UCMPL Microbat Monitoring 2025

Ulan Coal Mines Pty Ltd

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Executive Summary

Ulan Coal Mines Pty Ltd (UCMPL) is located in the central west of New South Wales, near the village of Ulan, within the Mid-Western Regional Council (MWRC) Local Government Area (LGA). Project Approval (PA) 08_0184 was issued on 15 November 2010 for continued operations at Ulan Coal Complex (UCC) and provided approval for the continued operations of the Ulan Surface Operations and the Ulan West and Ulan Underground mines. UCMPL developed a Biodiversity Management Plan (BMP) to satisfy the requirements of PA 08_0184, as well as Commonwealth Approvals EPBC Ref: 2009/5252 and EPBC Ref: 2015/7511.

Microbat monitoring in 2025 was undertaken in accordance with the approved management plans for the management of threatened species habitat across the Ulan Coal Complex (UCC). This annual report details the results of microbat monitoring of eight control sites, 15 impact sites and 20 general fauna sites, during December 2025.

Targeted cliffline monitoring was undertaken at non-mined control and both mined and non-mined impact sites above Ulan West longwall panels, to record the presence and activity of threatened cave-roosting microbat species *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Miniopterus orianae oceanensis* (Large Bent-winged Bat).

The Large-eared Pied Bat was definitely or potentially recorded via acoustic call detection at all general fauna sites, except for sites Spring Gully (SG) and Infrastructure Area 4 (INF4). While the Large Bent-winged Bat was definitely or potentially recorded at all twenty general fauna sites.

Monitoring was also completed at eight targeted cliffline – control sites. The Large-eared Pied Bat was definitely detected at all 8 control sites, whilst the Large Bent-winged Bat was definitively and potentially recorded at all of the 8 control sites. The consistent recording of both targeted threatened cave-roosting species in relatively high quantities, including the capture of Large-eared Pied Bat across multiple control sites, confirms their suitability for use as control sites for monitoring the population of both target species.

The monitoring of microbat species also occurred at seventeen targeted cliffline – impact sites. Acoustic call detection surveys recorded a diversity of species richness, with at least eleven individual microbat species recorded across all impact sites, inclusive of at least two and up to five threatened microbat species listed under the *NSW Biodiversity Conservation Act 2016* and the *Commonwealth Environment Protection and Biodiversity Act 1999,* respectfully. Mean species richness was highest in 2025 at UWLW8a and UWLW10c, of which UWLW8a had been mined, while UWLW10c has not yet been mined. In comparison to the 2024, which reported to have a greater mean species richness within the previously mined compared to the non-mined sites. Mean species richness in 2025 however recorded relatively high mean species richness at all targeted cliffline – impact sites. This result highlights the maintenance of habitat in both the mined and non-mined areas within the UCC landscape, which continues to provide habitat for a diverse range of microbat species. While no threatened microbat species were captured within the impact sites, the call detection data provides a positive indication as to the continued provision of suitable quality microbat habitat, even post-mining.

Large-eared Pied Bat call activity across all previously undermined sites decreased in 2025, compared to the previous year which had a substantial increase in Large-eared Pied Bat call activity. However, while the decrease is significant at the impact sites in 2025, it is considered to be due to seasonal variation and therefore, the performance indicator is not exceeded. Additionally, declines have been recorded in previous monitoring years, such as in 2021 when the mean call activity of Large-eared Pied Bat, per night, decreased by 87.61% since the 2020 monitoring period. Decreases in Large-eared Pied

Bat call activity has not been recorded over two or more monitoring periods and therefore, the performance indicator has not been exceeded.

In contrast, Large Bent-winged Bat call activity across previously mined sites, as well as non-mined control sites, increased significantly in 2025, in comparison to the large decrease in call activity recorded for the species in 2024. With the increase of call activity during the 2025 monitoring period, the performance indicator has not been exceeded for the species, across the two-year post-mining monitoring period.

Given the successful implementation of the UCMPL microbat monitoring program in 2025 and the results detailed in this report, UCMPL is considered to be compliant with their relevant Project Approval conditions.

