (Schofield 2006, in Duffy *et al.* 2012) in relation to management practices for the conservation of the PBTL, associated with the following:

- Grazing regimes;
- Insect control practices;
- Weed control;
- Fire;
- Tree planting; and
- Fertilisers.

Refer to the PBTL Recovery Plan (Duffy *et al.* 2012) for more information.

This PBTL OMP aims to be consistent with the objectives of the PBTL Recovery Plan, where possible.

3 PYGMY BLUE-TONGUE LIZARD

3.1 Conservation status

The PBTL (Figure 2) is listed as Endangered under the EPBC Act and Endangered under the South Australian *National Parks and Wildlife Act 1972* (NPW Act). These classifications are consistent with the International Union for Conservation of Nature (IUCN) (2001) criteria for listing species on the IUCN Red List System (Duffy *et al.* 2012).

Figure 2. A Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*). Photo by EBS Ecology.

3.2 EPBC legal status and associated documents

The EPBC Act legal status and associated documents for PBTL, as provided within DAWE's Species Profile and Threats (SPRAT) Database (online) SPRAT Profile for PBTL, are presented in Table 4.

Table 4. EPBC Act legal status and associated documents for PBTL.

EPBC Act Listing Status	Listed as Endangered
Approved Conservation Advice	There is no approved Conservation Advice for this species.
Listing Advice	There is no Listing Advice for this species.
Recovery Plan Decision	Recovery Plan required, this species had a recovery plan in force at the time the legislation provided for the Minister to decide whether or not to have a recovery plan (19/02/2007).
Adopted/Made Recovery Plans	Duffy, A., L. Pound & T. How (2012). Recovery Plan for the Pygmy Bluetongue Lizard Tiliqua adelaidensis. Department of Environment and Natural Resources, South Australia. In effect under the EPBC Act from 24 July 2012.
Adopted/Made Threat Abatement Plans	No Threat Abatement Plan has been identified as being relevant for this species.

Source: DAWE 2021.

3.3 Ecology and biology

3.3.1 Description

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

3.3.2 Distribution

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

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

3.3.3 Habitat

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

3.3.4 Populations

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

More recently, due to the PBTL Recovery Plan efforts, university studies and proposed wind farm flora and fauna assessments, surveys of PBTLs have increased. Despite this, overall population size is hard to estimate due to natural fluctuations.

3.3.5 Behaviour

PBTLs use unoccupied burrows of trapdoor (Mygalomorphae) and wolf (Lycosidae) spiders as refuges, basking sites and ambush points (Milne, Bull & Hutchinson 2003). The burrow entrances are circular in cross section, up to 20 millimetres (mm) in diameter, and lack any sign of excavated soil at the entrances (Hutchinson *et al.* 1994). The average depth of burrows is approximately 25 centimetres (cm), ranging from 10 to 75 cm (Souter *et al*. 2007).

PBTLs make no obvious external modifications to the burrows, except for a slight bevelling of the edges caused by their movement in and out of the burrows (Hutchinson *et al.* 1994). Burrow entrances are used as vantage points from which PBTLs are able to make short forays after any prey detected nearby. PBTLs are extremely sensitive to both movement and noise, retreating to their burrow if disturbed. They may deposit scats near the perimeter of the burrow entrance (Fenner & Bull 2010). Only one adult PBTL is found in each active burrow and individuals may utilise the same burrow for extended periods of time, with one study observing burrows occupied by the same individual for at least a two-year period (Bull *et al.* 2015).

Figure 3. A PBTL at the entrance of its burrow.

Figure 4. Adult and two juvenile PBTLs in a burrow.

3.3.6 Diet

PBTLs are omnivorous, mostly feeding on medium-sized arthropods that they ambush from their burrow (Hutchinson *et al.* 1994). Analyses of scats and stomach contents have recorded the remains of grasshoppers, ants, small spiders, beetles, snails, cockroaches and plant material (including *Dianella* spp. seed, possible chenopod material, and several leaves and flowers of introduced *Medicago* spp.) (Ehmann 1982; Hutchinson *et al.* 1994; Milne 1999; Fenner *et al.* 2007). PBTLs have been found to change their prey items opportunistically over spring and summer, with plant material incorporated in the diet to a greater extent as summer progresses (Fenner *et al.* 2007). Based on these dietary studies, it is likely that PBTLs require a high abundance of arthropod prey, habitat where efficient prey capture is possible, and particular plant species which form part of their diet (Fenner *et al.* 2007).

3.3.7 Reproduction

The PBTL has a spring mating season (October and November) (Milne and Bull 2000) and bears live young, like the other *Tiliqua* species. Males can reproduce from one year of age and females are sexually mature from approximately three years of age, and can have up to four young each season. Young are born between January and March, and disperse from the mother's burrow within weeks of their birth to find burrows of their own (Clarke 2000; Duffy *et al.* 2012; Milne and Bull 2000).

3.3.8 Activity timeframes

PBTL activity varies significantly throughout the year and is summarised in Table 5 and explained further below.

Table 5. PBTL activity throughout the year.

PBTL activity	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mating season												
Females heavily gravid												
Females with young												
Neonate dispersal												
Winter brumation												

The PBTL mating season is October to November. Females are heavily gravid (pregnant) in January and have young with them in their burrows from mid-January to mid-March. Neonate dispersal occurs in February and March. PBTLs go into brumation (a state of torpor exhibited by reptiles) over winter (June to August).

Males are more active during the mating season, moving away from their burrows to seek female mating partners (Schofield *et al.* 2012). Neonates and females are more active during late summer (February and March) as they disperse, with females shifting burrows if neonates do not leave the maternal burrow.

3.4 Known and/or potential threats

The PBTL Recovery Plan (Duffy *et al.* 2012) documents known and potential threats to the PBTL, which are summarised in Table 6.

Table 6. Known and potential threats to the PBTL and associated impacts (adapted from Duffy *et al.* 2012).

Known and/or potential threat	Known and/or potential impact
Changed land use - Ploughing	Direct mortality and displacement of both PBTLs and spiders.
	Destruction of PBTL and spider burrows.
	Soil destabilisation making any burrows subsequently dug by spiders (likely to be very few) unstable and unsuitable for PBTLs.
Changed land use - Ripping	Destruction of PBTLs and their burrows in the direct path of the ripping lines.

Known and/or potential threat	Known and/or potential impact
Changed land use - Inappropriate grazing regimes	Heavy grazing by hard-hoofed stock may lead to soil destabilisation, the filling of burrows in the dry season and the collapse of burrows in the wet season.
	Heavy grazing may also increase PBTL exposure to predators and/or reduce the availability of PBTL prey.
	Complete removal of grazing may lead to increased weed growth and/or a reduction in inter-tussock spaces, which may impact foraging and basking opportunities.
Changed land use - Other agricultural development	Any changes in areas occupied by PBTLs involving soil disturbance, clearing or habitat modification (e.g. establishment of saltbush pasture and viticulture) may be detrimental to the species.
Changed land use - Urban, industrial and infrastructure development	The establishment of buildings, roads, wind farms and telecommunications infrastructure may directly destroy PBTLs and their burrows, or disturb their native grassland habitat.
	Although wind farm WTGs are typically installed on hill slopes and crests, which are often not optimal PBTL habitat, access roads, underground cabling and other associated infrastructure, which are often developed on flats and lower slopes, have the potential to cause further loss and fragmentation of PBTL habitat, weed invasion and hydrological changes such as extra water runoff affecting soil structure.
	Shadow flicker, vibration and noise from WTGs may affect the ability of PTBLs to bask, feed and move around.
Weeds	High and dense growth of Wild Oats (*Avena barbata*) and other weeds may reduce opportunities for PBTLs to bask, catch insects and find mates.
	May render habitat unsuitable for burrowing spiders (Souter *et al.* 2003).
	High disturbance weed control or control that affects native plant species may be detrimental to PBTL habitat.
Pesticides (Insecticides)	While direct impacts of insecticides on PBTLs are unknown, insecticides are known to cause illness or death in some reptiles (Khan & Law 2005; Pauli *et al.* 2010).
	Indirect impacts could include a reduction in the main food source group for PBTLs, which could affect their survivorship or reproduction rates; cumulative secondary poisoning; or a reduction in the abundance of burrowing spiders, which may reduce the availability of burrows suitable for PBTLs.
Herbicides	While direct impacts of herbicides on PBTLs are unknown, herbicides are known to cause fertility problems for small vertebrates (Pauli *et al.* 2010), and are therefore a potential threat to PBTLs.
Inappropriate fire regimes	Fires that occur in spring, when males are active, or in late summer and early autumn, when juveniles are dispersing, could be particularly detrimental.
	Fires at other times of the year (mid-summer, late autumn, early spring) may be of less consequence. Indeed, PBTLs have been found to take refuge from fire in their deep burrows, as a fire in December 2005 did not kill adult lizards or affect the subsequent fecundity of females. Declines initially observed in activity, foraging, body condition and juvenile survivorship following the fire were short lived, with no adverse impacts in subsequent years (Fenner & Bull 2007).
Habitat fragmentation	Small, isolated populations may suffer from inbreeding and are vulnerable to extinction from stochastic events (Smith 2006; Smith *et al.* 2009).
Planting (tall trees and shrubs)	There are no records of PTBLs living under trees, even in areas adjacent to open grassland where the species occurs. Furthermore, experiments have shown that artificial burrows established under trees quickly fill with soil and debris (Souter *et al.* 2003).
	Planting trees and shrubs will alter the characteristics of the soil, litter and understorey plant community beneath their canopy, which may be detrimental to PBTLs.
	May increase predation risks for PBTLs by providing perches for birds to stalk burrows (compared to only hovering birds in open grassland).
	Will reduce the level of sunlight at ground level, which may result in PBTLs having to move further away from their burrows to bask, increasing predation risk.

Known and/or potential threat	Known and/or potential impact
Predators	Domestic dogs are known to take PBTLs.
	Foxes and cats are potential predators.
	Natural predators include Nankeen Kestrels (*Falco cenchroides*) and Eastern Brown Snakes (*Pseudonaja textilis*).
Fertilisers	May affect PBTLs by encouraging weed growth at the expense of native grasses.
Poaching	Despite the large fines and/or jail terms associated with poaching and smuggling threatened species, there is a risk that poachers could target PBTLs as Australian reptiles are generally in demand.
Climate change	Higher temperatures and altered rainfall regimes that are predicted under climate change may impact PBTLs, their prey and habitat.
	While the effects of climatic conditions on PBTLs remains largely unknown, surveys have recorded significantly lower fecundity, lower grass cover and more bare earth in 2007 and 2008 than in 2006, which may be linked to the prolonged drought in the region (A. Fenner *pers. Comm.*, J. Schofield *pers. Comm.*, in Duffy *et al.* 2012).
	PBTLs may be particularly vulnerable due to the isolation and small extent of the remaining populations and suitable habitat, and the very limited opportunities for dispersal if the current area of occupancy becomes unsuitable.

All PBTL habitats and populations, apart from one population which is formally protected (Tiliqua Nature Reserve), are considered to be potentially at risk from all of the threats summarised in Table 6 (Duffy *et al.*, 2012).

3.5 PBTL occurrence within the Goyder South Project Area

Understanding of PBTL occurrence and habitat within the Goyder South Project Area has evolved significantly over time, particularly after EPBC Act approvals were received and more detailed and targeted pre-clearance check (PCC) surveys and micro-siting surveys were undertaken. Additional PBTLs and PBTL habitat were found within the Stage 1A, Stage 1B and Common Asset Project Areas during PCC and micro-siting surveys, as explained below.

PCC surveys of the proposed infrastructure footprint were undertaken on site, prior to the commencement of ground disturbance works. In accordance with the environmental management measures outlined in the Project's CEMP, FFMP and the PBTL Management Plan, all areas required for construction of project infrastructure, including areas required temporarily during construction, are subject to a PCC survey prior to the commencement of any ground disturbance works, such as vegetation removal, topsoil stripping, excavation and other earthworks, During PCC surveys, additional PBTLs and PBTL habitat were found in areas that were not previously identified or mapped as PBTL habitat.

Similarly, in accordance with the environmental management measures outlined in the Project's CEMP, FFMP and PBTL Management Plan, infrastructure which will impact upon PBTLs and PBTL habitat, has been micro-sited (i.e., shifted and/or adjusted slightly) away from PBTLs, wherever possible, to avoid and/or minimise direct impacts to PBTLs and PBTL habitat, as much as possible. As such, when PBTLs were located within the proposed infrastructure footprint during PCC survey, additional surveys for PBTLs (i.e., micro-siting surveys) were undertaken within the adjacent areas to determine if the proposed infrastructure footprint could be micro-sited away from the PBTLs. During micro-siting surveys, additional

PBTLs and PBTL habitat were also found in areas that were not previously identified and mapped as PBTL habitat.

As such, this Section is separated into two sub-sections: Section 3.5.1 *PBTL occurrence prior to EPBC Act approval* and Section 3.5.2 *PBTL occurrence post EPBC Act approval*.

All PBTL surveys undertaken for the Project are consistent with the *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DSEWPC 2011), where relevant.

3.5.1 PBTL occurrence prior to EPBC Act approval

Habitat within the Goyder South Project Area was characterised as either 'Likely', 'Potential' or 'Unlikely' PBTL habitat by EBS Ecology during initial flora and fauna assessment for the Project during autumn and spring 2019 surveys based on suitable habitat attributes (EBS Ecology 2020). Suitable PBTL habitat attributes include spider burrows within native grasslands with or without an exotic component (PBTLs have also been detected in highly modified treeless grasslands), soil of heavy sandy loam (red-brown earth), footslopes of hills and sheltered areas of footslopes.

Likely PBTL habitat is classified based on several criteria. Firstly, any areas where PBTL have been recorded are considered Likely habitat. These known habitat areas are extended to incorporate adjacent areas that generally contain numerous spider burrows of suitable size and depth and are contiguous with known PBTL locations. If no PBTL are found within an area but the habitat is considered to be good – high quality PBTL habitat (consisting of grassland vegetation and extensive suitable spider burrows), the areas are also marked as Likely habitat.

Potential PBTL habitat is recorded in areas where no PBTL have been found. However, a low number of suitable spider holes are present in the area. The vegetation is considered to be poor-moderate quality for PBTL. Therefore, the likelihood of finding PBTL in these areas is lower and if found, it is likely to be scattered individuals.

Unlikely PBTL habitat includes areas that have been cropped/ploughed (including within the previous 5-10 years), areas lacking spider burrows, areas containing dense ground cover vegetation, steep terrain and exposed ridgelines and overly rocky areas, as these are unsuitable habitat attributes for PBTLs.

The weather and survey conditions were optimal for the duration of both survey periods due to low grass levels and fine/sunny conditions, which are important when searching for spider/PBTL burrows. Therefore, the results from the survey locations can be reported with a high degree of confidence. Refer to the *Goyder South Hybrid Renewable Energy Project: Flora and Fauna Assessment* (EBS Ecology 2020) for more detail on the habitat assessment.

Suitable PBTL habitat is mostly confined to the [redacted] of the [redacted] in the [redacted] of the Project Area. A total of 367.45 ha of likely habitat and 496.59 ha of potential habitat for PBTLs occurs within the Stage 1A and Stage 1B Project Areas, as summarised in Table 7.

Table 7. Likely and Potential PBTL habitat within the Stage 1A and Stage 1B Project Areas.

	Likely PBTL habitat (ha)	Potential PBTL habitat (ha)
Stage 1A (2021/8958)	24.63	22.70
Stage 1B (2021/8957)	342.82	106.44
Total	367.45	496.59

A total of 24 PBTLs were observed within the Goyder South Project Area across both autumn and spring 2019 surveys, as summarised in Table 8. A follow up PBTL survey, which targeted locations where the proposed infrastructure layout (at the time of the survey) impacted mapped PBTL habitat, including three areas of likely PBTL habitat and six areas of Potential PBTL habitat, was undertaken in March 2021 by EBS Ecology. A total of 13 individual PBTLs were observed across three sites, as summarised Table 8.

Table 8. PBTL observations within likely and potential habitat across Stage 1A and Stage 1B.

	2019 surveys (EBS Ecology 2020)		2021 targeted survey (EBS Ecology 2021)	
	Likely PBTL habitat	Potential PBTL habitat	Likely PBTL habitat	Potential PBTL habitat
Stage 1A (2021/8958)	11	0	0	0
Stage 1B (2021/8957)	13	0	10	3
Total	24	0	10	3

Refer to the *Goyder – Pygmy Bluetongue Lizard Survey March 2021* (EBS Ecology 2021) report for more detail on the targeted PBTL survey.

The location of PBTLs observed within the Stage 1A and Stage 1B during the 2019 surveys and the follow up targeted PBTL survey (March 2021) is shown in Figure 5, Figure 6 and Figure 7 and is the PBTL habitat included in the EPBC Act approvals for Stage 1A and Stage 1B. No PBTL habitat was included in the Common Asset (OTL and Substation) EPBC Act referral or subsequent approval, as it was not known to occur within the Common Asset Project Area at that time.

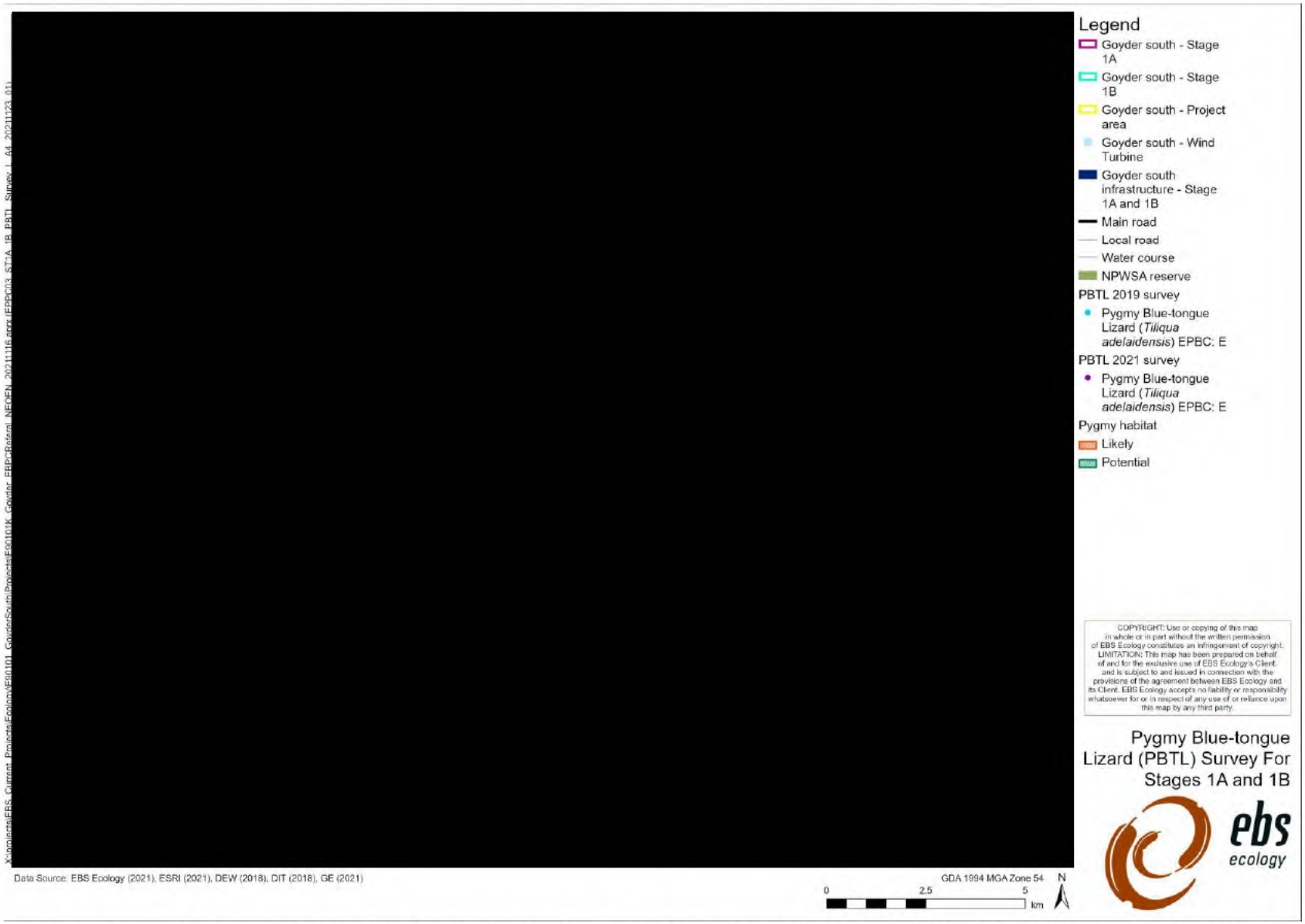

Figure 5. Location of PBTLs and PBTL habitat (likely and potential) within Stage 1A and Stage 1B (refer to the following figures for more detail).