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Abbreviations

Abbreviation	Description
BC Act	NSW *Biodiversity Conservation Act 2016*
BMP	Biodiversity Management Plan
BOA	Biodiversity Offset Area
ELA	Eco Logical Australia
EP	Extraction Plan
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GCAA	Glencore Coal Assets Australia
LGA	Local Government Area
LW	Longwall
MWRC	Mid Western Regional Council
PA	Project Approval
UCMPL	Ulan Coal Mines Proprietary Limited
UCC	Ulan Coal Complex

1. Introduction

Eco Logical Australia (ELA) was engaged by Ulan Coal Mines Proprietary Limited (UCMPL) to complete the 2025 microbat monitoring program. Microbat monitoring within the Ulan Coal Complex (UCC) dates back to the 1980s, with the monitoring program in its current form undertaken since 2011.

1.1. Background

The Ulan Coal Mine is situated in the central west of New South Wales. It is located in the Mid Western Regional Council (MWRC) Local Government Area (LGA) near the village of Ulan, approximately 38 km north-northeast of Mudgee and 19 km northeast of Gulgong. UCMPL landholdings straddle the Great Dividing Range and are located at the headwaters of the Goulburn and Talbragar River Catchments. UCMPL operates the mine, comprising an open cut mine and two underground mines (Ulan Underground and Ulan West), managed by Glencore Coal Assets Australia (GCAA).

1.2. Purpose of this monitoring report

UCMPL developed a Biodiversity Management Plan (BMP) (ULNCX-111515275-225); UCMPL 2024 to satisfy the requirements of Condition 44, Schedule 3 of the Project Approval (PA 08_0184). The BMP was also developed to satisfy Condition 3 of the Commonwealth Approval EPBC Ref: 2009/5252 and Condition 4 of Commonwealth Approval EPBC Ref: 2015/7511. Condition 26, Schedule 3 of PA 08_0184 also requires the development of an Extraction Plan BMP for both Ulan West (UW; UCMPL 2022b) and Ulan Underground (UCMPL 2013) Longwall (LW) panels in order to outline the management strategies, controls and monitoring programs to be implemented for the management of potential impacts to flora and fauna from secondary extraction.

Ulan West Extraction Plan (EP) (ULNCX-111515275-2811; UCMPL 2024) addresses subsidence related risk for LW panels 1-8. The updated EP brought the performance indicator for the assessment of potential subsidence impacts on threatened cave-dwelling microbats into line with that detailed above in the BMP. A draft EP is also being prepared for UW LW9 and UW LW10 which will contain a consistent performance indicator for the assessment of potential subsidence impacts on threatened cave-dwelling microbats. UW LW8 and UW LW9 have yet to complete their two-year post mining monitoring period and hence are not yet able to be assessed against the relevant performance measures. Table 1 shows when these longwalls will have completed mining and can begin their two-year post mining monitoring. UW LW10 is scheduled to commence mining September 2027 (Ulan West Glencore 2025).

Table 2 outlines the statutory requirements which underlie the UCMPL targeted cliffline microbat monitoring program and the associated methodology and performance measures applicable to the monitoring undertaken in 2025.

Microbat monitoring at the Bobadeen West Biodiversity Stewardship Site (BSS) is undertaken in accordance with the Bobadeen West Biodiversity Stewardship Agreement (NSW Government 2023), which includes the methodologies listed in Table 2.

This report details the results of general fauna monitoring and targeted cliffline monitoring of eight control sites and 16 impact sites.

Table 1: Longwall mining completion dates and monitoring status

Longwall	Mining completion	Monitoring status	Comment
UW LW8	October 2025	Ongoing	2-year post-mining to be completed 2027 (Ulan West Glencore 2025)
UW LW9	August 2027	Ongoing	2-year post-mining to be completed 2029 (Ulan West Glencore 2025)
UWLW10	March 2029	Ongoing	Mining scheduled to commence September 2027. 2-year pre-mining to commence 2025. 2-year post mining to be completed 2031 (Ulan West Glencore 2025)

Table 2: Statutory requirements of the Project Approval, and their relevant methods of assessment and performance measures outlined in the BMP