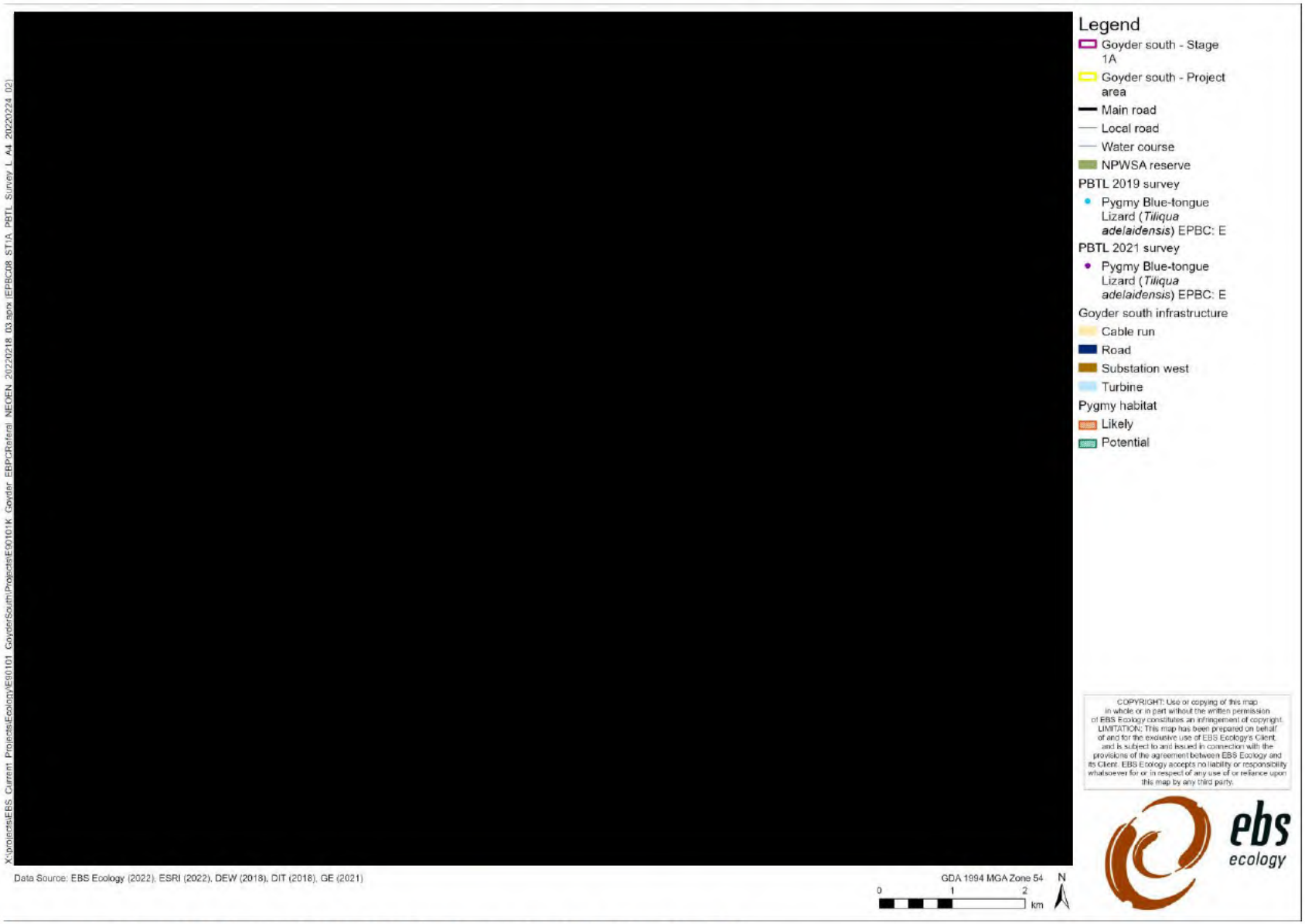

Figure 6. Location of PBTLs and PBTL habitat (likely and potential) within Stage 1A.

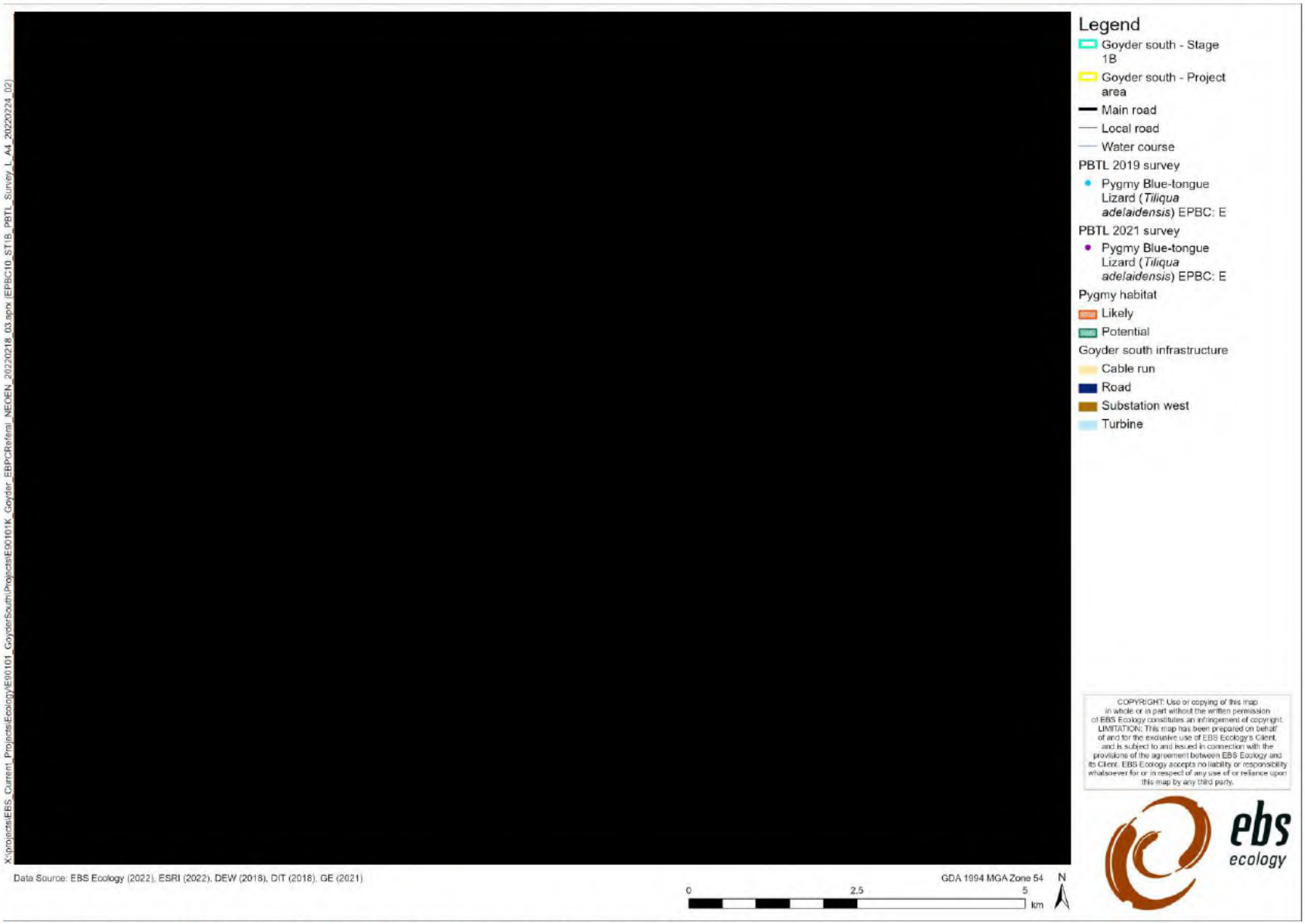

Figure 7. Location of PBTLs and PBTL habitat (likely and potential) within Stage 1B.

3.5.2 PBTL occurrence post EPBC Act approval

As stated previously, understanding of PBTL occurrence and habitat within the Goyder South Project Area has evolved significantly over time, particularly after EPBC Act approvals were received and more detailed and targeted PCC and micro-siting surveys were undertaken. Additional PBTL habitat found within the Stage 1A, Stage 1B and Common Asset Project Areas during PCC and micro-siting surveys is summarised in Table 9 and shown in Figure 8 to Figure 13 on the following pages.

Table 9. Additional PBTL habitat found post EPBC Act approvals.

Project Stage / Proposed Action	Area of additional PBTL habitat found post EPBC Act approvals (ha)			Figure reference
	Potential	Likely	Total	
Stage 1A (EPBC 2021/8958) Approval received 5/07/2022	0	1.28	1.28	Figure 8 to Figure 10
Stage 1B (EPBC 2021/8957) Approval received 15/08/2022	143.35	137.11	280.45	Figure 11 and Figure 12
OTL and Substation (EPBC 2021/8959) Approval received 22/08/2022 Approval Variation received 19/12/2022	1.40	2.36	3.76	Figure 13

Note that the data in Table 9 has only been derived from the PCC and micro-siting surveys of the proposed infrastructure footprint, and as such, not all areas within the Goyder South Project Area have been surveyed (many areas outside of the proposed infrastructure footprint have not been surveyed for PBTLs). As such, it is highly likely that additional PBTLs and PBTL habitat, that have not been identified, occur in other areas within the Goyder South Project Area.

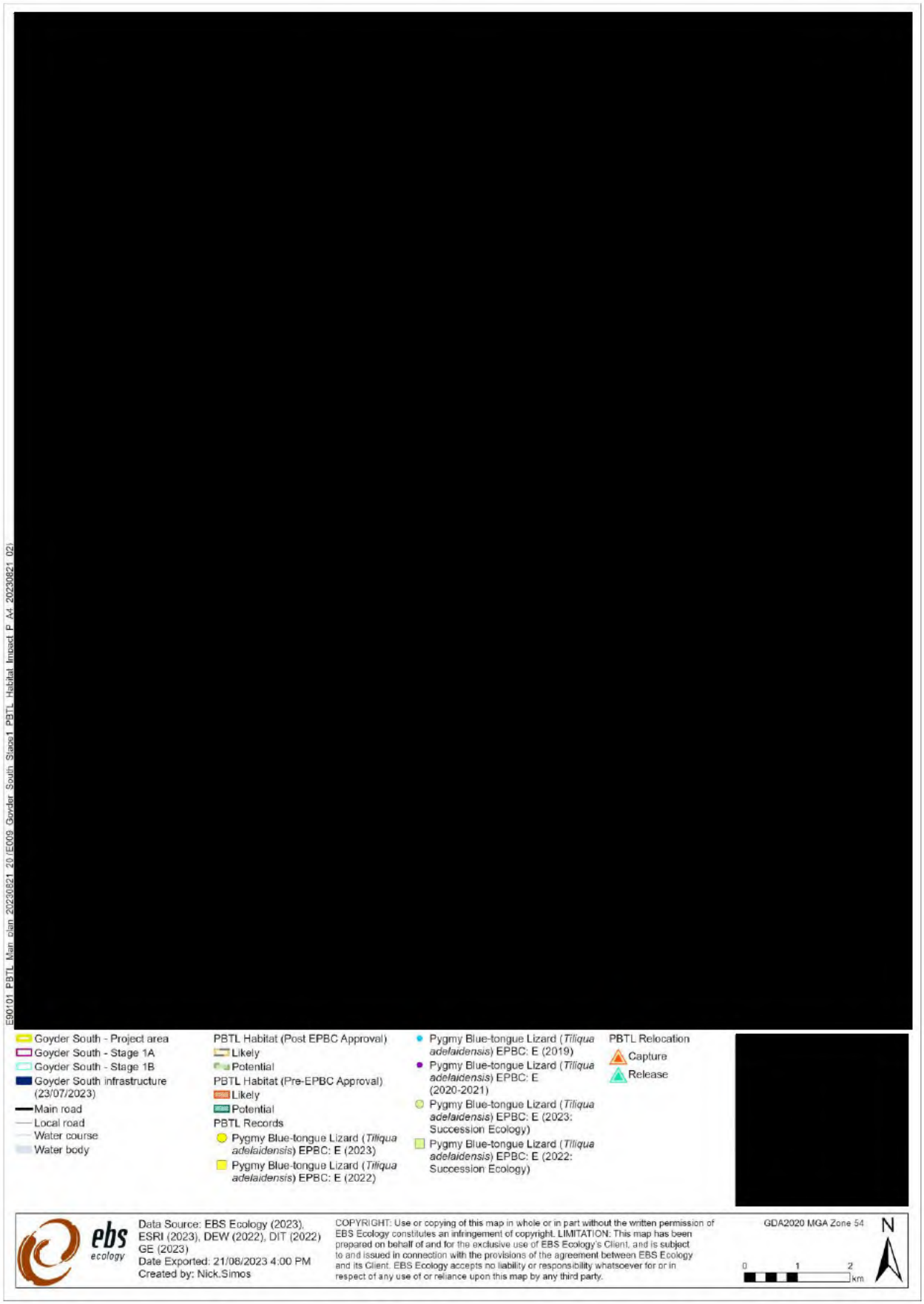

Figure 8. Overview map of PBTLs and PBTL habitat within the broader Goyder South Project Area pre-EPBC Act approval and post-EPBC Act approval. Refer to the following figures for more detail.

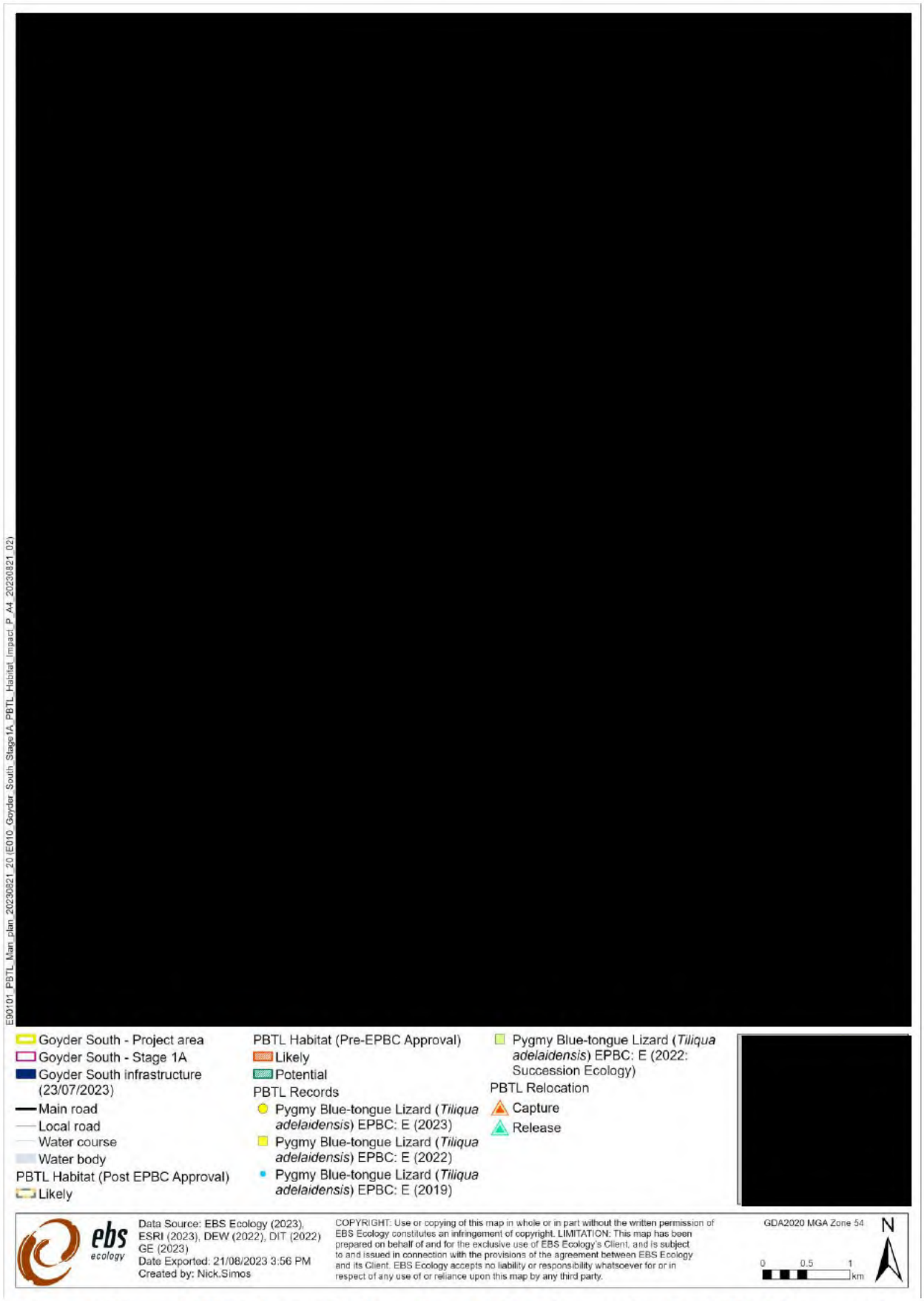

Figure 9. PBTLs and PBTL habitat within Stage 1A pre-EPBC Act approval and post-EPBC Act approval. Refer to the following figures for more detail.

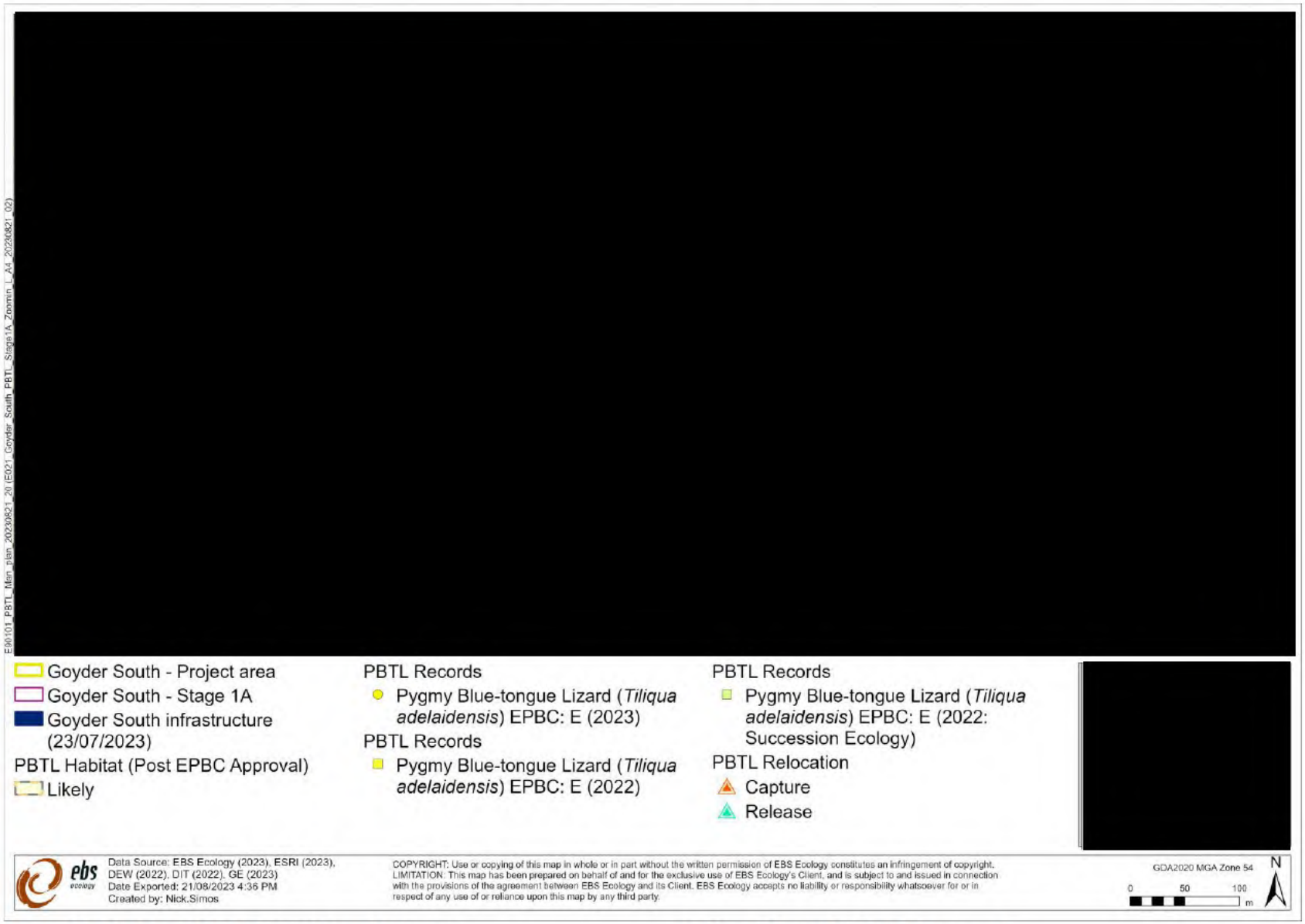

Figure 10. PBTLs and PBTL habitat found between [redacted] in Stage 1A, post-EPBC Act approval.

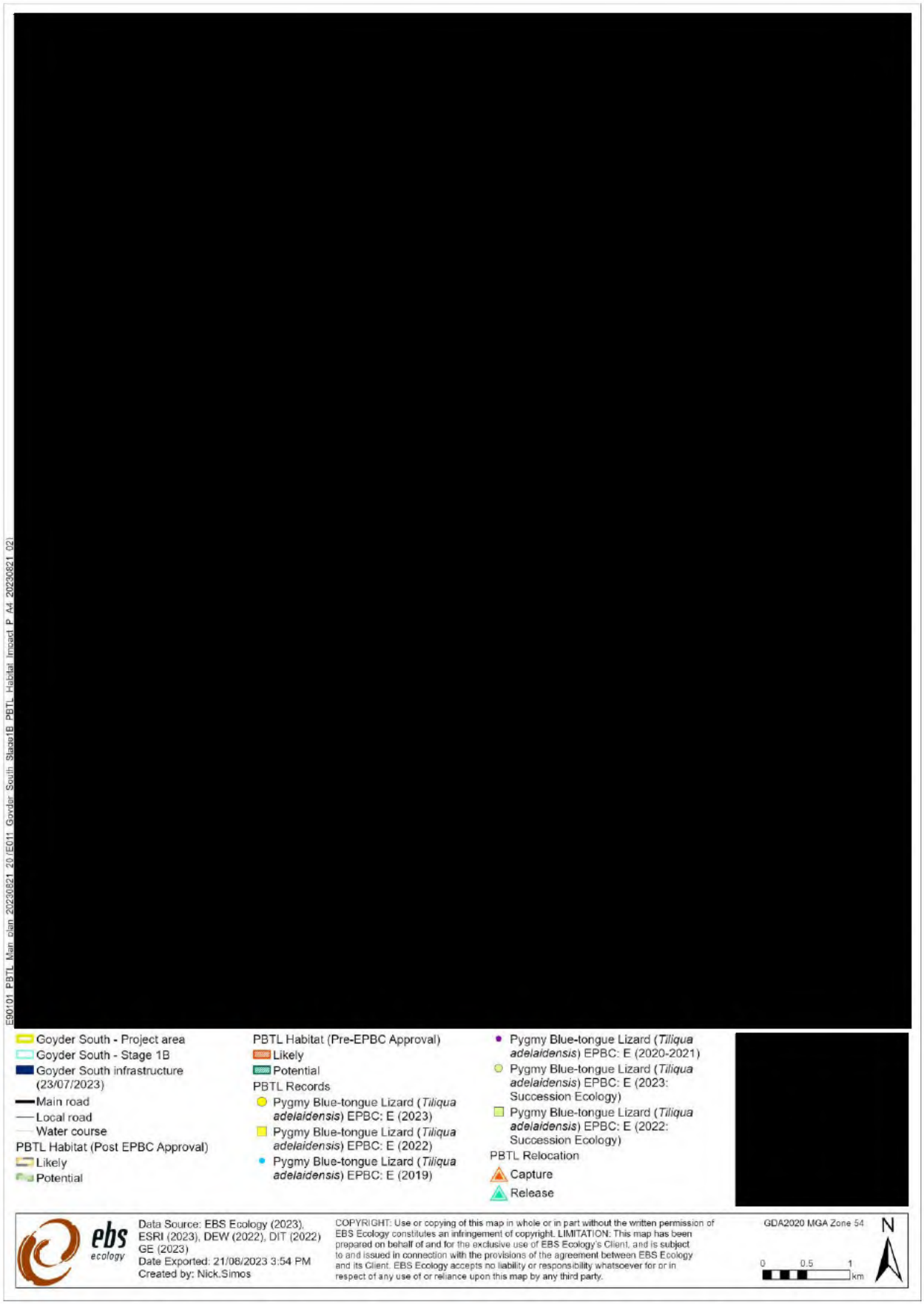

Figure 11. PBTLs and PBTL habitat within the Stage 1B Project Area pre-EPBC Act approval and post-EPBC Act approval. Refer to the following figure for more detail.

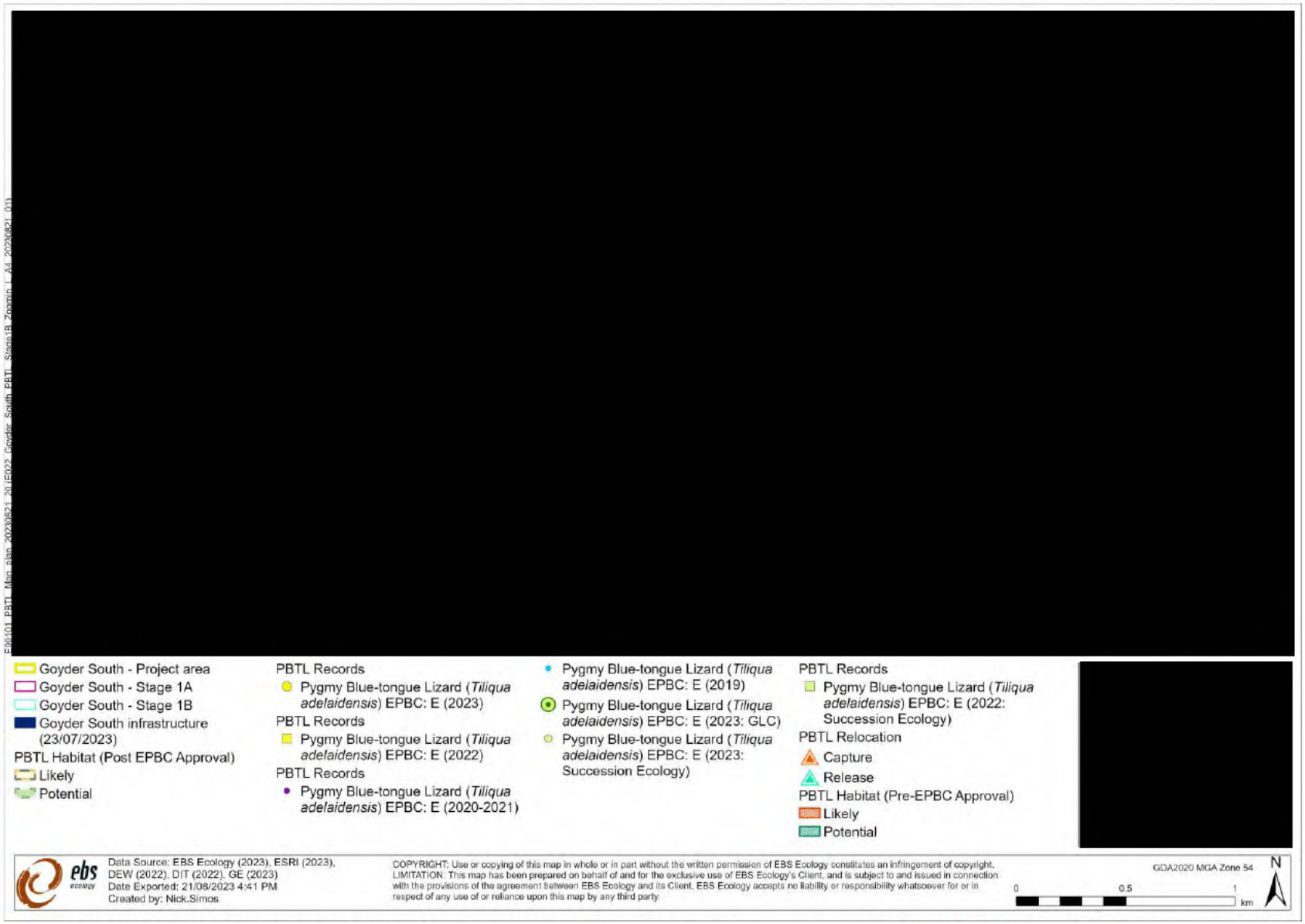

Figure 12. PBTLs and PBTL habitat within the Stage 1B Project Area pre-EPBC Act approval and post-EPBC Act approval (with PBTLs and PBTL habitat in the Common Asset Project Area, found post-EPBC Act approval also shown).

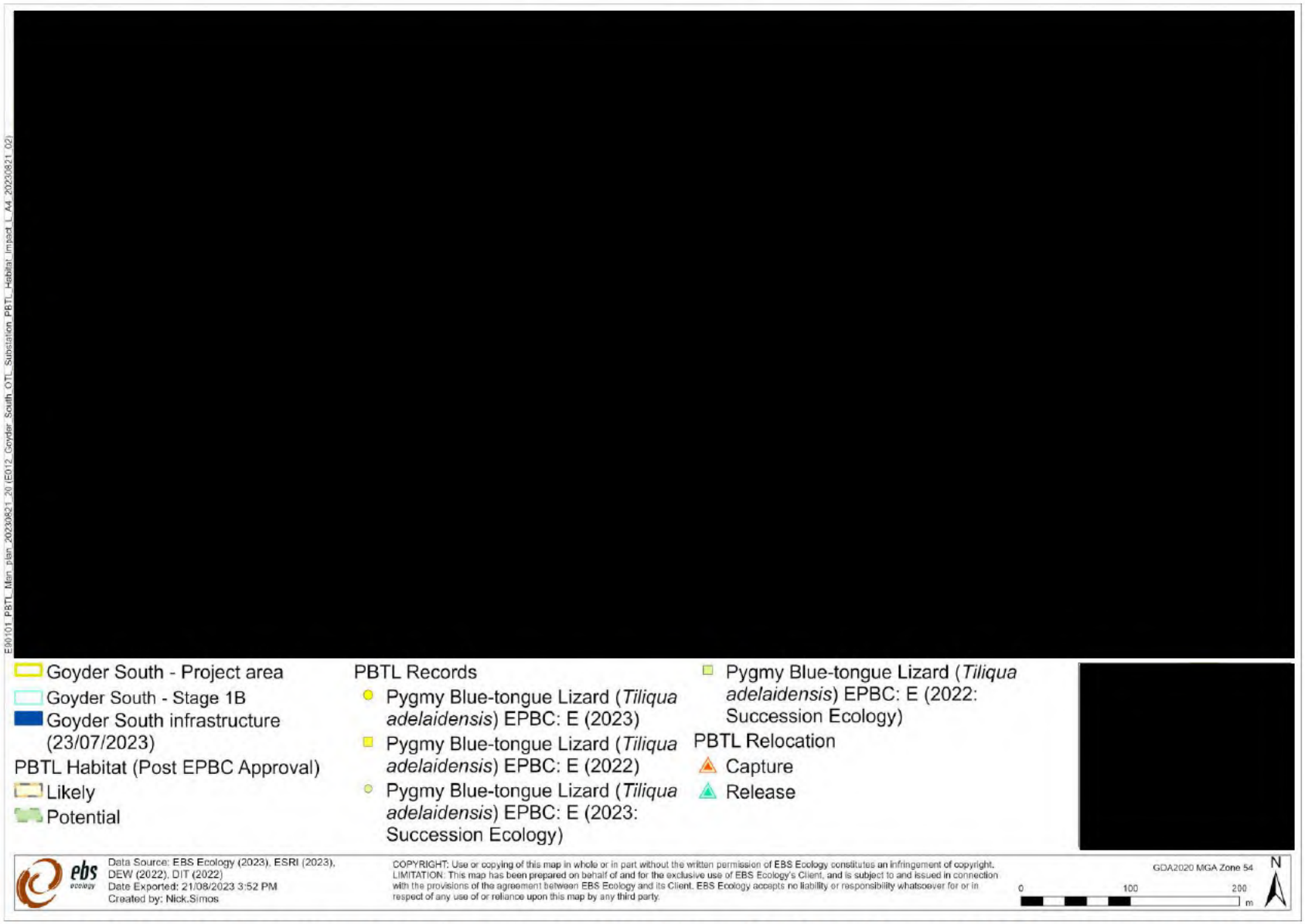

Figure 13. PBTLs and PBTL habitat found within the Common Asset (Substation and OTL) Project Area post-EPBC Act approval (with PBTLs and PBTL habitat found post-EPBC Act approval in the surrounding Stage 1B Project Area also shown).

3.6 Estimated residual significant impacts to PBTLs

While Project infrastructure has specifically been designed and/or located to avoid impact to PBTLs and their habitat as much as possible, assessment of Project design information, specifically the infrastructure footprint, has determined that the Project will directly impact (clear) up to a total of 43.53 ha of PBTL habitat, based on the infrastructure footprint, as summarised in Table 10. As such and in accordance with the *Matters of National Environmental Significance: Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (DoE 2013), these impacts are considered to be residual significant impacts and require an EPBC Offset.

Table 10. Overview of residual significant impacts to PBTL habitat.

Project component (EPBC Referral)	Impact to PBTL habitat (Pre-EPBC Approval) (ha)	Impact to Additional (Post-EPBC Approval) PBTL habitat (ha)	Total
Stage 1A (2021/8958)	8.04	0.26	8.30
Stage 1B (2021/8957)	2.61	28.74	31.35
Common Asset (OTL & Substation) (2021/8959 – variation dated 19/12/2022)	0	3.88	3.88
Totals	10.65	32.88	**43.53**

4 PROPOSED PBTL OFFSETS

As stated previously, NEOEN propose to establish and implement on-ground PBTL Offset Areas, to offset residual significant impacts and achieve a measurable conservation gain for the PBTL. Three Offset Areas are required, including:

- One to offset the impact to 8.30 ha of PBTL habitat associated with Stage 1A;
- One to offset the impact to 31.35 ha of PBTL habitat associated with Stage 1B; and
- One to offset the impact to 3.88 ha of PBTL habitat associated with the Common Asset (OTL and Substation).

However, as outlined in Table 2 and stated in the EPBC Approval Conditions (Stage 1A: Condition 8; Stage 1B: Condition 7; and Common Asset (OTL and Substation) Condition 6), "*the approval holder may choose to combine the OMPs required as conditions of approval for other proposed elements of the Goyder South Hybrid Renewable Energy Facility for the same protected matters.*"

As such, this *Goyder South Hybrid Renewable Energy Facility – Stage 1 Pygmy Blue-tongue Lizard (Tiliqua adelaidensis) Offset Management Plan* (PBTL OMP) has been prepared and will be executed to guide the establishment and implementation of each proposed PBTL Offset Area. Refer to Section 6 for the management aspects and actions associated with this PBTL OMP.

NEOEN have purchased the land that will contain the proposed PBTL Offset Areas and propose to transfer ownership of it to The Crown / State of South Australia for incorporation into the Reserves System under the *National Parks and Wildlife Act 1972,* with the land gazetted as a national park, conservation park or similar protected area, which will ensure protection in perpetuity. As such, the PBTL Offset Areas will become the first and only area known to contain PBTLs to be protected within the public Reserves System.

NEOEN intend to commence the proposed PBTL EPBC Offset as soon as possible after receiving approval of the OMP from the Minister, and are currently drafting a legal agreement to be entered into with the SA Department for Environment and Water (DEW) to manage the proposed PBTL Offset Areas for a minimum of ten years. DEW currently manages over 340 national parks, regional reserves, conservation reserves, conservation parks, game reserves, recreation parks and wilderness protection areas within SA (DEW 2020).

4.1 Type of Offset

4.1.1 Direct offsets

A total of 90.60 % (Stage 1A), 90.81 % (Stage 1B) and 100.37 % (Common Asset (OTL and Substation)) of each EPBC Offset will be achieved via the establishment and implementation of a direct offset in the form of on-ground offset areas that aims to provide a measurable conservation gain for the PBTL, referred to herein as the PBTL Offset Areas (refer to Table 13 in Section 4.3.1 for details). The EPBC Offsets Policy (DSEWPC 2012a) states that:

"*conservation gain is the benefit that a direct offset delivers to the protected matter, which maintains or increases is viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by:*

- *improving existing habitat for the protected matter*
- *creating new habitat for the protected matter*
- *reducing threats to the protected matter*
- *increasing the values of a heritage place, and/or*
- *averting the loss of a protected matter or its habitat that is under threat."*

Establishment and implementation of the proposed on-ground PBTL Offset Areas will improve existing habitat for PBTLs within the site as well as reduce threats to PBTLs within the site, such as, but not limited to, potential changes in land use such as ploughing and/or inappropriate grazing (for example, increased stocking rates and/or grazing duration), through active management and legal protection of the land.

4.1.2 Other compensatory measures

The remaining percentage of each EPBC Offset required (9.40 % for Stage 1A and 9.19 % for Stage 1B) is proposed to be achieved via implementation of a PBTL monitoring program across Stage 1A and Stage 1B. As such, a PBTL Scientific Monitoring and Research Plan is currently being developed and will be submitted to the Department for approval by the Minister.

4.2 Location of the PBTL Offset Areas

The proposed PBTL Offset Areas are located south of Stage 1B, as shown in Figure 14. The proposed PBTL Offset Areas will be located within an on-ground offset area for native vegetation (Figure 14). However, the PBTL Offset Areas are in addition to the on-ground offset for native vegetation, as they will be specifically managed for PBTLs. The management of these areas (and protection) will overlap with common activities such as removal of domestic grazing stock (e.g. sheep) and weed control, undertaken across the entire area. However, PBTL specific management actions, including the installation of artificial PBTL burrows, will only be undertaken within the PBTL Offset Areas.

Figure 14. Overview of the location of the proposed PBTL Offset Areas, within the on-ground offset area for native vegetation, south of Stage 1B.

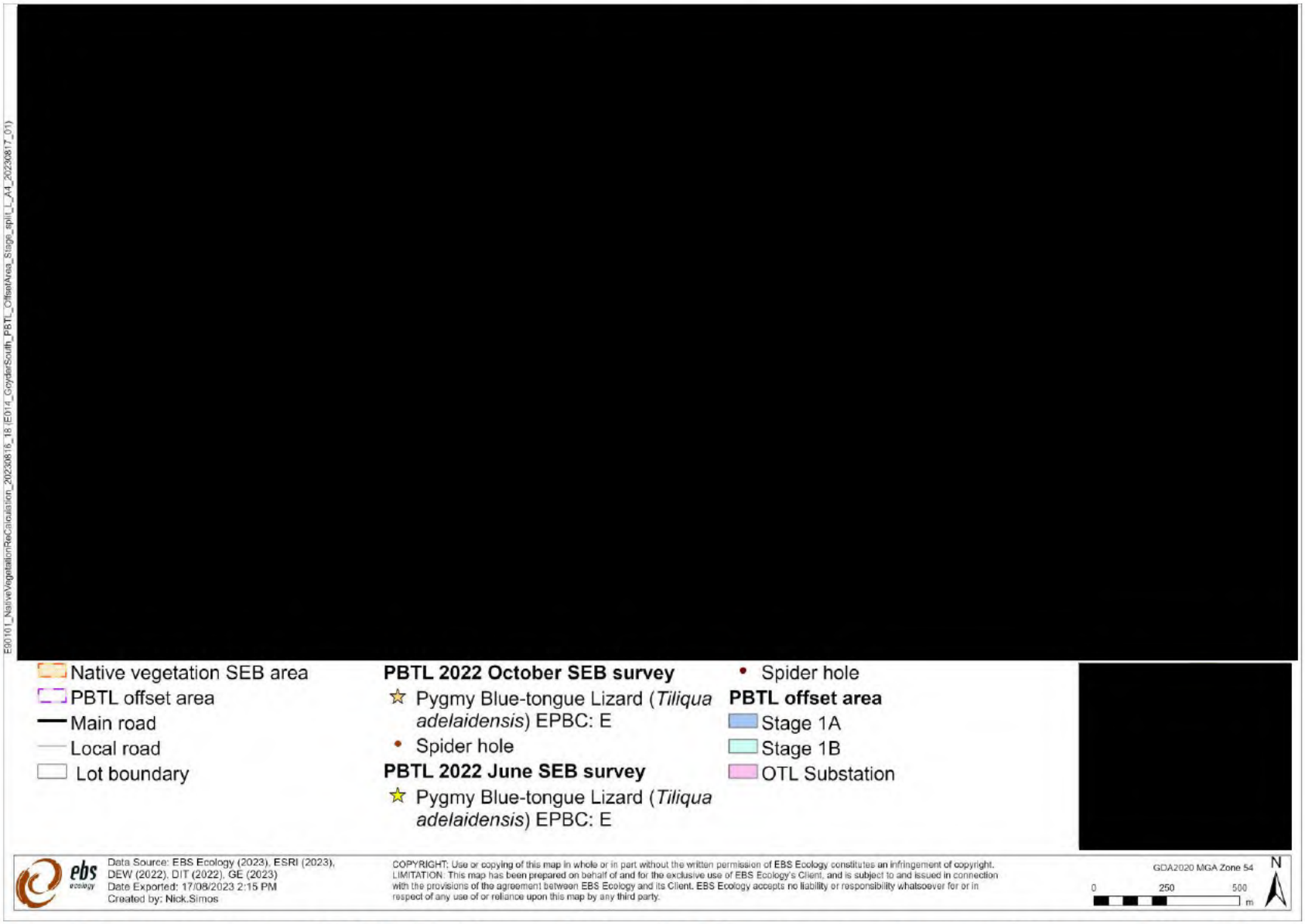

Figure 15. The proposed location of the PBTL Offset Areas and location of the PBTLs observed during survey work in June and October 2022.

4.3 Calculation of required EPBC Offsets

The *Offsets Assessment Guide* (the guide) (DSEWPC 2012b) was used to calculate the minimum direct offset areas (i.e. physical area in hectares) required to compensate for the clearance of up to a total of 43.53 ha of PBTL habitat (with 8.30 ha associated with Stage 1A, 31.35 ha associated with Stage 1B and 3.88 ha associated with the Common Asset (OTL and Substation)).