Statutory Requirements	Performance Measures	Assessment Methodology	Triggers for investigation
NSW Project Approval – PA 08_0184, Schedule 3			
Condition 24: The proponent shall ensure that the project does not cause any exceedances of the performance measure: Negligible impact on threatened species, populations habitat or ecological communities	Negligible impact on threatened species, populations habitat or ecological communities Ref: Project Approval Schedule 3, c24, Table 14	Targeted threatened microbat monitoring	Analysis of micro-bat monitoring data identifies decreasing activity levels (>10% decline) of endangered micro-bat species during cliff line monitoring within the mined area over two or more monitoring periods, outside of seasonal variations. Ref: EP LW1-6 (ULNCX-111515275-2811), s4.3; BMP (ULNCX-111515275-225), Appendix A.
Condition 41A: The proponent shall ensure that the offset areas contain suitable habitat for any significant and / or threatened species identified in areas to be cleared, removed or disturbed	A range of habitat features relevant to threatened species is available throughout offset areas	2009 Environment Assessment and confirmatory ecological assessments, as documented in Conservation Area Agreements Targeted threatened microbat monitoring undertaken in accordance with the BMP with respect to the Brokenback Conservation Area and Spring Gully Cliff Line Management Area, specifically: Acoustic call detection – 4 recording nights Harp trapping – up to 4 trap nights	A species of threatened microbat previously identified within Spring Gully Cliff Line Management Area or Brokenback Conservation Area for two or more consecutive monitoring years not detected in these areas across two or more consecutive subsequent monitoring periods. Ref: BMP (ULNCX-111515275-225), Appendix A.

Statutory Requirements	Performance Measures	Assessment Methodology	Triggers for investigation
Commonwealth Approval - EPBC Ref: 2009/5252			
Condition 5: To offset the impacts on the Large-eared Pied Bat, the person taking the action must, before commencement of operations (excluding first workings), obtain the Minister's approval of an Offset Management Plan for the Brokenback Conservation Area and Spring Gully Cliff Line Management Area. The plan must include details of: e) the development and implementation of a monitoring program	None specified	Targeted threatened microbat monitoring undertaken in accordance with the BMP with respect to the Brokenback Conservation Area and Spring Gully Cliff Line Management Area, specifically: Acoustic call detection – 4 recording nights Harp trapping – up to 4 trap nights	Annual microbat monitoring completed for 2023. A species of threatened microbat previously identified within Spring Gully Cliff Line Management Area or Brokenback Conservation Area for two or more consecutive monitoring years not detected in these areas during subsequent monitoring periods. Ref: BMP (ULNCX-111515275-225), Appendix A
Bobadeen West Biodiversity Stewardship Agreement – BS0099			
Section 4: Threatened Species Habitat Management Plan 2. The Owner must meet the performance measures described in this plan 3. The Owner must implement the monitoring of Threatened Species habitat management as described in the Monitoring Plan	Presence of Large-eared Pied bat at the Stewardship Site (ongoing use of maternity roost)	Internal roost searches at the known maternity site (UGLWW3) during Year 1, and then every five years in Years 1-20 and then every 10 years from Year 20 onwards 5-yearly call detection monitoring (4 full nights recording, Nov-Jan) at four sites, two near the cave monitoring sites (UGLWW3 and UGLWW4a) and two in suitable foraging habitat Year 1, and be repeated every 5 years in Years 1-20 and then every 10 years from Year 20 onwards. One full night of Anabat recording outside the entry to the known maternity cave site (UGLWW3) and the nearby cave monitoring site (UGLWW4a). This is to be undertaken every five years from Year 3.	Absence of *Chalinolobus dwyeri* (Large-eared Pied Bat) or decreasing activity levels (>10% decline) of over two or more monitoring periods, outside of seasonal variations consistent with UCMPL BMP (ULNCX-111515275-225), Appendix A.

2. Methods

2.1. General fauna sites

A total of 20 general fauna sites underwent monitoring during 2025 (Table 3), with the location of these sites displayed in Figure 1. All sites underwent acoustic survey for two nights, using Anabat (Anabat Swift and Anabat Chorus, Titley Scientific) or SongMeter (model SongMeter Mini Bat, Wildlife Acoustics) recording devices. Selected sites were also monitored using collapsible harp traps (2-bank harp trap, Austbat Faunatech) for two consecutive nights with the aim of capturing previously recorded threatened microbat species.

Table 3: General fauna sites monitored during 2025

Site	Easting	Northing	Monitoring Area	MZ	Survey dates and Method
BC1	761257	6436047	Bobadeen Corridor BOA	MZ1	26-30/11/25 – Acoustic 24-26/11/25 – Harp Trap
BC3	760279	6436189	Bobadeen Corridor BOA	MZ3	26-30/11/25 - Acoustic
BE1	763063	6436094	Bobadeen East BOA	MZ1	26-30/11/25 – Acoustic 24-26/22/25 – Harp Trap
BE3	762634	6436797	Bobadeen East BOA	MZ2	26-30/11/25 - Acoustic
BO1	757178	6435202	Bobadeen Vegetation BOA	MZ1	24-25/11/2025 – Acoustic 24-26/11/25 – Harp trap
BO2	760493	6434905	Bobadeen Vegetation BOA	MZ1	26/11/25-1/12/25 - Acoustic
BO3	757403	6436739	Bobadeen Vegetation BOA	MZ1	24-26/11/25 - Acoustic
BO5	756868	6437705	Bobadeen Vegetation BOA	MZ3	24-26/11/25 - Acoustic
BO6	758116	6437001	Bobadeen Vegetation BOA	MZ3	24-26/11/25 - Acoustic
INF3	755436	6438855	Surface Infrastructure Disturbance Area	MZ1	24-26/11/25 - Acoustic 34-26/11/25 – Harp Trap
INF4	758733	6439767	Surface Infrastructure Disturbance Area	MZ1	1-3/12/25 - Acoustic 24-26/11/25 – Harp Trap
OC3	758418	6428942	Open Cut Rehabilitation Area	MZ5	26-27/11/25 - Acoustic
OC4	761211	6427142	Open Cut Rehabilitation Area	MZ5	26-27/11/25 - Acoustic
OC5	760819	6427097	Open Cut Rehabilitation Area	MZ5	26-27/11/25 – Acoustic 26-28/11/25 – Harp Trap
OC6	757694	6429704	Open Cut Rehabilitation Area	MZ5	26-27/11/25 – Acoustic 26/28/11/25 – 2x Harp Traps
RES2	756711	6433175	Residual Project Area	MZ1	24-25/11/25 - Acoustic
RES4	759191	6438953	Residual Project Area	MZ1	1-3/12/25 - Acoustic
RES6	753504	6433141	Residual Project Area	MZ2	24-26/11/25 - Acoustic
RES7	757330	6439883	Residual Project Area	MZ2	24-26/11/25 - Acoustic
SG	759669	6433566	Spring Gully Cliffline Management Area	MZ1	1-2/12/25 – Acoustic 1-3/12/25 – Harp Trap