The methodology used to complete the Offsets Assessment Guide (the guide) was in accordance with the *How to Use the Offsets assessment Guide* (DSEWPC undated). Within the guide there are seven protected matter attributes within either *ecological communities*, *threatened species habitat* or *threatened species*, as follows:

- Ecological communities:
    - Area of community;
- Threatened species habitat:
    - Area of habitat;
    - Number of features (e.g. nest hollows, habitat trees);
    - Condition of habitat (change in habitat condition, but no change in extent);
- Threatened species:
    - Birth rate (e.g. change in nest success);
    - Mortality rate (e.g. change in number of road kills per year); and
    - Number of individuals (e.g. individual plants/animals).

The *How to Use the Offsets Assessment Guide* (DSEWPC undated) states:

> ***"Protected matter attributes*** *show the various options to calculate a suitable offset depending on a protected matter's habitat or ecology that a proposed action may be likely to impact – for example* ***area of habitat*** *or* ***birth rate****. The attribute that most effectively captures the nature of the residual impact should be selected…*
>
> *In some cases, more than one attribute may be impacted by a proposed action. For example, a coastal development may be likely to impact both the* ***birth rate*** *and* ***mortality rate*** *of a turtle species. In this case both attributes would be used in the guide to determine a suitable offset.*
>
> *It is not appropriate to choose multiple protected attributes where there is overlap in the impacts that are being captured by each attribute. For example, where a proposed action will result in clearing of nesting habitat, a decision would be made about whether it is more appropriate in that particular case to use* ***number of features*** *to count nest hollows or* ***area of habitat*** *to describe the extent of nesting habitat. The attribute most relevant to the impact on the protected matter should be selected. The type and quality of the data available will also inform this decision (e.g. if the number of individuals can be counted or accurately estimated from sampling then* ***number of individuals*** *should be used, if these data are not available, then using the* ***area of habitat*** *attribute may be more appropriate."*

As the Project will directly impact approximately 43.53 ha of PBTL habitat (with 8.30 ha associated with Stage 1A, 31.35 ha associated with Stage 1B and 3.88 ha associated with the Common Asset (OTL and

Substation)), the *area of habitat* attribute was used in the guide as it is the attribute that most effectively captures the nature of the residual impact (i.e. clearance of PBTL habitat).

Calculation of the area of impact

To calculate the impact to PBTL habitat, ArcMap (a geospatial processing program) was used by EBS Ecology to determine the overlap between the infrastructure footprint and PBTL habitat. For Stage 1A and Stage 1B, the infrastructure footprint includes, (but is not limited to), WTGs, access tracks, electrical circuits, construction compounds, batter slopes, site drainage and construction access. For the OTL and Substation, the infrastructure footprint includes transmission line towers, hardstands, access tracks and electrical cable stringing corridor.

The overlap between the infrastructure footprint for the Stage 1A, Stage 1B and Common Asset (OTL and Substation) components with PBTL habitat is 43.53 ha. As such, this is considered to be the area of impact to PBTL habitat (i.e., impact area) and has been inserted into the impact calculator within the guide.

Calculation of habitat quality

Habitat quality has been assessed in accordance with the *How to Use the Offsets assessment Guide* (DSEWPC undated). The key ecological attributes of PBTL habitat are summarised in Table 11 and have been used to help determine the overall habitat quality score of the impact areas as well as the PBTL Offset Areas, in relation to the three habitat quality components (site condition, site context and species stocking rate) as outlined in Table 12. Note that no weighting has been applied to any of the three habitat quality components (site condition, site context and species stocking rate). Rather, in this particular case, each component is considered equally important and as such contributes equally to the habitat quality score.

The habitat quality score for the impact areas has been assigned a 6 (out of 10), while the habitat quality score for the proposed Offset Areas has been assigned a 4 (out of 10) as that habitat contains a lower number of PBTLs and currently lacks suitable spider burrows.

Table 11. Evaluation of key ecological attributes of the PBTL.

Habitat requirements and variability: **What are the nesting, breeding, foraging, dispersal, migration and/or roosting requirements of the species?**
As outlined in Section 3.3, PBTLs require un-ploughed native grasslands dominated by species including *Austrostipa* spp. (Spear-grasses), *Rytidosperma* spp. (Wallaby Grasses), *Maireana* spp. (Bluebush), *Aristida behriana* (Brush Wire-grass) and *Lomandra* spp. (Iron-grasses). They also require burrows which are made by trapdoor (Mygalomorphae) and wolf (Lycosidae) spiders and approximately 25 – 40 cm deep, for refuge, basking sites and ambush points. Only one adult PBTL is found in each active burrow and individuals may utilise the same burrow for extended periods of time. Generally, PBTLs do not move far from their burrow.
Lifecycle and population dynamics: **What are the key life cycle stages of the species? How do these impact its population viability or ecosystem integrity?**
As outlined in Section 3.3.7 PBTLs have a spring mating season (October and November) and females bear live young, which are born between January and March. Young disperse from the mother's burrow within weeks of their birth to find burrows of their own. Males can reproduce from one year of age and females are sexually mature from approximately three years of age and can have up to four young each season. The total population size of the PBTL in South Australia is unknown (Duffy *et al.* 2012). As outlined in the PBTL Recovery Plan (Duffy *et al.* 2012) significant genetic differentiation has been recorded between most of the studied populations. Sampling of 229 PBTLs from six sites between Burra and Peterborough in the mid-north of South Australia, found that there was a distinct genetic structure among sample sites separated by only a few kilometres, including variations within small patches of continuous habitat, indicating a fine-scale pattern of isolation by distance in the species.

Movement and distribution patterns: **How does the species population function across the landscape?**

As outlined in Section 3.3.8, PBTL activity varies significantly throughout the year. The PBTL mating season is October to November. Females are heavily gravid (pregnant) in January and have young with them in their burrows from mid-January to mid-March. Neonate dispersal occurs in February and March. PBTLs go into brumation (a state of torpor exhibited by reptiles) over winter (June to August).

Males are more active during the mating season, moving away from their burrows to seek female mating partners. Neonates and females are more active during late summer (February and March) as they disperse, with females shifting burrows if neonates do not leave the maternal burrow.

As outlined in Section 3.3.2, the PBTL is endemic to South Australia, where its population is severely fragmented and occupies less than 500 square km (Duffy *et al.* 2012). The PBTL is now known from 31 sites extending from Peterborough in the north to Kapunda in the south, and to the South Hummocks (north of Port Wakefield) in the west. The full extent of most populations is yet to be determined.

Each of the 31 sites contains an isolated population that has no interaction with any other PBTL population as each site is surrounded by unsuitable habitat, usually cropped agricultural land.

Threatening processes: **What are the threatening processes contributing to the loss of the species?**

As outlined within the PBTL Recovery Plan (Duffy *et al.* 2012) and summarised within Table 6 in Section 3.4, the known and potential threats to the PBTL include:

- Changed land use, including ploughing, ripping, inappropriate grazing regimes, other agricultural development, and urban, industrial and infrastructure development;
- Weeds;
- Pesticides (insecticides);
- Herbicides;
- Inappropriate fire regimes;
- Habitat fragmentation;
- Planting (tall trees and shrubs);
- Predators;
- Fertilisers;
- Poaching; and
- Climate change.

Adapted from the How to Use the Offsets assessment Guide (DSEWPC undated).

Table 12. Determining the habitat quality scores for the impact areas and the proposed PBTL Offset Areas.

Component	Question / consideration	Impact area/sites (Stage 1A; Stage 1B; and the Common Asset (OTL and Substation))	Proposed PBTL Offset Areas
Site condition	What is the structure and condition of the vegetation on the site?	The condition of preferred habitat of PBTL (i.e. grasslands) within the Goyder South Project Area, which consist predominantly of *Austrostipa* spp. (Spear Grass) Mixed Grassland, was initially observed to be poor, with low coverage and most tussocks grazed to their base and vulnerable to mortality (EBS Ecology 2020). However, the condition of PBTL habitat within impact areas, has more recently (2022) been observed to be in moderate condition, with moderate coverage and minimal grazing impacts. As such, the condition is likely to vary over time depending on seasonal conditions (amount of rainfall) and grazing impacts. Nonetheless, grazing (by domestic stock) is considered to limit the condition of PBTL habitat.	Vegetation within the proposed PBTL Offset Areas site predominantly consists of *Austrostipa* sp. (Spear-grasses), with other co-dominant species including *Aristida behriana* (Brush Wire-grass) and *Rytidosperma* sp. (Wallaby-grass). In relation to PBTL habitat, vegetation condition is considered to be moderate, as it has been modified through historical grazing practices and weed invasion. A variety of introduced grasses and herbs occur across the area. However, with appropriate management, the native grasses can be promoted and enhanced.
	What is the diversity of relevant habitat species present (including both endemic and non-endemic)?	Native grass diversity within the impact sites is considered to be relatively high as it includes *Austrostipa* sp. (Spear-grasses), *Aristida behriana* (Brush Wire-grass), *Rytidosperma* sp. (Wallaby-grass), *Themeda triandra* (Kangaroo Grass), *Ptilotus spathulatus* (Pussy-tails), *Vittadinia cuneata* var. (Fuzzy New Holland Daisy) *Lomandra effusa* (Scented Mat-rush), and *Lomandra multiflora* ssp. *dura* (Hard Mat-rush).	Native grass diversity within the proposed PBTL Offset Areas site is considered to be moderate as it includes *Austrostipa* sp. (Spear-grasses), *Aristida behriana* (Brush Wire-grass) and *Rytidosperma* sp. (Wallaby-grass). However, removal of domestic grazers (sheep) together with weed control, is expected to allow for regeneration and improve native grass species diversity.
	What relevant habitat features are on the site?	The impact sites contain native tussock grasslands which are largely contiguous and unfragmented with an abundance of deep spider burrows suitable for PBTLs.	The proposed PBTL Offset Area sites contain native tussock grasslands which are largely contiguous with grassland areas to the south and west of the proposed PBTL Offset Areas. They contain numerous spider holes and a high occurrence of spiders. However, a high proportion of the spider holes are probably not deep enough to be suitable for PBTLs (which is why it is proposed to install artificial PBTL burrows within the PBTL Offset Areas).
Site context	What is the connectivity with other suitable/known habitat or remnants?	The impact sites could be considered to be connected to habitat within the proposed PBTL Offset Area sites. However, the actual status of connectivity between the two sites is unknown. It is also possible that populations occur within neighbouring properties. However, the status of connectivity with these is also unknown.	The proposed PBTL Offset Area sites could be considered to be connected to PBTLs and PBTL habitat located immediately to the north-west. However, the actual status of connectivity is not known. It is also possible that populations occur within neighbouring properties to the south and/or south-west of the proposed PBTL Offset Areas. However, the status of connectivity with these is also unknown.

Component	Question / consideration	Impact area/sites (Stage 1A; Stage 1B; and the Common Asset (OTL and Substation))	Proposed PBTL Offset Areas
	What is the importance of the site in relation to the overall species population or the occurrence of the community?	As stated in the PBTL Recovery Plan, all known PBTL habitat is considered habitat critical to the survival of the species (Duffy *et al.* 2012).	As stated in the PBTL Recovery Plan, all known PBTL habitat is considered habitat critical to the survival of the species (Duffy *et al.* 2012).
	What threats occur on or near site?	Threats that currently occur on or near the impact site include changed land use (e.g. wind farm, ploughing), weeds, predators, a potential for inappropriate grazing and climate change.	Threats that currently occur on or near the PBTL Offset Area sites include changed land use (e.g. wind farm, ploughing), weeds, predators, a potential for inappropriate grazing and climate change.
Species stocking rate	**What is the presence of the species on the site? (i.e. confirmed / modelled).**	PBTL have been confirmed within the impact site, as they have been observed during numerous field surveys during the Project planning phase (EBS Ecology 2020; EBS Ecology 2021) and during PCC and micro-siting surveys during construction prior to ground disturbance.	PBTL have been confirmed within the proposed PBTL Offset Area for Stage 1A, while the proposed Offset Area for Stage 1B is immediately adjacent to where the small population of PBTL was observed (refer to Section 4.8).
	What is the density of species known to utilise the site?	Based on survey work undertaken by EBS Ecology to date (EBS Ecology 2020 and EBS Ecology 2021) within the Goyder South Project Area (Figure 8 to Figure 13) the density of PBTLs within the impact area is considered to be medium as design has been altered to avoid areas of PBTL habitat with higher densities of PBTLs.	Based on BDBSA data and survey work undertaken by EBS Ecology to date within the proposed PBTL Offset Areas (Section 4.8), the density of PBTLs within the proposed PBTL Offset Areas is also considered to be low.
	What is the role of the site population in regards to the overall species population?	As stated in the PBTL Recovery Plan, all PBTL populations are considered important due to the restricted and fragmented distribution of the species (Duffy *et al.* 2012).	As stated in the PTBL Recovery Plan, all PBTL populations are considered important due to the restricted and fragmented distribution of the species (Duffy *et al.* 2012).
Additional comments:		The medium number of PBTLs, but moderate number of suitable spider burrows observed during field surveys within the impact areas, including targeted PBTL survey of the proposed infrastructure footprint (EBS Ecology 2020 and EBS Ecology 2021), is reflective of a moderate level of PBTL habitat quality within the impact area. The impact area has been subjected to a low-moderate grazing regime for quite some time, with native grass tussocks observed to be intact as opposed to modified or over-utilised.	The proposed PBTL Offset Area sites have been subject to a low-moderate grazing regime for quite some time, with native grass tussocks observed to be intact as opposed to modified or over-utilised. However, the low number of PBTLs and lack of suitable spider burrows observed during field survey in the proposed PBTL Offset Areas is reflective of a low level of PBTL habitat quality within the proposed Offset Areas.
Habitat Quality Score (Scale of 0-10):		**6**	**4**

Adapted from the How to Use the Offsets assessment Guide (DSEWPC undated).

4.3.1 Reasoning associated with the values applied to other parameters in the offset calculator

A summary of the reasoning associated with the values applied to each parameter in the offset calculator within the guide is provided in Table 13.

Table 13. Reasoning associated with the values applied to each parameter in the guide.

Parameter	Value			Reasoning
	Stage 1A	Stage 1B	Common Asset (OTL and Substation)	
Impact Calculation				
Protected matter attribute	Area of habitat	Area of habitat	Area of habitat	The *area of habitat* attribute has been selected as it is the attribute that most effectively captures the nature of the residual impact (i.e. clearance of 43.53 ha of PBTL habitat.
Area of impact (ha)	8.30 ha	31.35 ha	3.88 ha	Impact calculated by EBS Ecology by intersecting the infrastructure footprint (as shown in Figure 8 to Figure 13) with PBTL habitat extent (established via site survey).
Impact area habitat quality (scale of 0-10)	6	6	6	This is based on the moderate numbers of PBTLs found during targeted PBTL surveys within the Project Area (EBS Ecology 2020 and EBS Ecology 2021; and during PCC and micro-siting surveys). In addition, the condition of preferred habitat of PBTL within the Project Area (Austrostipa spp. (Spear Grass) Mixed Grassland) was observed to be poor, with low coverage and most tussocks grazed to their base and vulnerable to mortality (EBS Ecology 2020).
Total quantum of impact (ha)	4.98 ha	18.81 ha	2.33 ha	Adjusted hectares as calculated by the guide.
Offset Calculation				
Protected matter attribute	Area of habitat	Area of habitat	Area of habitat	Aligning with the impact calculation protected matter attribute.
Proposed offset	On-ground PBTL Offset Area	On-ground PBTL Offset Area	On-ground PBTL Offset Area	An on-ground offset is proposed.
Time over which loss is adverted	20 years (immediate)	20 years (immediate)	20 years (immediate)	Loss is expected to be averted immediately due to the establishment of a legal agreement between the Project Owner (NEOEN) and the land manager (DEW), which will commence once the PBTL Offset Areas are established.
Time until ecological benefit	10 years	10 years	10 years	The legal agreement will immediately secure the future management of the PBTL Offset Areas for the conservation of PBTLs. However, it may take up to 10 years for ecological benefit to be achieved.
Start area (ha)	28.00 ha	106 ha	14.50 ha	Approximately 28.00 ha (for Stage 1A), 106 ha (for Stage 1B) and 14.50 ha (for Common Asset (OTL and Substation)) of PBTL habitat has been identified for potential use as PBTL Offset Areas.

Parameter	Value			Reasoning
	Stage 1A	Stage 1B	Common Asset (OTL and Substation)	
Start quality of habitat (scale of 0-10)	4	4	4	Refer to Table 12.
Risk of loss (%) without offset	0.52 % (shown as 1 % in the guide)	0.52 % (shown as 1 % in the guide)	0.52 % (shown as 1 % in the guide)	A Risk of Loss (ROL) without offset value of 0.52 % has been applied in accordance with the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* document (Maseyk *et al.* 2017) as outlined below. In accordance with the *Calculating Risk of Loss under a Without Offset scenario* decision tree outlined in Figure 4 and Table 3, Pathway C (in Maseyk *et al.* 2017) reflects the situation, as: 1. *The proposed offset site contains a threatened species*; and 2. *There is no credible, site-specific evidence to indicate development will occur within the foreseeable future* (i.e. 20 years), As such, the recommended ROL is "*average annual background rate of loss x time horizon*". The 'Risk of Loss over twenty years (%)' for the Goyder Local Government Area is 0.52 % (in accordance with Appendix One in Maseyk *et al*. 2017). As such a ROL of 0.52% been applied for the ROL without offset value.
Future quality without offset (scale of 0-10)	4	4	4	The condition of habitat within the proposed PBTL Offset Areas under the current land manager is unlikely to change. However, if the land that will contain the PBTL Offset Areas was to change owners, then a reduction in the quality of habitat for PBTLs may occur, due to inappropriate grazing regime (such as increased stocking rates and grazing duration) and/or the inappropriate placement of water points. Such changes in land management would be detrimental to the PBTL (as detailed in Section 6.3.5 Management of grazing regime).
Risk of loss (%) with offset	0 %	0 %	0 %	A Risk of Loss (ROL) with offset value of 0 % has been applied in accordance with the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* document (Maseyk *et al.* 2017) as outlined below. In accordance with the *Calculating Risk of Loss under a With Offset scenario* decision tree outlined in Figure 3 and Table 2, Pathway A (in Maseyk *et al.* 2017) reflects the situation, as: 1. *The proposed offset site contains a threatened species*; 2. *The tenure status of the proposed offset site will be changed to secure protection* (i.e. Heritage Agreement); and 3. *Development induced clearing of the proposed offset site due to allowable activities would trigger an offset requirement under legislation* (i.e. the EPBC Act), As such, the recommended ROL is "0 %".
Future quality with offset (scale of 0-10)	6	6	6	Implementation of the PBTL OMP, for a minimum of ten years, (after which the need for ongoing management in accordance with this PBTL OMP will be reviewed and reconsidered, as outlined in Section 6), is expected to increase PBTL habitat condition within the PBTL Offset Areas. For example, known and/or potential threats to PBTLs (as outlined in Section 3.4) will

Parameter	Value			Reasoning
	Stage 1A	Stage 1B	Common Asset (OTL and Substation)	
				be actively managed, with some being almost eliminated altogether. Changes in land use, including ploughing, ripping, inappropriate grazing regimes (heavy grazing by hard-hoofed stock such as sheep and/or cattle), other agricultural developments (e.g., establishment of saltbush pasture and viticulture) and urban, industrial and infrastructure development, will be prevented from occurring, particularly as the land on which the on-ground PBTL Offset Areas occur will be incorporated into the Reserves System (or placed under a Heritage Agreement) (refer to Section 4.7), and protected in perpetuity. As such, the changes in land use stated above will be prevented from occurring. More importantly, the implementation of specific management actions contained within the PBTL OMP, for a minimum of ten years, (as outlined in Section 6.3), is expected to increase PBTL habitat condition within the PBTL Offset Areas, including: • installation of artificial PBTL burrows to provide additional habitat for PBTLs, therefore increasing PBTL habitat condition; • management of grazing regime (including removal of domestic hard-hoofed stock) to reduce potential grazing pressure, soil destabilisation, the filling of burrows in the dry season and the collapse of burrows in the wet season, therefore increasing PBTL habitat condition; • weed control to reduce high and dense growth of weeds which may reduce opportunities for PBTLs to bask, catch insects and find mates, therefore increasing PBTL habitat condition; • feral animal control to reduce the risk of predation by foxes and cats, therefore increasing PBTL habitat condition; • fire prevention, as fires that occur in spring, when males are active, or in late summer and early autumn, when juveniles are dispersing, could be particularly detrimental; and • restricting access to prevent potential impacts to PBTL habitat from vehicles and foot traffic. In addition, the proposed PBTL Offset Areas will be monitored, for a minimum of ten years, (as outlined in Section 6.3 and 6.5) *and* monitoring results will be used to identify any changes required to management measures (such as grazing regime) (i.e., adaptive management) to increase PBTL habitat condition and ensure the longevity of PBTL habitat and the PBTL population within the PBTL Offset Areas. While this PBTL OMP and the management actions within it are proposed to be implemented for a minimum of ten years (after which the need for ongoing management will be reviewed and reconsidered as outlined in Section 6), the land on which the on-ground PBTL Offset Areas occur will be incorporated into the Reserves System (refer to Section 4.7 for more detail). As such, the land will be protected in perpetuity and managed for conservation by the relevant SA government department (currently the South Australian Department for Environment and Water

Parameter	Value			Reasoning
	Stage 1A	Stage 1B	Common Asset (OTL and Substation)	
				(DEW)). As the land will be managed for conservation, it will not be subject to grazing by stock (including domestic hard-hoofed stock) and weeds and feral animals will also be managed/controlled, which is expected to contribute to maintaining the increase in PBTL habitat condition achieved in the ten years of implementation of this PBTL OMP. Furthermore, changes in land use (such as those described above previously) will also be prevented from occurring, and access by vehicles and foot traffic potentially impacting upon PBTL habitat, will also be highly restricted, which is also expected to contribute to maintaining the increase in PBTL habitat condition achieved in the ten years of implementation of this PBTL OMP. As such, the future quality of the PBTL habitat within the PBTL Offset Areas is expected to be increased via implementation of the PBTL OMP, compared to the future quality of the same PBTL habitat without implementation of the offsets or PBTL OMP. If monitoring undertaken as part of this PBTL OMP (as outlined in Section 6.3.9 and Section 6.5) determines that the future quality target score of 6 out of 10 for the PBTL Offset Areas has not been achieved within the proposed ten-year management timeframe, then NEOEN will undertake further management in accordance with this PBTL OMP beyond the initial ten years proposed, until the future quality target score is achieved. Monitoring and reporting will also continue until the future quality target score is achieved.
Confidence in result (%) – Risk of loss	90%	90%	90 %	The high confidence (90%) is due to the major threats outlined in the PBTL Recovery Plan (Duffy *et al.* 2012), such as change in land practice and development, being addressed by the PBTL OMP for the proposed PBTL Offset Areas, including implementation of the legal agreement. In particular, monitoring results for the PBTL Offset Areas will be used to identify any changes required to management measures (such as grazing regime) to rectify any shortfalls or underperformance issues.
Confidence in result (%) – Future quality	90%	90%	90 %	The high confidence (90%) is attributed to the results from the extensive scientific literature on the ecology of PBTLs. For example, the confidence level for determining a change in the fecundity of PBTLs between moderate and heavily grazed sites was 95% (Nielsen and Bull 2017). As such, this confidence level has been applied to the calculator.
% of impact offset (i.e. by 28.0 ha, 106 ha and 14.5 ha proposed PBTL Offset Areas)	90.60 %	90.81 %	100.37 %	As calculated by the guide.
Minimum 90 % direct offset requirement met?	Yes	Yes	Yes	As calculated by the guide.

4.4 Size of the PBTL Offset Areas

As stated previously, the *Offsets Assessment Guide* (the guide) has been used to determine the size of the Offset Area required for the impact to PBTL habitat associated with each Project component, which is presented in Table 14.

Table 14. Size of Offset Area required for each Project component.

Project component	Offset Area required (ha)
Stage 1A	28.0
Stage 1B	106.0
Common Asset (OTL and Substation)	14.5
Total	**148.50**

4.5 Property and land tenure of the proposed PBTL Offset Areas

The land in which the PBTL Offset Areas are proposed to be located was until recently, privately owned. However, as stated previously (in Section 4), NEOEN have recently purchased the land that will contain the proposed PBTL Offset Areas and proposed to transfer ownership of it to The Crown / State of South Australia for incorporation into the Reserves System under the *National Parks and Wildlife Act 1972,* with the land gazetted as a national park, conservation park or similar protected area, which will ensure protection in perpetuity. As such, the proposed property and land tenure details for the PBTL Offset Areas are presented in Table 15.

Table 15. Property and land tenure details for the proposed PBTL Offset Areas.

Landholder	The Crown / State of South Australia
Land manager	South Australian Department for Environment and Water (DEW)
Local Government Area	Regional Council of Goyder
NRM Region	Northern and Yorke
Hundred	Apoinga
Current land parcel & title	[redacted] (but may change)
Current tenure	Freehold
Proposed tenure	Crown Record

4.6 Current land use and management

The land in which the PBTL Offset Areas are proposed to be located on is currently used for grazing of sheep and/or cattle. The current stocking rate is not known but seems to accommodate sufficiently for PBTLs.

4.7 Protection of the Offset Areas

As stated previously, Neoen propose to transfer ownership of the land containing the PBTL Offset Areas to The Crown / State of South Australia for incorporation into the Reserves System under the *National Parks and Wildlife Act 1972,* with the land gazetted as a national park, conservation park or similar protected area, which will ensure protection in perpetuity. As part of this process, Neoen is currently engaged in negotiations with the South Australian Department for the Environment and Water (DEW) and expects that the process will take at least 12 months to finalise. If it is not finalised within 12 months Neoen will continue to pursue the process with DEW until it is finalised.

If agreement cannot be reached and the land cannot be incorporated into the Reserves System, then Neoen will pursue alternate protection measures, such as a Heritage Agreement, in accordance with the South Australian *Native Vegetation Act 1991*, over each PBTL Offset Area, which will provide protection in perpetuity.

4.8 Selection and suitability of the proposed PBTL Offset Areas for PBTLs

Field surveys of the proposed PBTL Offset Areas were undertaken by EBS Ecology Director/Principal Ecologist Dr Travis How (who has been a member of the PBTL Recovery Team) and EBS Ecology staff in June and October 2022, to assess the presence of the species and map PBTL habitat within the areas (refer to Appendix 1 for data recorded). These surveys were consistent with the *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DSEWPC 2011), where relevant. A total of 148.50 ha of PBTL habitat was identified and three PBTLs were recorded, as shown in Figure 15.

The proposed PBTL Offset Areas contain numerous spider holes, one of the key habitat indicators for PBTL, and a high occurrence of spiders. However, a high proportion of the spider holes were probably not deep enough to be suitable for PBTLs, which may suggest why a larger population of PBTLs was not observed. This is an indicator that the density of PBTLs in this area is low and one of the likely limiting factors to their presence is the lack of suitable spider holes.

In addition, the site was observed to be fairly degraded, with a significant number of weeds such as thistles and annuals including Salvation Jane (*Echium plantagineum*) present.

Whilst the proposed PBTL Offset Areas may not currently contain a large amount of high quality PBTL habitat, nor a substantial population of PBTLs, there are significant opportunities to increase PBTL habitat quality and thus increase the PBTL population at the sites.

The proposed PBTL Offset Areas have been selected and is considered highly suitable as an offset site for PBTLs for the following reasons:

- The proposed PBTL Offset Area for Stage 1A contains a small population of PBTL, while the proposed PBTL Offset Area for Stage 1B is immediately adjacent to where the small population of PBTL was observed;
- The areas will be purchased by Neoen and transferred to The Crown / State of South Australia for incorporation into the State's reserve system as a national park, conservation park, conservation reserve (or similar) and be protected into the future;

- The areas contain structural elements of the species' habitat requirements and is in a condition where active management of threats to the species (such as unsuitable grazing regimes, weeds and feral animals) is likely to improve the PBTL population and PBTL habitat conditions within the site;
- The areas are located in close proximity to other areas that contain PBTLs, thereby potentially connecting these areas and enhancing landscape connectivity;
- The areas are in close proximity to the impact site (infrastructure footprint of the Goyder South Project), but not impacted by the Project; and
- The areas will have one land manager (DEW) (rather than multiple property owners / managers), which will increase the ease of co-ordinated management of the site.

4.9 Known and/or potential threats to the proposed PBTL Offset Areas

All of the known and/or potential threats identified in the PBTL Recovery Plan (Duffy *et al.* 2012), which are summarised in Table 6 (Section 3.4), have the potential to threaten the proposed PBTL Offset Areas and the PBTLs within them. However, apart from climate change and natural predators, all of the known and/or potential threats can be avoided and/or managed via implementation of specific management actions outlined within this PBTL OMP (which are outlined in Section 6).

5 EPBC OFFSETS POLICY

As stated previously, this PBTL OMP has been prepared in accordance with the *EPBC Offsets Policy* (DSEWPC 2012a). In order to demonstrate how the proposed PBTL Offsets are consistent with the EPBC Offsets Policy, a review of the proposed PBTL Offsets against the eight overarching Offset Principles has been undertaken and is presented in Table 16 on the following pages.

Table 16. Offset Principles outlined in the EPBC Offsets Policy and comments on how the proposed PBTL Offset is consistent with them.

Offset Principle	Details / Commentary	Comments on how the proposed PBTL Offset is consistent with the Offset Principle
1. Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.	Offsets must directly contribute to the ongoing viability of the protected matter impacted by the proposed action, and deliver an overall conservation outcome that *improves* or *maintains* the viability of the protected matter as compared to what is likely to have occurred under the status quo, that is if neither the action nor the offset had taken place. Offsets should be tailored specifically to the attribute of the protected matter that is impacted in order to deliver a conservation gain. For impacts on habitat for threatened species, migratory species and threatened ecological communities, any direct offset must meet, as a minimum, the quality of the habitat at the impact site.	The EPBC Offsets Assessment Guide has been used to calculate the direct offset areas required for the maximum disturbance that may occur under the proposed layout, in order to compensate for any adverse impacts to PBTL and provide a measurable conservation gain. Implementation of the PBTL Offset Areas is expected to achieve an overall conservation outcome that as a minimum maintains, but also improves the viability of PBTLs within the PBTL Offset Areas. This EPBC OMP has been specifically developed to ensure the effective management of the PBTL Offset Areas, ensuring its continued suitability as habitat for resident PBTLs. Installation of artificial PBTL burrows together with active management of the PBTL Offset Areas, in accordance with Section 6.3.2, will ensure that the quality of habitat within the PBTL Offset Areas will improve upon its current condition.
2. Suitable offsets must be built around direct offsets but may include other compensatory measures.	Offsets must be built around direct offsets, which should form a minimum of 90 % of the total offset requirement. Other compensatory measures may satisfy up to a maximum of 10 % of the total offset requirement. Where possible, an offset should address key priority actions outlined for the impacted protected matter in any approved recovery plans, threat abatement plan, conservation advice, ecological character description or approved Commonwealth management plan. Higher priority actions are preferred to lower priority actions. ***Tenure*** The securing of existing unprotected habitat as an offset only provides a conservation gain if that habitat was under some level of threat of being destroyed or degraded, and as a result of offsetting will instead be protected in an enduring way and actively managed to maintain or improve the viability of the protected matter. The tenure of the offset should be secured for at least the same duration as the impact on the protected matter arising from the action, not necessarily the action itself. Legal mechanisms, such as conservation covenants, exist in each state and territory to enable protection of the land that is set aside for environmental purposes on a permanent or long-term basis. There is also provision under Part 14 of the EPBC Act for the Minister to enter into a conservation agreement with a third party for the conservation of a protected matter. An EPBC Act conservation agreement is a flexible instrument that can be used for implementing a range of management activities to benefit a protected matter, such as fencing off important habitat areas, undertaking weed and feral animal control or the establishment of compensatory habitat.	As outlined in Section 4.1, the offsets in this PBTL OMP are built around direct offsets, but also include other compensatory measures. A total of 90.60 % of the Stage 1A, 90.81 % of the Stage 1B, and 100.37 % of the Common Asset offsets will be achieved via the establishment and implementation of direct offsets in the form of the on-ground PBTL Offset Areas. The remaining percentage of the offsets required for Stage 1A (9.40 %) and Stage 1B (9.19 %) is proposed to be achieved via implementation of a PBTL monitoring program across Stage 1A and Stage 1B. The EPBC offset addresses key priority actions for PBTL outlined in the PBTL Recovery Plan (Duffy *et al.* 2012) by assisting in improving the long-term viability of PBTLs in the PBTL Offset Areas. In particular, the PBTL Offset contributes to the following specific objectives from Duffy *et al.* (2012): • Protect existing PBTL populations and habitat; • Maintain, enhance and increase the area and quality of suitable habitat for PBTL at known populations; and • Monitor populations to evaluate the effectiveness of management and detect trends which may require a management response. Refer to Section 6.1 for detail. As stated in Section 3.2 there is no conservation advice or threat abatement plan for PBTL. ***Tenure***

Offset Principle	Details / Commentary	Comments on how the proposed PBTL Offset is consistent with the Offset Principle
		As stated previously in Section 4.5, NEOEN propose to purchase the land that will contain the proposed PBTL Offset Areas and transfer ownership of it to The Crown / State of South Australia for incorporation into the State's Reserves System as a national park, conservation park or similar protected area. As such, land tenure is expected to change from freehold to Crown Reserve. The Project Owner (NEOEN) will enter into a legal agreement with the land manager (DEW) to manage the proposed PBTL Offset Areas for a minimum of ten years.
3. Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	Due to the higher risk involved with protected matters of greater conservation status, the offsets required for those protected matters with higher conservation status must be greater than those with a lower status. For listed threatened species and ecological communities, this is calculated in the Offsets assessment guide by using International Union for Conservation of Nature data on the probability of annual extinction for different categories of threatened species.	The proposed offsets are considered to be in proportion to the level of statutory protection that applies to PBTL, as the Offsets Assessment Guide was used to calculate the direct offset areas required (28.00 ha, 106.0 ha and 14.5 ha ha) for the maximum disturbance that may occur under the proposed layout.
4. Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	Offsets must be proportionate to the size and scale of the residual impacts arising from the action so as to deliver a conservation gain that adequately compensates for the impacted matter. The size and scale of an offset required for each impact is determined by taking account of a number of different considerations that are discussed in the EPBC Offsets Policy, including the: • level of statutory protection that applies to the protected matter; • specific attributes of the protected matter, or its habitat, being impacted; • quality or importance of the attributes being impacted with regard to the protected matter's ongoing viability; • permanent or temporary nature of the residual impacts; • level of threat (risk of loss) that a proposed offset site is under; • time it will take an offset to yield a conservation gain for the protected matter; and • risk of the conservation gain not being realised.	A number of different considerations outlined in the EPBC Offsets Policy have been taken into account and entered into the Offset Assessment Guide (where appropriate), including: • level of statutory protection to PBTLs (Endangered); • specific attributes of PBTL habitat being impacted by the infrastructure footprint = 43.53 ha with a quality score of 6 (scale 0-10); • quality or importance of the PBTL habitat being impacted with regard to PBTL ongoing viability (6 out of 10); • permanent or temporary nature of the residual impacts (operational life of the Goyder South Project is expected to be approximately 30 years); • level of threat (risk of loss) that the proposed offset site is under (which is considered to be a low to moderate risk of loss without offset measures in place); • time it will take the proposed offset (PBTL Offset Areas) to yield a conservation gain for PBTLs (10 years); and • risk of conservation gain not being realised (which is considered to be a low 2% as confidence in result is considered to be 90%). Therefore, the proposed direct offset (PBTL Offset Areas) is considered to be proportionate to the size and scale of the residual impacts on PBTLs arising from the action.

Offset Principle	Details / Commentary	Comments on how the proposed PBTL Offset is consistent with the Offset Principle
5. Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	The use of offsets as a compensatory measure through the assessment and approval process involves two levels or risk. The first, and highest, level of risk is that the impact on the protected matter will be too great and that an offset will not be able to compensate for the impact. The second level of risk relates to whether individual offsets are likely to be successful in compensating for the residual impacts of a particular action over a period of time. It is this risk that is considered in determining a suitable offset and has direct bearing on the scale of the offset required. The magnitude of a suitable offset will increase proportionately to the risk posed to the protected matter by the proposed action. In general terms, direct offsets present a lower risk than other compensatory measures, as they are more likely to result in a conservation gain for a protected matter.	The proposed PBTL Offset Areas will be implemented and managed in accordance with a PBTL OMP (Section 6), which identifies potential risks (such as a decrease in PBTL population(s) and/or PBTL habitat condition) as well as associated contingency measures for the successful management of the proposed PBTL Offset Areas. The PBTL OMP involves an adaptive management approach where monitoring will measure progress and allow for timely identification of any changes required to management measures (for example the grazing regime), which will help to ensure that the PBTL Offset Areas are successful. A high percentage (90.60 – 100.37 %) of the proposed PBTL Offsets are direct offsets (i.e., the on-ground PBTL Offset Areas), which is considered by the *EPBC Offsets Policy* to present a lower risk than compensatory measures, as they are more likely to result in a conservation gain. Furthermore, the proposed PBTL Offset is proposed to be implemented as soon as possible upon commencement of the action, which is also considered to reduce the risk profile of the offset through providing a conservation gain at an earlier point in time.
6. Suitable offsets must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.	Offsets must deliver a conservation gain for the impacted protected matter, and that conservation gain must be new, or additional to what is already required by a duty of care or to any environmental planning laws at any level of government. It is important to note however that this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action. Whether or not an offset is considered to be additional will be assessed on a case by case basis. ***Links with state and territory approval processes*** It is important to note that while there are many similarities between the environmental laws of the states and territories and the EPBC Act, they also differ in a fundamental way. The EPBC Act focuses on protecting MNES and only protects the broader environment in certain circumstances, while state and territory laws usually protect the environment as a whole (for example air quality, noise pollution, water quality, biodiversity, and heritage values). These differing legislative objectives result in different assessment processes and can result in different offset requirements. As a consequence, some proponents may need to provide offsets under both state or territory laws and the EPBC Act for the same action. A state or territory offset will count toward an offset under the EPBC Act to the extent that it compensates for the residual impact to the protected matter identified under the EPBC Act.	The Goyder South Project is required to achieve a Significant Environmental Benefit (SEB) in accordance with the SA *Native Vegetation Act 1991,* for clearance of native vegetation. NEOEN have negotiated with a local landowner to purchase land located south-east of Stage 1A and south of Stage 1B, which includes the Worlds End Gorge to achieve majority of the total SEB required for the Goyder South Project (Stage 1A, Stage 1B and the Overhead Transmission Line and Substation). However, the SEB area is separate to the PBTL Offset and as such the PBTL Offset is additional to what is required by the SA *Native Vegetation Act 1991*. No other environmental schemes or programs, for example stewardship funding from a program such as *Caring for our Country* are currently applicable to the land parcels proposed to be used for the EPBC Offset. Therefore, the EPBC Offset will be additional to what is already required and/or determined by SA law or planning regulations (other offset requirements).

Offset Principle	Details / Commentary	Comments on how the proposed PBTL Offset is consistent with the Offset Principle
7. Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable.	Efficient and effective offsets are those that maintain or improve the viability of a protected matter through the sound allocation of resources. An offset should be implemented either before, or at the same point in time as, the impact arising from the action. This timing is distinct from the time it will take an offset to yield a conservation gain for the protected matter, which may be a point in the future. Offsets must be based on both scientifically robust and transparent information that sufficiently analyses and documents the benefit to a protected matter's ecological function or values. This includes undertaking desktop modelling of offset benefits and conducting relevant field work as appropriate.	Implementation of the proposed PBTL Offset Areas is considered to be a highly efficient, effective, timely, transparent, scientifically robust and reasonable offset for the following reasons: • the *time until ecological benefit* is 10 years as while the PBTL Offset Areas is proposed to be implemented as soon as possible upon commencement of the action and the legal agreement will immediately secure the future management of the PBTL Offset Areas, for the conservation of PBTLs, it may take up to 10 years for ecological benefit to be achieved. • The *risk of loss* (with offset) is only 2 % as the PBTL Offset Areas is proposed to be protected for the duration of the Goyder South Project's operation (as a minimum) via incorporation into the State's reserve system as a national park, conservation park or similar protected area; and the PBTL Offset Areas will be actively managed in accordance with the PBTL OMP. • Monitoring of the PBTL Offset Areas, in accordance with the PBTL OMP, will provide scientifically robust data which will be used to identify any changes required to management measures (for example the grazing regime). • Monitoring reports will be provided to the Department and may also be uploaded to the Goyder South Project's website for public viewing (desensitised) if appropriate.
8. Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Offsets must be delivered within appropriate and transparent governance arrangements. Proponents, or their contractors, must report on the success of the offsets so that conditions of approval can be varied if the offsets are not delivering the desired outcome. Offset proposals will need to include clearly articulated measures of success that are linked to the purpose of the offsets and provide clear benchmarks about their success or failure. Annual reports will be required by the department and, where possible, will be made publicly available. Performance of offsets will be reviewed as part of the monitoring, compliance and audit program for all proposals considered under the EPBC Act.	The PBTL OMP (Section 6), including the PBTL Offset Areas Monitoring Program (Section 6.5) clearly outline the following: • the management responsibilities between the Project Owner and the land manager, as well as an ecological consultancy; • the ecological indicators to be monitored and a proposed monitoring methodology to audit the implementation of the management actions and identify any changes to management actions that might be required; and • the annual reporting responsibilities, which include submission of a monitoring report to the Department. All environmental reporting and records will be available for auditing by the Department if required.

Source: Adapted from the EPBC Offsets Policy (DSEWPC 2012a).

6 PBTL OFFSET MANAGEMENT PLAN

This section outlines the specific details to guide the establishment, implementation and management of the PBTL Offsets consisting of the PBTL Offset Areas. It details the specific management aspects and associated management actions that are required to be undertaken to establish, implement and manage the PBTL Offsets and PBTL Offset Areas for a minimum of ten years, after which the need for ongoing management in accordance with this PBTL OMP will be reviewed and reconsidered (as outlined in Section 6.3.1).

Furthermore, this section contains clear objectives, roles and responsibilities, as well as the measurable outcomes associated with each management action to monitor progress and success. It also includes a specific monitoring program, reporting requirements and a process for review and improvement, as well as identifying potential risks to achieving the objectives of the PBTL Offsets.