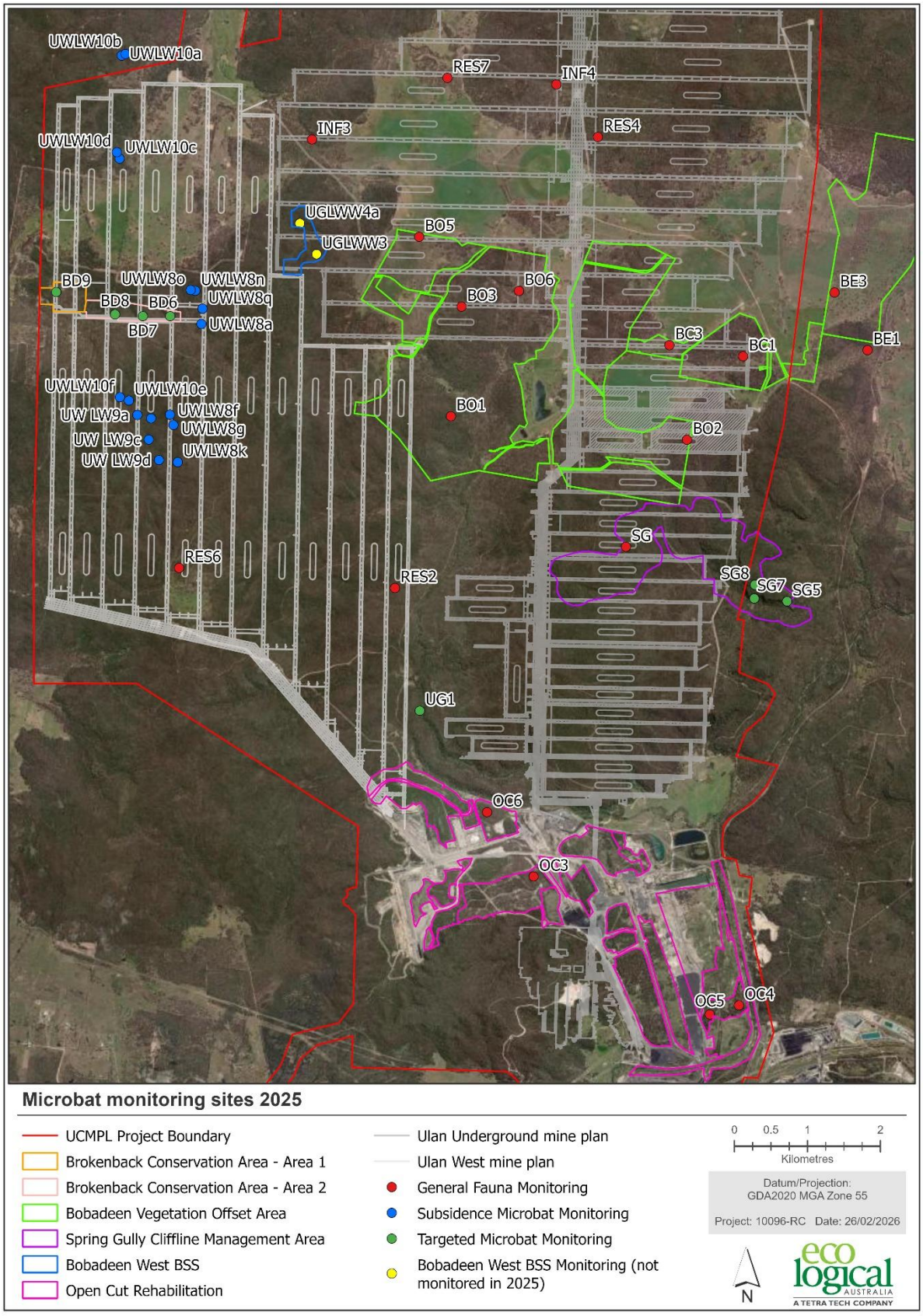

Figure 1: Microbat monitoring sites 2025

2.2. Bobadeen West BSS

'Year 1' monitoring requirements were completed in 2024. Ina accordance with the Bobadeen West BSA (NSW Government 2023), the next round of monitoring within the Bobadeen West BSS is in 2026 and involves one full night of Anabat recording outside the entry to the known maternity cave site (UGLWW3) and the nearby cave monitoring site (UGLWW4a).

2.3. Targeted cliffline - Control sites

A total of eight control sites underwent targeted cliffline monitoring during 2025. The control sites are located along non-mined clifflines, surrounded by remnant vegetation in the Brokenback Conservation Area, Spring Gully Cliffline Management Area and adjacent to Ulan Creek (Table 4, Figure 1).

All eight sites underwent acoustic survey across four nights, using Anabat (Anabat Swift, Titley Scientific) or SongMeter (model SongMeter Mini Bat, Wildlife Acoustics) recording devices. Acoustic survey provides an inventory of species present at sites, as well as a relative estimate of microbat activity, both of which are used to address the aims of this report (Section 1.2).

Five control sites where Large-eared Pied Bat had previously been captured were also surveyed using collapsible harp traps (2-bank harp trap, Austbat Faunatech) for between two and three survey nights per site (Table 4). Harp trapping is used to provide an inventory of species present at sites and confirm the ongoing presence and breeding status of threatened cave-roosting microbat species at control sites. This method provides both quantitative and qualitative data to address the aims of this report, as detailed above in Section 1.2.