6.1 Objectives

The key objectives of each PBTL Offset Area will include:

- Formal protection of each PBTL Offset Area for the duration of each associated action (Stage 1A, Stage 1B and the Common Asset (OTL and Substation)). However, protection is highly likely to be in perpetuity as the PBTL Offset Areas will be located on land which is proposed to be added to South Australia's reserve system and become the first and only areas known to contain PBTLs to be protected within the public Reserve System (as outlined in Section 4.7).
- Management of each PBTL Offset Area in accordance with this PBTL OMP, for a minimum of ten years (after which the need for ongoing management will be reviewed and reconsidered) in order to:
    - maintain and increase (where possible) the condition/quality of each PBTL Offset Area from a 4 to a 6 (as outlined in Table 13); and
    - increase the PBTL population(s) (where possible).
- Monitor habitat condition and PBTL population numbers within each PBTL Offset Area.

These objectives align with overall and specific objectives of the PBTL Recovery Plan (Duffy *et al.*, 2012) by assisting in improving the long-term viability of PBTLs in the PBTL Offset Areas. In particular, the PBTL OMP is expected to contribute to the following specific objectives from Duffy *et al.* (2012):

- Protect existing PBTL populations and habitat;
- Maintain, enhance and increase the area and quality of suitable habitat for PBTL at known populations; and
- Monitor populations to evaluate the effectiveness of management and detect trends which may require a management response.

The key objectives will be achieved via implementation of specific management aspects and associated management actions and monitoring will determine if the objectives are being achieved. To ensure the objectives are met, an adaptive management approach will be adopted. This approach requires regular

monitoring and review of the Plan, allowing for review and corrective action of management strategies if required.

The objective to manage the proposed PBTL Offset Areas for a minimum of ten years, in order to maintain and improve PBTL habitat and maintain and increase the PBTL population(s), will primarily be achieved via the following management aspects:

- removal of domestic livestock grazing;
- installation of artificial PBTL burrows;
- management of grazing regime (i.e. native grazers such as (kangaroos) (if required));
- weed control; and
- feral animal control.

These measures will enable the PBTL population to be maintained and increased. The population may increase naturally via natural reproduction, and/or potentially by PBTLs from neighbouring populations moving into the PBTL Offset Areas.

6.2 Roles and responsibilities

It is anticipated that there will be three main roles associated with implementation of the PBTL OMP, including the Project Owner (NEOEN), the land manager (DEW) and an ecological consultancy. The aspects and/or tasks that each role is likely to be responsible for are summarised in Table 17.

Table 17. Roles and responsibilities associated with implementation of this Plan.

Role	Aspects and/or tasks the role is responsible for
Project Owner (NEOEN)	Currently NEOEN is the project developer and Project Owner, and is responsible for the planning of the entire Goyder South Project, including seeking and obtaining relevant planning and environmental approvals under State and Federal legislation as well as construction and operation of the Project. NEOEN intends to own and operate the Goyder South Project in the future and does not intend to sell the Project. The Project Owner will be responsible for implementing the PBTL OMP including this PBTL OMP, which involves planning and establishing the proposed PBTL Offset Areas as well as engaging a suitably qualified ecological consultancy, with experience working with PBTLs, to undertake monitoring and reporting on the PBTL Offset Areas and review of the PBTL OMP. In particular, the Project Owner is responsible for ensuring that reporting responsibilities are completed. Implementation of the PBTL OMP will be the responsibility of the Project Owner. Should the Project Owner change in future, implementation of the PBTL OMP will remain the responsibility of whoever is the Project Owner.
Land manager (DEW)	It is proposed that the land manager (DEW) will be responsible for undertaking the day-to-day management of the PBTL Offset Areas on behalf of the Project Owner (NEOEN), including management of native grazers (if required), weed and feral animal control, fire prevention and restricting access. The Land manager will also be responsible for reporting on management actions undertaken.
Ecological Consultancy	It is proposed that a suitably qualified and experienced ecological consultancy will be responsible for establishing the PBTL Offset Areas, including the installation of artificial PBTL burrows. The same ecological consultancy is likely to be required to undertake monitoring and reporting activities and likely to be responsible for reviewing and analysing monitoring data and results to determine the success (or failure) of management actions and recommending refinement/improvement, if required.

As stated previously, NEOEN proposes to negotiate a legal agreement with the land manager (DEW) to manage the proposed PBTL Offset Areas. Whilst the land manager (DEW) will be responsible for implementing management actions within the PBTL OMP, NEOEN will retain overall responsibility for ensuring the entire PBTL OMP is implemented. NEOEN will also be responsible for undertaking monitoring and reporting, as well as review of the PBTL OMP, with these tasks likely to be completed by a suitably qualified and experienced ecological consultancy. This includes periodic review of the PBTL OMP's success, including update and improvement of management actions if required. This may involve NEOEN providing further direction to the land manager (DEW) or utilising the resources of an external contractor to implement specific tasks.

Management responsibilities are also allocated for each management action in Table 18 in Section 6.3.

6.3 Management aspects and associated management actions

The management aspects addressed in this Plan include the following:

- Implementation of the PBTL OMP
- Planning and establishment (including protection) of the PBTL Offset Areas
- Management of grazing regime
- Weed and pest animal control
- Fire prevention
- Restricting access and preventing poaching
- Monitoring and reporting
- Review and update of the PBTL OMP

These management aspects and the management actions associated with them, are outlined in Table 18, while more detail is provided in the sub-sections further below. The timeline, responsibility and measurable outcome associated with each management action is also included in Table 18.

Management actions associated with each management aspect will be implemented in accordance with the PBTL Recovery Plan (Duffy *et al.* 2012) and the *Pygmy Bluetongue Lizards: Best Practice Management Guidelines for Landholders* (PBTL Best Practice Management Guidelines) (Schofield 2006).

Table 18. Proposed management aspects and actions, along with associated proposed timing, responsibility, measurable outcomes and corrective actions.

Management aspect	Management action	Reference	Timing	Responsibility	Measurable outcome	Corrective action
Implementation of the PBTL OMP	Implement the PBTL OMP.	Section 6.3.1	Immediately upon approval of the OMP by the Minister and for a minimum of ten years.	Project Owner	The PBTL OMP is implemented immediately upon approval of the OMP by the Minister and for a minimum of ten years, and measurable outcomes associated with management actions are achieved or in the process of being achieved.	Project Owner to implement the PBTL OMP within 14 days of becoming aware that the PBTL OMP has not yet been implemented.
Planning and establishment of proposed PBTL Offset Areas	Execute the legal agreement between the Project Owner (NEOEN) and the land manager (DEW).	Section 6.3.2	As soon as possible after approval of the OMP by the Minister.	Project Owner	Legal agreement between the Project Owner (NEOEN) and the land manager (DEW) is executed as soon as possible after approval of the OMP by the Minister.	Project Owner to execute the legal agreement as soon as possible upon becoming aware that the legal agreement has not yet been executed.
	Establish formal protection of the PBTL Offset Areas (i.e. likely to be inclusion within the Reserves System).	Section 6.3.2	Commence process immediately after approval of the OMP by the Minister.	Project Owner	Process to achieve formal protection of the PBTL Offset Areas commenced immediately after approval of the OMP by the Minister.	Project Owner to establish formal protection of the PBTL Offset Areas as soon as possible upon becoming aware that formal protection of the PBTL Offset Areas has not yet been established.
	Establish the PBTL Offset Areas on site via installation of inconspicuous markers at key boundary locations where there is no existing fence line.	Section 6.3.2	As soon as possible after approval of the OMP by the Minister.	Project Owner (may delegate task)	Inconspicuous markers identifying PBTL Offset Areas on site are installed as soon as possible after approval of the OMP by the Minister.	Project Owner to establish proposed PBTL Offset Areas on site via installation of inconspicuous markers at key boundary locations where there is no existing fence line within 14 days of becoming aware that the markers have not yet been installed on site.
Preliminary assessment of the proposed PBTL Offset Areas	Undertake preliminary assessment of the PBTL Offset Areas.	Section 6.3.3	At the earliest opportunity upon implementation of the OMP but outside of the PBTL brumation season (June to August).	Project Owner (delegate task to ecological consultancy)	Preliminary assessment of the PBTL Offset Areas undertaken at the earliest opportunity upon implementation of the OMP but outside of the PBTL brumation season (June to August).	Project Owner to ensure preliminary assessment of the PBTL Offset Areas is undertaken as soon as possible upon becoming aware that it has not yet been undertaken.
Installation of artificial PBTL burrows	Install artificial PBTL burrows within the PBTL Offset Areas.	Section 6.3.4	After the preliminary assessment of the PBTL Offset Areas and preferably completed in 2023.	Project Owner (delegate task to ecological consultancy)	Artificial PBTL burrows installed within the PBTL Offset Areas and preferably completed in 2023.	Project Owner to ensure that artificial burrows are installed within the PBTL Offset Areas as soon as possible upon becoming aware that they have not yet been installed.

Management aspect	Management action	Reference	Timing	Responsibility	Measurable outcome	Corrective action
Management of grazing regime	Remove and exclude domestic grazers (sheep/cattle) from the PBTL Offset Areas.	Section 6.3.5	Immediately prior to / upon commencement of implementation of the OMP.	Project Owner (may delegate task)	Domestic grazers (sheep/cattle) removed and excluded from the PBTL Offset Areas.	Project Owner to ensure that domestic grazers (sheep) are removed from the PBTL Offset Areas as soon as possible upon becoming aware that they have not yet been removed.
	Management of grazing regime via monitoring of grassland conditions. If monitoring determines that grazing levels are too high, then local kangaroo numbers may require control (via culling).	Section 6.3.5	As soon as possible after monitoring results.	Project Owner, ecological consultancy and land manager.	Grassland conditions are monitored and reported upon with management recommendations made (by ecological consultancy); and if grazing levels are considered too high, then local kangaroo numbers are controlled by land manager (via culling) if recommended by ecological consultancy.	Project Owner to contact land manager within 7 days of becoming aware of any identified non-compliance associated with management of grazing regime, as outlined within the PBTL OMP and required by the legal agreement between the Project Owner and the land manager. Agreement with land manager to permit Project Owner to take corrective action (such as culling of kangaroos) if required.
Weed and feral animal control	Control weeds, particularly Declared weeds such as Salvation Jane (*Echium plantagineum*), in accordance with measures detailed in Section 6.3.6.	Section 6.3.6	Annually during implementation of this OMP, as appropriate for each targeted weed species and ongoing for a minimum of ten years.	Land manager	Records of weed control effort documented (via Activity Record Sheet in Appendix 2) and included in the monitoring report, including mapping (if possible), including: • Species; • Location; • Method of control (including quantity / concentration of herbicide, if used); and • If re-treatment is required.	Project Owner to contact land manager within 7 days of becoming aware of any identified non-compliance associated with weed control to remind them to control weeds and document weed control in the Activity Record Sheet (Appendix 2), as outlined within the PBTL OMP and required by the legal agreement between the Project Owner and the land manager. Agreement with Land manager to permit Project Owner to take corrective action including stepping in to undertake weed control, if required.
	Control feral animals, particularly foxes. Use methods which avoid or minimise ground disturbance.	Section 6.3.6	Annually during implementation of this OMP, or as appropriate for each feral animal species and ongoing for a minimum of ten years.	Land manager	Records of feral animal control documented (via Activity Record Sheet in Appendix 2) and included in the monitoring report, including mapping (if possible) including: • Species and number (if possible); and • Method of control (including quantity and/or concentration of any poison used).	Project Owner to contact land manager within 7 days of becoming aware of any identified non-compliance associated with feral animal control to remind them to control feral animals and document feral animal control in the Activity Record Sheet (Appendix 2), as outlined within the PBTL OMP and required by the legal agreement between the Project Owner and the land manager. Agreement with land manager to permit Project Owner to take corrective action

Management aspect	Management action	Reference	Timing	Responsibility	Measurable outcome	Corrective action
						including stepping in to undertake feral animal control, if required.
Fire prevention	Continue to use grazing to manage fuel loads. Ensure grazing is in accordance with PBTL Offset Areas grazing regime requirements.	Section 6.3.7	Ongoing during implementation of this OMP, for a minimum of ten years.	Land manager	Evidence of native grazers being present within the PBTL Offset Areas (observed by ecological consultancy during monitoring).	Project Owner to contact land manager within 7 days of becoming aware of any identified non-compliance and remind them to use grazing to manage fuel loads (ensuring that grazing is in accordance with PBTL Offset Areas grazing regime requirements) as outlined within the PBTL OMP and required by the legal agreement between the Project Owner and the land manager. Agreement with land manager to permit Project Owner to take corrective action, if required.
	Any occurrence of a fire event within the PBTL Offset Areas should be reviewed as part of the monitoring and reporting process.	Section 6.3.7	During PBTL Offset Areas monitoring and reporting.	Ecological Consultancy / Project Owner	Occurrence of fire documented in PBTL Offset Areas Monitoring Report.	Project Owner to contact the ecological consultancy within 7 days of becoming aware of any identified non-compliance and remind them to document the occurrence of fire in PBTL Offset Areas Monitoring Report or request re-drafting of the report as required.
Restricting access and preventing poaching	Continue to maintain existing boundary fencing surrounding the PBTL Offset Areas and ensure gates are locked.	Section 6.3.8	Ongoing during implementation of this OMP, for a minimum of ten years.	Land manager	Existing boundary fencing surrounding the PBTL Offset Areas is intact and maintained with no gaps, and gates are locked.	Project Owner to contact the land manager within 7 days of becoming aware of any identified non-compliance associated with restricting access and preventing poaching and remind them to maintain fencing surrounding the PBTL Offset Areas, as outlined within the PBTL OMP and required by the legal agreement between the Project Owner and the land manager. Agreement with land manager to permit Project Owner to take corrective action, if required.

Management aspect	Management action	Reference	Timing	Responsibility	Measurable outcome	Corrective action
	Ensure presence and location of the PBTL Offset Areas is not communicated or made accessible to the general public.	Section 6.3.8	Ongoing during implementation of this OMP, for a minimum of ten years.	Project Owner, land manager and ecological consultancy.	Presence and location of the PBTL Offset Areas is not communicated or made accessible to the general public.	Project Owner to contact the land manager and/or the ecological consultancy within 7 days of becoming aware of any identified non-compliance associated with restricting access and preventing poaching and remind them to ensure the presence and location of the PBTL Offset Areas is not communicated or made accessible to the general public, as outlined within the PBTL OMP and required by the legal agreement between the Project Owner and the land manager. Agreement with land manager to permit Project Owner to take corrective action, if required.
Monitoring and reporting	Complete Activity Record Datasheet (Appendix 2) and provide to the Project Owner (NEOEN).	Section 6.3.9	Proposed to be completed by the end of May each year (or as otherwise appropriate), for the duration of the PBTL Offset Areas monitoring program.	Land manager	Completed Activity Record Datasheet provided to the Project Owner by the end of May each year.	Project Owner to contact the land manager within 7 days of becoming aware of any identified non-compliance and remind them to complete the Activity Record Sheet (Appendix 2) and provide it to the Project Owner by the end of May each year. Agreement with Land manager to permit Project Owner to take corrective action, if required.
	Engage a suitably qualified and experienced ecological consultancy to undertake the monitoring program (for the first ten years (as a minimum) of the PBTL Offset Areas) and complete annual reporting requirements.	Section 6.3.9	As soon as possible after approval of the OMP by the Minister.	Project Owner	A suitably qualified and experienced ecological consultancy is engaged to undertake monitoring and reporting for the PBTL Offset Areas.	Project Owner to engage a suitably qualified and experienced ecological consultancy to undertake the monitoring program and complete annual reporting requirements, within 28 days of becoming aware of any identified non-compliance.

Management aspect	Management action	Reference	Timing	Responsibility	Measurable outcome	Corrective action
	Complete monitoring and reporting, including recommendation of any minor amendments to management actions, such as management of grazing regime (control of kangaroos), weed control and/or feral animal control.	Section 6.3.9 and Section 6.5	As outlined in Section 6.5 and for the first ten years (as a minimum) during implementation of the PBTL Offset Areas.	Ecological consultancy	PBTL Offset Areas Monitoring Report completed in accordance with Section 6.3.9.	Project Owner to contact the ecological consultancy within 28 days of becoming aware of any identified non-compliance and ensure PBTL Offset Areas Monitoring Report is completed in accordance with Section 6.3.9 and Section 6.5.
	Project Owner (NEOEN) to direct the land manager (DEW) to implement minor amendments to management actions, such as management of grazing regime (control of kangaroos), upon advice from the ecological consultancy (if required).	Section 6.3.9 and Section 6.3.10	Annually prior to finalisation of the PBTL Offset Areas Monitoring Report by the ecological consultancy.	Project Owner	Record (i.e., email or letter) of any direction to implement minor amendments to management actions given to the land manager.	Project Owner to ensure they direct the land manager to implement minor amendments to management actions, such as management of grazing regime (control of kangaroos), upon advice from the ecological consultancy (if required) and keep a record of any direction to implement minor amendments to management actions given to the land manager.
	Submit PBTL Offset Areas Monitoring Report to the Department.	Section 6.3.9	Annually or bi-annually as appropriate, (most likely in line with Department requirements (EPBC Act approval).	Project Owner	PBTL Offset Areas Monitoring Report submitted to the Department on an annual / bi-annual basis (as appropriate).	Project Owner to ensure PBTL Offset Areas Monitoring Report is submitted to the Department when due in each year.
Adaptive management	Adapt management actions in response to results of the monitoring program and/or unforeseen threats and issues, or advances in management technologies.	Section 6.3.10	After the Monitoring Report (if required).	Project Owner	Management actions adapted if the need to do so is identified in the Monitoring Report.	Project Owner to ensure that management actions are adapted if the need to do so is identified in the Monitoring Report.

Management aspect	Management action	Reference	Timing	Responsibility	Measurable outcome	Corrective action
Corrective actions	Undertake corrective actions if measurable outcomes are not achieved or on track to being achieved.	Section 6.3.11	After the Monitoring Report (if required) and/or as required during implementation of the PBTL OMP.	Project Owner	Corrective actions undertaken if the need to so is identified in the Monitoring Report and/or during implementation of the PBTL OMP.	Project Owner to ensure that corrective actions are undertaken within 28 days of becoming aware that corrective actions are required.
Review and update of PBTL OMP	Complete a review and update of the PBTL OMP to identify any amendments to the management actions and/or the monitoring program that may be required to ensure the objectives are met.	Section 6.3.12	At five yearly intervals for ten years (as a minimum), with the first review undertaken after the first five years of implementation of the PBTL Offset Areas.	Ecological consultancy / Project Owner	Reviewed and updated (if required) PBTL OMP in accordance with Section 6.3.12.	Project Owner to contact the ecological consultancy within 28 days of becoming aware of any identified non-compliance and ensure the PBTL OMP is reviewed and updated (if required) as soon as possible.

6.3.1 Implementation of the PBTL OMP

NEOEN intend to commence implementation of the PBTL OMP immediately after receiving approval of the PBTL OMP (which is anticipated to be in October 2023), prior to commissioning or operation of the action (as applicable). NEOEN propose to implement this PBTL OMP for a minimum of ten years, after which the need for ongoing management in accordance with this PBTL OMP will be reviewed and reconsidered.

While this PBTL OMP and the management actions within it are proposed to be implemented for a minimum of ten years, the land on which the on-ground PBTL Offset Areas occur will be incorporated into the Reserves System (refer to Section 4.7 for more detail). As such, the land will be protected in perpetuity and managed for conservation by the relevant SA government department (currently the South Australian Department for Environment and Water (DEW)). As the land will be managed for conservation, it will not be subject to grazing by stock (including domestic hard-hoofed stock) and weeds and feral animals will also be managed/controlled, which is expected to contribute to maintaining the increase in PBTL habitat condition achieved in the ten years of implementation of this PBTL OMP. Furthermore, changes in land use will also be prevented from occurring, and access by vehicles and foot traffic potentially impacting upon PBTL habitat, will also be highly restricted, which is also expected to contribute to maintaining the increase in PBTL habitat condition achieved in the ten years of implementation of this PBTL OMP.

As the land on which the on-ground PBTL Offset Areas occur will be protected in perpetuity and managed for conservation by the relevant SA government department (currently DEW) in perpetuity, ongoing management in accordance with this PBTL OMP beyond the proposed 10 years, is unlikely to be required.

If monitoring undertaken as part of this PBTL OMP (as outlined in Section 6.3.9 and Section 6.5) determines that the future quality target score of 6 out of 10 (refer to Table 13) for the PBTL Offset Areas has not been achieved within the proposed ten-year management timeframe, then NEOEN will undertake further management in accordance with this PBTL OMP beyond the initial ten years proposed, until the future quality target score is achieved. Monitoring and reporting will also continue until the future quality target score is achieved.

6.3.2 Planning and establishment of the PBTL Offset Areas

As stated previously, NEOEN proposes to negotiate a legal agreement with the land manager (DEW) to manage the proposed PBTL Offset Areas. This will include implementation of the PBTL OMP for a minimum of ten years, after which the need for ongoing management in accordance with this PBTL OMP will be reviewed and reconsidered (as explained above).

The legal agreement with the land manager (DEW) will prevent known and/or potential threats to the proposed PBTL Offset Areas, including change in land use, the use of pesticides (insecticides), habitat fragmentation, planting (tall trees and shrubs) and use of fertiliser within the proposed PBTL Offset Areas.

The location of the proposed PBTL Offset Areas will be identified on site (for monitoring purposes) via installation of inconspicuous markers at key boundary locations, where there is no existing fence line.

The western and southern boundaries of the proposed PBTL Offset Areas are currently fenced and will remain fenced into the future. However, fencing the northern and western boundaries is not proposed as these boundaries intersect with the adjacent native vegetation offset area, which is fenced on its outer

boundaries. Furthermore, installation of additional fencing will require clearance of vegetation and PBTL habitat, so is not desirable.

6.3.3 Preliminary assessment of the proposed PBTL Offset Areas

A preliminary assessment of the proposed PBTL Offset Areas will be undertaken at the earliest opportunity outside of the PBTL brumation season (June to August) and prior to implementation of the management actions including installation of artificial burrows, management of grazing regime, and weed and feral animal control detailed in the PBTL OMP, to:

- collect additional data on the location and abundance of PBTLs;
- collect additional data on PBTL habitat condition via assessment of grassland condition as well as existing burrow depths; and
- identify six 1 ha (100 m x 100 m) sites suitable for installation of artificial PBTL burrows and monitoring.

Once the data is collected it will be analysed and used to determine the best location for each of the six sites suitable for installation of artificial PBTL burrows that will be subject to monitoring.

6.3.4 Installation of artificial PBTL burrows

Given that the limiting factor to PBTL presence within the PBTL Offset Areas is believed to be a lack of suitable spider holes, artificial PBTL burrows will be installed to improve and extend PBTL habitat and contribute to increasing the population within the PBTL Offset Areas. Studies have shown that PBTLs accept and use artificial burrows (Milne *et al*., 2003; Souter *et al*., 2004).

Initially, it is proposed that artificial PBTL burrows will be installed at six separate 1 ha (100 m x 100 m) sites within each of the PBTL Offset Areas, with 20 artificial burrows installed at each site. Artificial burrows are likely to be constructed of 30 cm lengths of 3 cm diameter wooden doweling with a 2 cm diameter central hole. They are likely to be installed into the ground by drilling a 3 cm diameter hole approximately 30 cm deep with a drill or auger and then hammering the artificial burrow into the hole, with the top or entrance of the burrow flush with the ground surface. Artificial burrows will be installed a minimum of 1 m apart in four clusters of five burrows in each 1 ha site. A videoscope with an illuminated articulating camera at the end of an optic fibre insertion probe and a digital video display screen (e.g. Yatek M-Series) will be used to check the integrity of installed artificial burrows immediately after installation.

The location of each artificial burrow will be recorded via a hand-held GPS device, with the location added to a database, and marked inconspicuously on site to enable monitoring of the burrow, but minimise the risk of identifying the burrow to minimise the risk of poaching of PBTLs.

If monitoring determines that PBTLs are using the artificial burrows, then more artificial burrows may be installed in the future, either at the same sites or at additional sites within the PBTL Offset Areas.

6.3.5 Management of grazing regime

Domestic grazers (sheep/cattle and others) will be removed and excluded from the PBTL Offset Areas upon establishment of the site (as it will become a national park / conservation park or similar). However, native grazers (i.e. kangaroos) are expected to still graze within the PBTL Offset Areas. Implementation of

suitable grazing regime is a key part of managing the PBTL Offset Areas to maintain optimal habitat conditions for PBTLs.

The PBTL Recovery Plan indicates that heavy stocking rates and inappropriate grazing regimes impact adversely on PBTLs and PBTL habitat. Similarly, removing all grazing pressure may be detrimental to the condition of optimal PBTL habitat (Duffy *et al*, 2012). The current population of native grazers (such as kangaroos) and their associated grazing rate is not known. However, if monitoring of PBTL habitat (grassland) within the PBTL Offset Areas determines that grazing levels are too high, then local kangaroo numbers may require control (culling).

6.3.6 Weed and feral animal control

Weed control

Weed control is a key part of managing the PBTL Offset Areas to maintain optimal habitat conditions for PBTLs. As stated in Section 4.8 a significant number of weeds such as thistles and annuals including Salvation Jane (*Echium plantagineum*) are present within the PBTL Offset Areas. Salvation Jane is a Declared Weed which, in accordance with the *Landscape South Australia Act 2019* (LSA Act) is required to be controlled. As such, targeted weed control within the PBTL Offset Areas will be required to be undertaken, particularly for Declared weeds. However, non-declared weeds that are not required to be controlled under the LSA Act, will also be required to be controlled as part of this PBTL Offset Management Plan. This may also include control of grassy weeds, if required, as dense growth can reduce the suitability of habitat for PBTLs (Duffy *et al.* 2012).

Weed control methods should be selected to have minimal impact on PBTL habitat and be in accordance with the PBTL Recovery Plan (Duffy *et al.* 2012) and PBTL Best Practice Management Guidelines (Schofield 2006) as follows:

- Use minimal disturbance weed control methods wherever possible;
- If herbicide use is required:
    - Read and adhere to the guidelines and recommended quantities stated on the label of the herbicide container;
    - Ensure application occurs on a calm day to minimise drift and off-target damage;
    - Wherever possible, spot spray directly onto the target species; and
    - Avoid broadscale application of herbicide.

If a sub-contractor is engaged to undertake weed control, ensure that they are aware of the above requirements.

High disturbance weed control, such as some physical removal techniques, may be detrimental to PBTL habitat by causing soil disturbance and destruction of burrows and so should be avoided.

A moderate level of grazing (by native grazers) may help control weeds. Other methods include slashing or the application of specific herbicides at certain times of the year. Whilst there is no direct evidence that herbicide use will harm PBTLs, it is known to cause fertility problems for small vertebrates (which PBTLs eat) and should only be used with caution (Schofield 2006). If herbicide use within the PBTL Offset Areas cannot be avoided, ensure relevant guidelines and recommended quantities are adhered to. Application

should occur on a calm day to minimise drift and wherever possible, herbicide should be spot sprayed directly onto the target species. Broadscale application of herbicide should be avoided, but targeted spot spraying of weeds is encouraged (Schofield 2006).

Feral animal control

Feral animal control is also a key part of managing the PBTL Offset Areas to maintain optimal habitat conditions for PBTLs. Foxes are known to prey upon PBTLs, while Rabbits may adversely impact PBTLs and their habitat via increasing grazing pressure.

The land manger (DEW) is likely to be required to undertake feral animal control within the PBTL Offset Areas, on an annual basis or as required. However, the Project Owner (NEOEN) may also decide to engage a sub-contractor to undertake feral animal control, if required.

6.3.7 Fire prevention

Fire is not currently used as a management tool on the property. The risk of uncontrolled / unplanned fire can be minimised via grazing (by native grazers) to manage fuel loads. Gates within fence lines will be maintained in a trafficable condition, allowing for access for fire-fighting activities if required.

Any occurrence of a fire event within the PBTL Offset Areas should be reviewed as part of the monitoring and reporting process.

6.3.8 Restricting access and preventing poaching

The proposed PBTL Offset Areas will be located within a larger fenced area, within a national park / conservation park / conservation reserve (or similar). They will not be sign-posted as a PBTL Offset Area and their presence and location will not be communicated or made accessible to the general public, in order to minimise the risk of poaching PBTLs.

The land manager (DEW) will be required to maintain fencing and gates, which will be locked, for the duration of the PBTL Offset Areas.

6.3.9 Monitoring and reporting

A collaborative monitoring and reporting approach involving the land manager (DEW), Project Owner (NEOEN) and a suitably qualified and experienced ecological consultancy is proposed to be implemented as outlined below, to enable an adaptive management approach.

Activity Record Sheet

The land manager (DEW) will be required to complete the Activity Record Sheet (Appendix 2) and provide it to the Project Owner (NEOEN) by the end of May each year (or as otherwise determined), for the duration of the monitoring program, to assist with management and monitoring of weeds and feral animals within the PBTL Offset Areas.

Monitoring program

An effective monitoring program will be implemented by the Project Owner (NEOEN) and carried out by an independent, suitably qualified and experienced ecological consultancy, to audit the implementation of

the management actions and to quantify and assess changes brought about by the management actions. Data will be collected with each PBTL Offset Area.

The results of each monitoring event will be analysed and used to assess the effectiveness of management actions associated with the PBTL Offset Areas and identify any management failures or areas for improvement.

The data collected during monitoring events will assist in making adaptive management decisions to ensure that PBTL habitat condition/quality and PBTL population numbers within each PBTL Offset Area is maintained and improving (where possible). Whilst there will be natural variation in PBTL habitat condition/quality and/or PBTL population numbers (due to climatic/seasonal factors), the aim is to maintain and improve (where possible) PBTL habitat condition/quality and PBTL population numbers over the long-term. If a reduction in PBTL habitat condition/quality and/or PBTL population numbers is observed and considered to be outside natural fluctuations, then management actions will be reviewed to determine possible causes. Management actions, where required, will then be altered and updated.

The land manager (DEW) and Project Owner (NEOEN) will work with the suitably qualified and experienced ecological consultancy during to adapt management actions if required, for example, installation of additional PBTL burrows and/or increased management of grazing regime (kangaroos), to continue to maintain and improve (where possible) PBTL habitat condition/quality and/or PBTL population numbers within each PBTL Offset Area. Where appropriate, the Project Owner (NEOEN) may direct the land manager (DEW) to implement minor amendments to management actions, such as grazing regime (management of kangaroos), upon advice from the ecological consultancy.

Refer to Section 6.5 for more information on the monitoring program.

Annual / bi-annual monitoring report

Monitoring results will be documented within a *PBTL Offset Areas Monitoring Report*, which will detail the results of the monitoring program and any minor amendments to management actions, such as grazing regime (management of kangaroos), and be submitted to the Department, on an annual or bi-annual basis (as appropriate – refer to Section 6.5.1), for the first ten years (as a minimum) of the PBTL Offset.

The *PBTL Offset Areas Monitoring Report* will:

- summarise the status of measurable outcomes associated with each management action;
- summarise management actions (for example grazing regime, weed and feral animal control) undertaken in the PBTL Offset Areas and the outcome of those actions (including whether actions are adequate or inadequate);
- detail the monitoring methodology;
- present and analyse the monitoring results;
- compare the monitoring results to previous monitoring results collected to date;
- identify any trends in the PBTL population(s) and/or PBTL habitat (grassland) condition;
- recommend any minor amendments to management actions, such as grazing regime (management of kangaroos), for the Project Owner (NEOEN) to consider and if appropriate, direct the land manager (DEW) to implement; and

- document any minor amendments to management actions, such as grazing regime (management of kangaroos), that are to be implemented by the land manager (after consideration and approval by the Project Owner (NEOEN)).

Monitoring data will be prepared in accordance with the *Guidelines for biological survey and mapped data* (Commonwealth of Australia, 2018) and provided to the Department on an annual or bi-annual basis (as appropriate – refer to Section 6.5.1), likely as an attachment to the *PBTL Offset Areas Monitoring Report*.

6.3.10 Adaptive management

An adaptive management approach will be adopted to ensure the objectives (Section 6.1) of the PBTL OMP Plan are being met. This involves adapting management actions associated with the management aspects outlined in Section 6.3 in response to the results of the monitoring program (Section 6.3.9 and Section 6.5) and to unforeseen or unplanned management threats and issues, as well as to reflect advances in ecological research and land management technologies that may arise during implementation of the Plan.

For example, if the results of the monitoring program suggest that PBTL habitat and/or PBTL population(s) within the proposed PBTL Offset Area(s) are not being maintained, then it is likely that management aspects and actions associated with grazing regime and/or weed control will need to be reviewed and adapted to ensure that PBTL habitat and/or PBTL population(s) are being maintained and/or improved/increased.

The suitably qualified and experienced ecological consultancy will review the results of the monitoring program and, if required, recommend changes to relevant management actions. For example, a reduction or increase in the number of native grazers (i.e. kangaroos) associated with the grazing regime, or increased effort on weed control. Where appropriate, the Project Owner (NEOEN) will direct the land manager to implement minor amendments to management actions, such as controlling kangaroos and/or increasing weed control effort, upon advice from the ecological consultancy.

6.3.11 Corrective actions

In the event that measurable outcomes are not being achieved, corrective actions associated with each specific management action and measurable outcome, will be undertaken, as outlined in Table 18.

As stated in Section 6.3.9, the monitoring report will summarise the status of measurable outcomes associated with each management action (detailed in Table 18). If any measurable outcomes are not achieved or on track to being achieved, this will be documented, along with appropriate corrective action to ensure that the measurable outcome will be achieved, within the monitoring report which is submitted to the Department.

6.3.12 Review and update of the PBTL OMP

The PBTL OMP will be reviewed and updated (if required), at five yearly intervals, for the first ten years (as a minimum). The first review will be undertaken after the first five years of implementation of the PBTL Offset Areas and will use the monitoring data collected to date, together with land manager (DEW) and Project Owner (NEOEN) input. The results or findings of the review will determine the overall success of

existing management actions and identify any amendments to the management actions and/or the monitoring program that may be required, to ensure the objectives are met.

Each review will be documented within an amended version of the PBTL OMP and include:

- the review process;
- the status of measurable outcomes associated with each management action (detailed in;
- the monitoring results to date;
- the status of achieving the PBTL OMP objectives (Section 6.1);
- any amendments to the management actions, if required;
- any amendments to the monitoring program (Section 6.5); and
- any recommendations for future reviews.

The amended version of the PBTL OMP will be provided to the land manager (DEW) and submitted to the Department for reference. Any significant changes to the PBTL OMP may require approval from the Department.

6.4 Risk management

Despite good planning, there are still potential risks to achieving the objectives of the PBTL OMP and the successful management of the proposed PBTL Offset Areas. The following potential risks have been identified for the proposed PBTL Offset and/or proposed PBTL Offset Areas:

- Inadequate implementation of the PBTL OMP; and
- A decrease in PBTL population(s) and/or PBTL habitat (grassland) condition.

Each of the above risks are described below, together with the contingency measures that should be implemented to avoid and/or mitigate them.

Inadequate implementation of the PBTL OMP

It is possible that inadequate implementation of the PBTL OMP may potentially occur due to the land manager (DEW) not having or allocating sufficient resources (i.e. staff) or time to implementing the management actions that they are responsible for (as outlined in Section 6.2 and throughout Section 6.3).

However, the Project Owner (NEOEN) will implement a legal agreement with DEW to manage the proposed PBTL Offset Areas in accordance with the PBTL OMP for a minimum of ten years. Furthermore, NEOEN will be providing an annual budget to DEW to manage the proposed PBTL Offset Areas in accordance with the PBTL OMP for a minimum of ten years. As such, the risk of DEW not having or allocating sufficient resources (i.e. staff) or time to implement the management actions that they are responsible for (as outlined in Section 6.2 and throughout Section 6.3) is considered to be low.

If it is established that DEW is not adequately implementing the PBTL OMP, then the Project Owner (NEOEN) will act and potentially engage a separate party to carry out the land manager responsibilities outlined within the PBTL OMP.

A decrease in the PBTL population(s) and/or PBTL habitat (grassland) condition

It is possible that the PBTL population(s) and/or PBTL habitat (grassland) condition may decline over time despite implementation of the PBTL OMP, due to climatic conditions, particularly drought. Alternatively, it is also possible that implementation of the management actions within the PBTL OMP, for some reason, result in a decline in PBTL population(s) and/or PBTL habitat (grassland) condition over time.

A baseline assessment of PBTL population(s) and habitat (grassland) condition within the proposed PBTL Offset Areas and control sites outside of the proposed PBTL Offset Areas, will be undertaken to establish a baseline population number, as well as habitat (grassland) condition, prior to implementation of the management actions including installation of artificial burrows, management of grazing regime, and weed and feral animal control, detailed in the PBTL OMP (throughout Section 6.3).

The PBTL Offset Areas monitoring program (outlined in Section 6.5) will be used to quantify and qualify any changes, including a potential decline, in PBTL population(s) and PBTL habitat (grassland) condition over time within the PBTL Offset Areas and at control sites outside of the PBTL Offset Areas. Data from the control sites, which are not subject to the management actions within the PBTL OMP (Section 6.3) will help identify if changes are likely to be due to the management actions or climatic conditions.

If a significant decline is identified and attributable to the management actions within the PBTL OMP, then those management actions will be reviewed and amended to ensure the most appropriate management is implemented. For example, and as stated previously, this could involve management of grazers (control of kangaroos via culling) to allow PBTL habitat (grassland) condition to be maintained and/or improved. This adaptive management approach is considered critical to achieving the objectives of the PBTL OMP.

6.5 PBTL Offset Areas Monitoring Program

An effective monitoring program will be implemented by the Project Owner (NEOEN) and carried out by an independent, suitably qualified and experienced ecological consultancy, to audit the implementation of the management actions (Section 6.3) and to quantify and assess changes brought about by the management actions. Data will be collected on both PBTL population(s) and PBTL habitat (grassland) condition at the six 1 ha (100 m x 100 m) sites within the PBTL Offset Areas.

The data collected during monitoring events will assist in making adaptive management decisions to ensure that PBTL habitat and PBTL population(s) within the PBTL Offset Areas remain healthy and viable. Whilst there will be natural variation in PBTL habitat and PBTL population numbers, the aim is to improve PBTL habitat and increase the current population(s) levels over the long-term. If necessary, the results of each monitoring event will be discussed with the SA Museum, Flinders University and/or the PBTL Recovery Team to ensure any fluctuations observed are within the natural limits for the species. If a reduction in population numbers is considered to be outside natural fluctuations, then management actions will be reviewed, in conjunction with the climatic and vegetation data, to determine possible causes. Management actions, where required, will then be altered and updated.

Monitoring results will be documented within the *PBTL Offset Areas Monitoring Report* which will be provided to the Department for reference and used to direct the land manager's management of the PBTL Offset Areas to work towards continued maintenance and, where possible, improvement of PBTL habitat (grassland) condition and PBTL population(s).

The monitoring program will enable for adaptive management, where management actions, such as, but not limited to, management of grazing regime and/or weed control effort, may be subject to minor amendment or adjustment, to ensure the objectives of the PBTL OMP are being met. For example, and as stated previously, this could involve management of grazers (control of kangaroos via culling) to allow PBTL habitat (grassland) condition to be maintained and/or improved. Similarly, if the monitoring program indicates an increase in weeds, then an increase in weed control effort is likely to be required.

Furthermore, if unforeseen or unplanned management threats and issues, or advances in ecological research and land management technologies arise during the monitoring program, these can also be addressed.

6.5.1 Frequency and timing of monitoring

Monitoring events will initially be implemented once a year for the first four years (providing a total of four monitoring events), with field work for monitoring events likely to be undertaken in autumn (i.e., April-May, after juvenile dispersal and prior to brumation). The results of each monitoring event as part of this initial monitoring will be analysed post field survey and used to assess the effectiveness of management actions and identify any management failures or areas for improvement in a timely manner. However, the very first monitoring event as part of this initial monitoring, is likely to be a baseline survey which records the status of the PBTL population and PBTL habitat within the six 1 ha (100 m x 100 m) monitoring sites prior to implementation of management actions including installation of artificial burrows, management of grazing regime, and weed and feral animal control detailed in the PBTL OMP (throughout Section 6.3).

After completion of the initial monitoring described above, monitoring events will be implemented once every two years over six years, after which the need for ongoing monitoring will be reviewed and discussed with the Department. As outlined in Section 6.3.1, if monitoring determines that the future quality target for the PBTL Offset Areas has not been achieved within the proposed ten-year management timeframe, then NEOEN will undertake further management in accordance with this PBTL OMP beyond the initial ten years proposed, until the future quality target score is achieved. Monitoring and reporting will also continue until the future quality target score is achieved.

Field work for these monitoring events will likely be undertaken in autumn (i.e., April-May) each year. Field work for each monitoring event will be completed in one session (i.e., over consecutive days) to ensure that the number of PBTLs counted is accurate. Intervals between surveys should be avoided as this may result in an inaccurate count of PBTLs if they move between burrows. The survey is likely to be conducted by one team of two people.

6.5.2 Ecological indicators to be monitored

The objectives to manage the PBTL Offset Areas in order to improve PBTL habitat and increase the PBTL population(s) can be assessed via collection of data on six specific ecological indicators, each with accompanying desired outcomes, as outlined in Table 19.

Table 19. Ecological indicators and associated desired outcomes.

Ecological indicator	Desired outcomes
PBTL population(s)	Maintain and/or increase the current population levels over the long-term.
Vegetation composition (native and exotic plant species diversity)	Long-term increase in native plant species diversity and decrease in exotic species diversity based on initial baseline survey.
Grassland health (% dead material; tussock height, basal width and canopy width; % litter cover; % bare ground)	Increased proportion of living material on mature tussocks based on initial baseline survey. Increase in size of plants (height, basal width and canopy width) based on initial baseline survey. Less thatch as proportion of whole plant based on initial baseline survey. No significant increase in the cover of bare ground based on initial baseline survey.
Dominant species cover and abundance (tussock spacing; tussocks per hectare)	Maintenance of tussock spacing representative of moderate to sparse vegetation cover, which is preferred by PBTLs, based on initial baseline survey. No decrease in tussocks per hectare to reference site levels in grassland communities based on initial baseline survey.
Seedling recruitment and regeneration (juvenile tussocks per hectare)	Mixed age of grassland species and other native flora.
Soil surface condition (% cryptogram cover)	No loss of soil surface cryptogram and structure due to grazers based on initial baseline survey.