Table 4: Control sites monitored during 2025

Site	Easting	Northing	Location	Survey Dates and Method
BD6	753428	6436595	Brokenback Conservation Area	3-9/12/25 – Acoustic 3-5/12/25 – Harp Trap
BD7	753052	6436594	Brokenback Conservation Area	3-9/12/25 – Acoustic
BD8	752671	6436618	Brokenback Conservation Area	3-9/12/25 – Acoustic 3-5/12/25 – Harp Trap
BD9	751864	6436925	Brokenback Conservation Area	3-9/12/25 - Acoustic
SG5	761877	6432689	Spring Gully Cliffline Management Area	1-4/12/25 - Acoustic
SG7	761320	6432855	Spring Gully Cliffline Management Area	1-4/12/25 – Acoustic 1-3/12/25 – Harp Trap
SG8	761324	6432943	Spring Gully Cliffline Management Area	1-4/12/25 – Acoustic 1-3/12/25 – Harp Trap
UG1	756847	6431191	Residual Project Area – Ulan Creek	24-27/11/25 – Acoustic 26-28/11/25 – Harp Trap

2.4. Targeted cliffline - Impact sites

A total of 15 impact sites underwent targeted cliffline monitoring during 2025. The impact sites are located along clifflines, surrounded by remnant vegetation above Ulan West longwall panels LW8-LW10. (Table 5; Figure 1). All sites underwent acoustic survey for four nights, using Anabat (Anabat Swift and Anabat Chorus, Titley Scientific) or SongMeter (model SongMeter Mini Bat, Wildlife Acoustics) recording devices (Table 5). Two impact sites (UWLW8a and UWLW8q) were also surveyed using collapsible harp traps (2-bank harp trap, Austbat Faunatech) for two nights (Table 5).

In accordance with the BMP (UCMPL 2024), pre-mining monitoring of UW LW10 commenced in 2025. An experienced bat ecologist completed detailed inspections of potential roosting/breeding habitat (caves, fissures and overhangs) along cliffline areas on UW LW10. Clifflines were inspected for signs of potential roosting, including groups or individuals of cave-roosting microbats, stone surface staining, droppings and characteristic aromas. Several areas of potential roosting habitat were identified during the surveys and six acoustic detection monitoring sites were established on UW LW10 during 2025 targeting these areas. Two of these sites, UW LW10a and UW LW10b were established to the north of the currently approved UW mine plan to allow for future mine plan changes (Figure 1).

Table 5: Impact sites monitored during 2025

Site	Easting	Northing	Location	Survey Dates
UWLW8a*	753854	6436487	Ulan West Longwall 8	3-9/12/25 – Acoustic 9-11/12/25 – Harp Trap
UWLW8f*	753425	6435246	Ulan West Longwall 8	24-27/11/25 – Acoustic
UWLW8k	753529	6434596	Ulan West Longwall 8	24-27/11/25 – Acoustic
UWLW8q*	753869	6436696	Ulan West Longwall 8	3-9/12/25 – Acoustic 9-11/12/25 - Harp Trap
UWLW8o	753706	6436955	Ulan West Longwall 8	3-9/12/25 – Acoustic
UWLW8g	753471	6435106	Ulan West Longwall 8	5-7/12/25 – Acoustic 9-11/12/25 – Harp Trap
UWLW8n*	753801	6436944	Ulan-West longwall 8	3-9/12/25 – Acoustic 9-11/12/25 – Harp Trap
UWLW9a	752978	6435242	Ulan West Longwall 9	4-10/12/25 - Acoustic
UWLW9b	753167	6435192	Ulan West Longwall 9	24-27/11/25 - Acoustic
UWLW9c	753132	6434910	Ulan West Longwall 9	24-27/11/25 - Acoustic
UWLW9d	753280	6434624	Ulan West Longwall 9	24-27/11/25 – Acoustic
UWLW10a	752761	6440164	Ulan-West Longwall 10	1-4/12/25 - Acoustic
UWLW10b	752815	6440185	Ulan-West Longwall 10	1-4/12/25 - Acoustic
UWLW10c	752732	6438753	Ulan-West Longwall 10	1-4/12/25 - Acoustic
UWLW10d	752697	6438839	Ulan-West Longwall 10	1-4/12/25 - Acoustic
UWLW10e	752861	6435440	Ulan-West Longwall 10	1-4/12/25 - Acoustic
UWLW10f	752738	6435484	Ulan-West Longwall 10	1-10/12/25 - Acoustic

*Site had been undermined by the time of 2025 monitoring

2.5. Acoustic call data analysis

Microbat calls were recorded as full-spectrum WAV-format sound files, with a total of 98,457 files analysed primarily by Dr Rod Armistead (Attachment 1). To exclude the non-microbat noise files from the microbat calls, the WAV-format files were subject to a generic noise removal filter using the software program Anabat Insight (Titley Scientific). The remaining 65,860 files post-noise filter application (i.e. files containing microbat calls) were then subject to a decision-tree analysis to:

- Sort the microbat call profiles into groups based upon 5 to 10 kilohertz (kHz) increments in average characteristic frequency.
- Attach a species or species complex identifier label to each group of microbat calls that best represent the characteristic frequency of those calls.