The status of each of the ecological indicators and associated desired outcomes will help determine if the objective to manage the proposed PBTL Offset Areas for a minimum of ten years in order to maintain and/or improve PBTL habitat and maintain and/or increase the PBTL population(s) is being achieved or not. If required, corrective action, will be undertaken to ensure the objectives are being met.

Undesirable outcomes, which will be triggers for adapting management actions, along with the adaptive management actions likely to be implemented to ensure the desired outcomes are achieved, are outlined in Table 20 and expanded upon further below, while the proposed monitoring methodology is outlined in Section 6.5.3.

Table 20. Desired outcomes for each ecological indicator, along with the undesirable outcomes and associated likely adaptive management actions.

Ecological indicator	Desired outcome	Undesirable outcome (trigger(s) for adapting management actions)	Likely adaptive management action(s)
PBTL population(s)	Increase the current population levels over the long-term.	Significant decrease in PBTL population level (in one year) based on initial baseline survey.	Review results for other ecological indicators to determine likely cause of decrease in PBTL population level (based on initial baseline survey); If necessary, discuss results with the SA Museum and/or Flinders University and/or the PBTL Recovery Team; and If required, adjust management actions as determined by the suitably qualified and experienced ecological consultancy.
Vegetation composition (native and exotic plant species diversity)	Long-term increase in native plant species diversity and decrease in exotic species diversity based on initial baseline survey.	Decrease (>20%) in native plant species diversity (in one year) based on initial baseline survey; and/or Increase (>20%) in exotic species diversity (in one year) based on initial baseline survey.	Review weed control records documented in Activity Record Sheet to determine likely cause of increase in exotic species diversity (based on initial baseline survey); Review climatic data to determine likely cause of decrease in native plant species diversity and/or increase in exotic species diversity (based on initial baseline survey); If required, adjust management actions (such as, but not limited to, grazing regime (management of kangaroos)) as determined by the suitably qualified and experienced ecological consultancy; and/or Increase weed control effort (in accordance with measures detailed in Section 6.3.6) prior to next monitoring event.
Grassland health (% dead material; tussock height, basal width and canopy width; % litter cover; % bare ground)	Increased proportion of living material on mature tussocks based on initial baseline survey. Increase in size of plants (height, basal width and canopy width) based on initial baseline survey. Less thatch as proportion of whole plant based on initial baseline survey. No significant increase in the cover of bare ground based on initial baseline survey.	Decrease (>20%) in proportion of living material on mature tussocks (in one year) based on initial baseline survey; Decrease (>20%) in size of plants (height, basal width and canopy width) (in one year) based on initial baseline survey; and/or Significant increase (>25%) in the cover of bare ground (in one year) based on initial baseline survey.	Review climatic data to determine likely cause of decrease in grassland health indicators (based on initial baseline survey); and If required, adjust management actions (such as, but not limited to, grazing regime (management of kangaroos)) as determined by the suitably qualified and experienced ecological consultancy.

Ecological indicator	Desired outcome	Undesirable outcome (trigger(s) for adapting management actions)	Likely adaptive management action(s)
Dominant species cover and abundance (tussock spacing; tussocks per hectare)	Maintenance of tussock spacing representative of moderate to sparse vegetation cover, which is preferred by PBTLs, based on initial baseline survey. No decrease in tussocks per hectare to reference site levels in grassland communities based on initial baseline survey.	Tussock spacing of more than, or less than, moderate to sparse vegetation cover (in one year) based on initial baseline survey; and/or Decrease (>20%) in tussocks per hectare to reference site levels in grassland communities (in one year) based on initial baseline survey.	Review climatic data to determine likely cause of undesirable change in tussock spacing and/or decrease in tussocks per hectare (based on initial baseline survey); and If required, adjust management actions (such as, but not limited to, grazing regime (management of kangaroos)) as determined by the suitably qualified and experienced ecological consultancy.
Seedling recruitment and regeneration (juvenile tussocks per hectare)	Mixed age of grassland species and other native flora.	Significant disproportion in age of grassland species and other native flora and no juvenile tussocks or other native flora (in one year) based on initial baseline survey.	Review climatic data to determine likely cause of significant disproportion in age of grassland species and other native flora (based on initial baseline survey); and If required, adjust management actions (such as, but not limited to, grazing regime (management of kangaroos)) as determined by the suitably qualified and experienced Ecological Consultancy.
Soil surface condition (% cryptogram cover)	No loss of soil surface cryptogram and structure due to grazers based on initial baseline survey.	Loss of (>20% decrease in) soil surface cryptogram and structure due to grazers (in one year) based on initial baseline survey.	Review climatic data to determine likely cause of loss of soil surface cryptogram and structure by grazers (based on initial baseline survey); and If required, adjust management actions (such as, but not limited to, grazing regime (management of kangaroos)) as determined by the suitably qualified and experienced Ecological Consultancy.

PBTL population(s)

Increase in the PBTL population(s) within the PBTL Offset Areas over the long-term is one of the desired outcomes of the PBTL OMP. This can be measured within each monitoring site by systematically counting the number of individuals within the 1 ha quadrat.

However, PBTL populations will fluctuate over time depending on the abundance of insects (i.e. food) and the abundance of spider burrows (i.e. shelter sites) (Sharp 2011) and drought conditions may also be responsible for fluctuation in PBTL numbers (Duffy *et al.*, 2012). Therefore, it is possible that the PBTL population(s) and/or PBTL habitat (grassland) condition may decline over time despite implementation of the PBTL OMP, due to climatic conditions, particularly drought.

Vegetation composition

An overall increase in native plant species diversity is one of the desired outcomes of the PBTL OMP. However, the difficulty in monitoring diversity is that significant changes, or no change at all, cannot be directly attributed to changed management as plant recruitment is also dependent on favourable seasonal conditions. As such, it may be preferable to assess diversity improvement over the long term, rather than after the first year.

Grassland health

Grassland health is related to health of the tussocks, amount of bare ground and litter on the surface. Monitoring will partly focus on whether the tussocks are actively growing, and whether the tussocks are large, or small and struggling. The percentage of dead material will be measured for each tussock along a permanent 100 m transect, so that the same individuals can be remeasured the following year (where possible).

Dominant species cover and abundance

Cover and abundance can be measured fairly simply along the permanent 100 m transect, using a 1 x 1 m quadrat at 10 m intervals, to count tussocks per square metre. This can be averaged out over a number of repeated counts. Juvenile plants can also be recorded using this methodology. However, a grassland community with a high density of tussocks already, may not show any significant change from year to year. Changes to exotic species levels can also be measured here.

Seedling recruitment and regeneration

Usually, with strategic timing of grazing, perennial plants and grasses will have a greater opportunity to recruit seedlings into the population. However, as grazing by domestic grazers (sheep) is not currently proposed, grazing will not be specifically managed to favour seedling recruitment and regeneration, which may limit change in this ecological indicator. Although, management of local kangaroo numbers may potentially enable and/or improve seedling recruitment and regeneration.

Juvenile recruitment will be monitored using the permanent 100 m transects using a 1 x 1 m quadrat at 10 m intervals.

Soil surface condition

Inappropriate grazing, including heavy grazing by hard-hoofed stock, can impact the cryptogram and soil structure within PBTL habitat, and crush/damage spider and/or PBTL burrows. Cryptogram cover is used

as an indicator as cryptograms contribute to increased soil stability where they occur and impacts from hard-hoofed stock will be evident if grazing has been inappropriate. Although, impacts from hard-hoofed stock will reduce over time as domestic stock (sheep) will be removed from the PBTL Offset Areas upon commencement of the PBTL Offset.

The percentage of cryptogram cover will be estimated along each 100 m transect within a 1 x 1 m quadrat at 10 m intervals and averaged out over a number of repeated counts.

6.5.3 Monitoring methodology

The proposed method for monitoring each of the ecological indicators described in Section 6.5.2 is outlined in Table 21, along with the desired outcome to demonstrate maintenance and/or improvement in PBTL population(s) and/or PBTL habitat (grassland) condition. A more detailed methodology for surveying PBTL population(s) is outlined further below.

Table 21. Monitoring method and desired outcomes for each ecological indicator.

Ecological indicator	Method	Desired outcome
PBTL population(s)	• Establishment of 6 x 1 ha (100 x 100 m) monitoring quadrats. • Each quadrat systematically traversed on foot by two surveyors at 4 m intervals. Each burrow suitable for PBTLs marked with a GPS and an individual survey peg. All marked burrows subsequently examined using a videoscope to determine PBTL occupancy. • Refer to the detailed methodology for more detail.	• Increase the current population levels over the long-term. • Use of artificial PBTL burrows.
Vegetation composition (native and exotic plant species diversity)	• 100 x 100 m quadrat (refer to Figure 16). • Each quadrat searched to identify all native and exotic plant species present.	• Long-term increase in native plant species diversity and decrease in exotic species diversity based on initial baseline survey.
Grassland health (% dead material; tussock height, basal width and canopy width; % litter cover; % bare ground)	• 1 x 1 m quadrat every 10 m along each 100 m transect running north–south down centre of each 100 x 100 m monitoring quadrat (refer to Figure 16). • 1 x 1 m quadrat further divided into four quarters, within which tussock attributes (% dead material, tussock height, basal width and canopy width) are collected for the nearest tussock grass to the centre point of each 1 x 1m quadrat (Point-centred Quarter Method or PCQM, refer to Figure 17). • % litter and bare ground cover estimated in each 1 x 1 m quadrat. • Photo points.	• Increased proportion of living material on mature tussocks based on initial baseline survey. • Increase in size of plants (height, basal width and canopy width) based on initial baseline survey. • Less thatch as proportion of whole plant based on initial baseline survey. • No significant increase in the cover of bare ground based on initial baseline survey.
Dominant species cover and abundance (tussock spacing; tussocks per hectare)	• 1 x 1 m quadrat every 10 m along each 100 m transect running north–south down centre of each 100 x 100 m monitoring quadrat (refer to Figure 16). • 1 x 1 m quadrat further divided into four quarters, within which distance to the nearest tussock grass from the centre point of each 1 x 1 m quadrat is collected (Point-centred Quarter Method or PCQM, refer to Figure 17). • Total number of tussocks counted in each 1 x 1 m quadrat.	• Maintenance of tussock spacing representative of moderate to sparse vegetation cover, which is preferred by PBTLs, based on initial baseline survey. • No decrease in tussocks per hectare to reference site levels in grassland communities based on initial baseline survey.

Ecological indicator	Method	Desired outcome
Seedling recruitment and regeneration (juvenile tussocks per hectare)	• 1 x 1 m quadrat every 10 m along each 100 m transect running north–south down centre of each 100 x 100 m monitoring quadrat (refer to Figure 16). • Total number of juvenile tussocks counted in each 1 x 1 m quadrat.	• Mixed age of grassland species and other native flora.
Soil surface condition (% cryptogram cover)	• 1 x 1 m quadrat every 10 m along each 100 m transect running north–south down centre of each 100 x 100 m monitoring quadrat (refer to Figure 16). • % cryptogram cover estimated in each 1 x 1 m quadrat.	• No loss of soil surface cryptogram and structure due to grazers based on initial baseline survey.

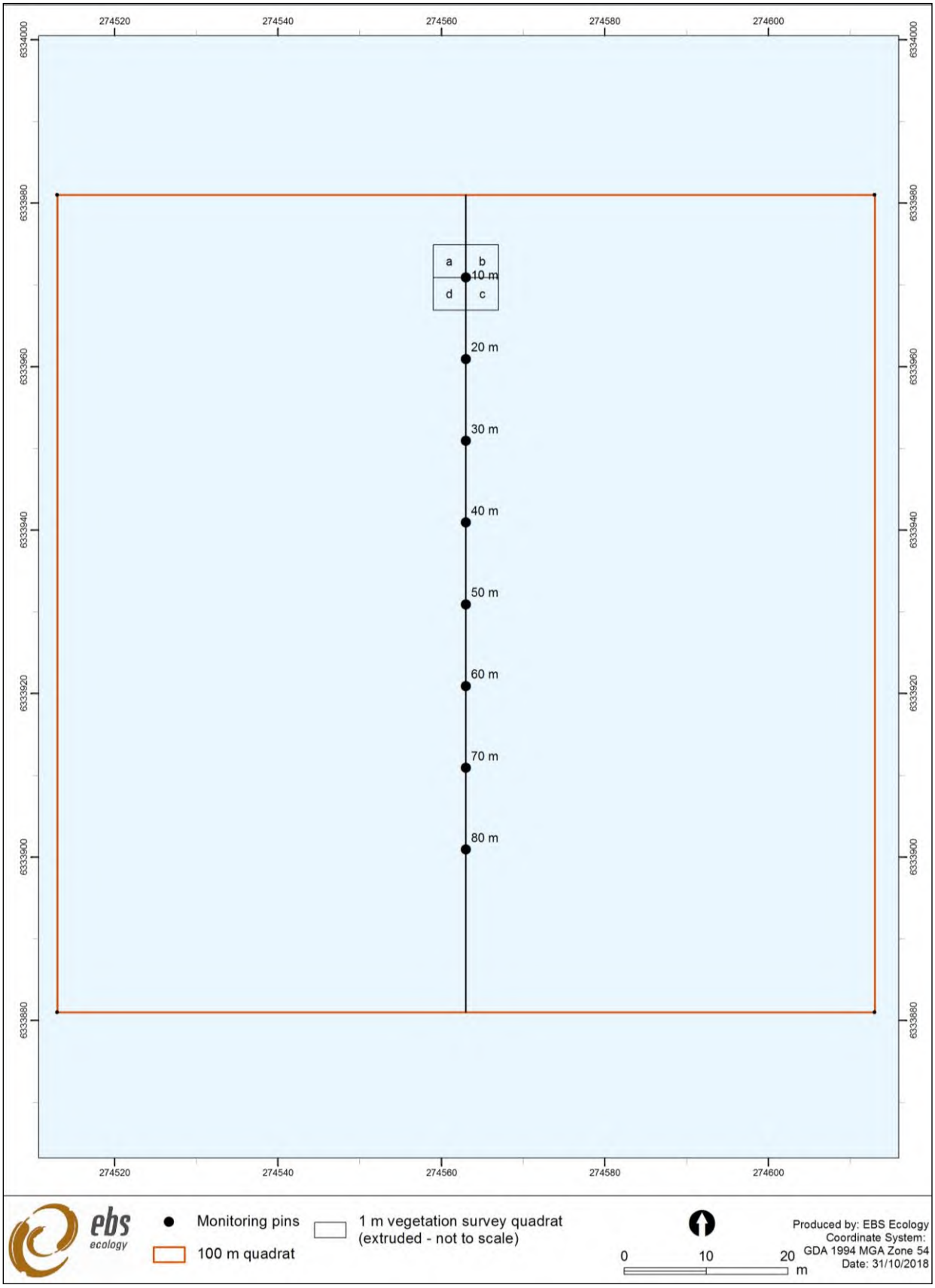

Figure 16. An example of a 1 ha (100 x 100 m) monitoring quadrat with the layout of (1) a 100 m vegetation monitoring transect with monitoring pins at 10 m intervals, and (2) the location of a 1 x 1 m vegetation monitoring quadrat.

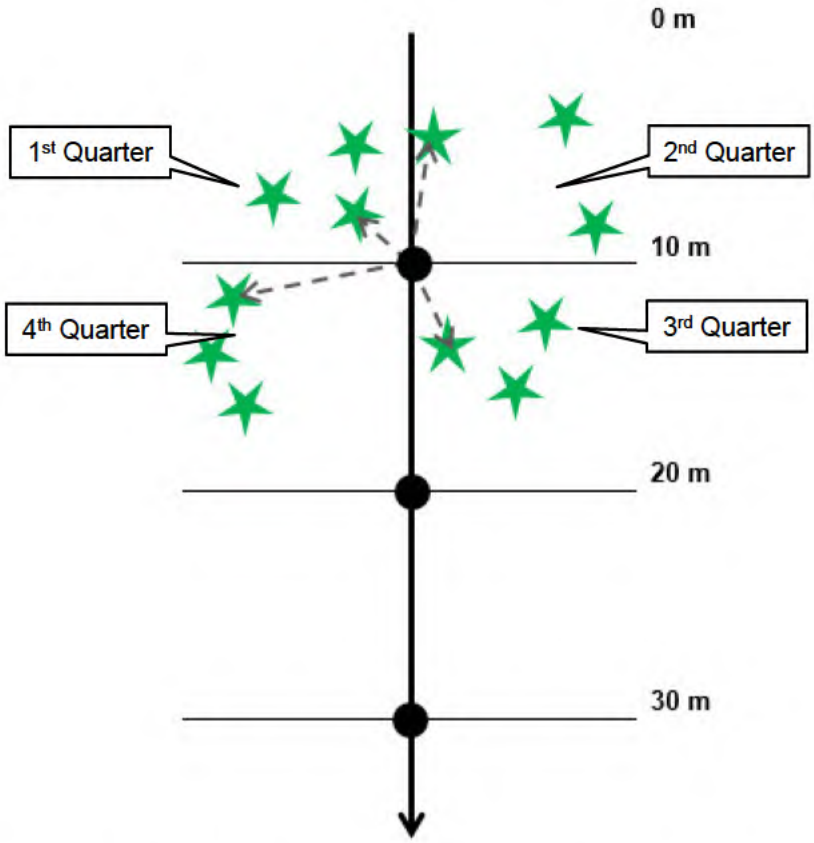

Figure 17. The Point-centred Quarter Method (PCQM) is used to collect data on the closest tussock grass (indicated by a green star) located in each of the four quarters of a 1 x 1 m quadrat, to each sample point, along the transect (image adapted from Tongway & Hindley 2005).

Photographs showing examples of a 100 m monitoring transect, with a 1 x 1 m quadrat, as well as a 1 x 1 m quadrat with a monitoring pin indicating centre point, are provided in Figure 18 and Figure 19 respectively.

Figure 18. Example of 100 m monitoring transect (yellow measuring tape) and 1 x 1 m quadrat within a 1 ha monitoring quadrat. Photo by EBS Ecology.

Figure 19. Example of a 1 x 1 m quadrat with a monitoring pin indicating the centre point. Photo by EBS Ecology.

Detailed PBTL Offset Areas monitoring methodology

Monitoring within the PBTL Offset Areas will involve the following methodology:

- Each 1 ha quadrat will be traversed by two surveyors, starting at opposite ends of the survey area and moving towards each other along parallel transects at 4 m intervals to identify spider burrows;
- Each surveyor will use a GPS to check and log their tracks as they work to ensure the 4 m transects are aligned;
- The surveyors will ensure that all artificial PBTL burrows previously installed are located;
- All spider burrows and artificial PBTL burrows will be temporarily marked using a survey peg. Burrows/holes that will not be marked or checked include holes containing ants and holes with a diameter of less than 5 mm which are considered too small for juvenile PBTL;
- All temporarily marked burrows will be checked for PBTL occupancy using a videoscope with an illuminated articulating camera at the end of an optic fibre insertion probe and a digital video display screen (e.g., Yatek M-Series);
- A GPS waypoint and the depth and contents (i.e., PBTL, spider, weevil, ants, debris) will be recorded for each burrow checked;
- If a PBTL is observed, then the age of that individual will be estimated (adult, sub/adult or juvenile) and recorded;
- The ID of each artificial burrow will be recorded;
- The integrity of each artificial PBTL burrow previously installed will be checked and repaired or replaced if required;
- Survey pegs will be removed once each burrow has been checked to avoid checking the same burrow more than once.

This methodology is consistent with the *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DSEWPC 2011).*

Opportunistic observations

Any opportunistic observations, for example, of native grazers (kangaroos) or their scats along with feral animals such as foxes or rabbits (including their tracks, scats, and warrens), or of significant weed outbreaks or infestations, which are observed within the monitoring quadrats, or within the surrounding landscape when moving through the PBTL Offset Areas and area(s) containing the control sites, will be recorded (type and location) and reported upon.

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8 APPENDICES

Appendix 1 – PBTL Habitat assessment surveys

Table 22. PBTL Habitat assessment surveys.

Survey date	Number of spider burrows surveyed		Number of PBTLs observed (within proposed PBTL Offset Areas)
	Within proposed PBTL Offset Areas	Within land adjacent to proposed PBTL Offset Area*	
20 June 2022	331	98	2
20 October 2022	120	0	1
Totals	**451**	**98**	**3**

*At the time of investigating options and planning the PBTL Offset Areas, a larger area was surveyed than what is proposed to be used for the PBTL Offset Areas.

Appendix 2 – Activity Record Sheet

Activity Record Sheet - To be filled in by land manager as work progresses and issued to NEOEN at the end of May each year.

Management Action (e.g. feral animal control / weed control – specify species targeted and method used, including poison / herbicide type and concentration etc as well as location)	**Date**	**Time spent on task** (hrs / days)	**Comments** (Completed / more remaining / follow up required – provide estimate of time remaining)

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