All resulting microbat calls were then reviewed in zero crossing and/or full spectrum format, to ensure that the species or species complex labels applied during the decision-tree were correct. Discrepancies in the species identification labels applied during the decision-tree analysis can occur when more than once species of microbat is recorded. Incorrect species and species complex labels were altered manually by comparing the features of each recorded call profile with the published call parameters in the following documents and reference call libraries:

- Region based guide to the echolocation calls of microbats in New South Wales (Pennay et al. 2004)
- Key to the bat calls of south-east Queensland and north-east New South Wales (Reinhold et al. 2001).

Species and species complex identifications were further guided by the species-specific distribution information provided in Churchill (2008), Pennay et al. (2011), Specialised Zoology (2022), the Atlas of Living Australia webpage, the NSW BioNet database, Van Dyck and Strahan (2008), Van Dyck et al. (2013), and the Australasian Bat Society (2025).

During this process the following protocols were applied:

- Search phase calls are used preferentially when analysing the data because they contain more diagnostic features than cruise phase calls or feeding buzzes.
- Calls made by microbats that cannot be used for identification purposes such as social calls, short and low-quality calls, cruise and approach phase calls were reviewed and labelled as being ‘of low’ quality.
- Recorded calls containing less than three pulses are generally excluded from the analysis as they can often be too short to confidently determine the identity of the species making the call. These short sequences along with sequences not attributed to a microbat echolocation call (e.g. insect buzzes, wind) are generally removed during the decision-tree analysis.
- For those calls that can be used to identify the microbat species making the call, two categories of confidence are used:
    - Definite presence – the quality and structure of the call profile are such that there is a high degree of confidence in the identity (and therefore the presence) of the species making the call; and

- Potential presence – the quality and structure of a call profile is such that there is a degree of uncertainty about the identity of the species making the call, or there is some likelihood of confusion with another species that produces a similar call profile.

2.6. Survey limitations

Calls were only positively identified to a specific microbat species when the defining characteristics of the species calls were present as described in Pennay et al. 2004 and Reinhold et al. 2001 and there was no chance of confusion between species with overlapping and/or similar calls. In this survey, there were some call sequences that could not be positively identified to species level. Further, some species recorded in this survey can have call profiles that overlap with other species. When overlap occurs, species with similar call profiles are assigned to multi-species groups (species complex) of two or three potential species depending on the characteristics displayed in the recorded call sequences. This includes the target threatened cave-roosting microbat species *Miniopterus orianae oceanensis* (Large Bent-winged Bat), which overlaps in call frequency with several of the Forest Bat (*Vespadelus* spp.) species.

Whilst the 'potential presence' of all relevant species is noted for each monitoring site, only 'definite presence' calls are used for analysis of call activity within this report. This is consistent with previous reports and includes those calls from the Large Bent-winged Bat / *Vespadelus darlingtoni* (Large Forest Bat) species complex. Example call profiles of identified species are provided in the Microbat Ultrasonic Call Identification Report (RA Environmental Consultants 2026) attached as Attachment 1.

2.7. Weather conditions

While there were only a few fluctuations in rainfall during 2025, April experienced very little rain with a total of 0.3 mm recorded for the entire month Similarly with the temperature, while there were some fluctuations, the temperatures in 2025 were largely in line with historical averages for the region. The temperatures ranged from 5ºC in June to 29ºC in January (UCMPL 2025, Figure 2). Below average rainfall was experienced at Ulan 2025 (Figure 3). Rainfall was particularly high in May and low in April in 2025 compared to the long-term average.

Weather during the field surveys was generally warm and fine. Overnight temperatures on 1-3 December 2025 fell below 8 ºC (Australian Government BoM 2026). Microbats are generally more active in hot, warm or mild, and calm conditions (Mills et al. 1996; Fischer et al. 2009; Law et al. 2015).

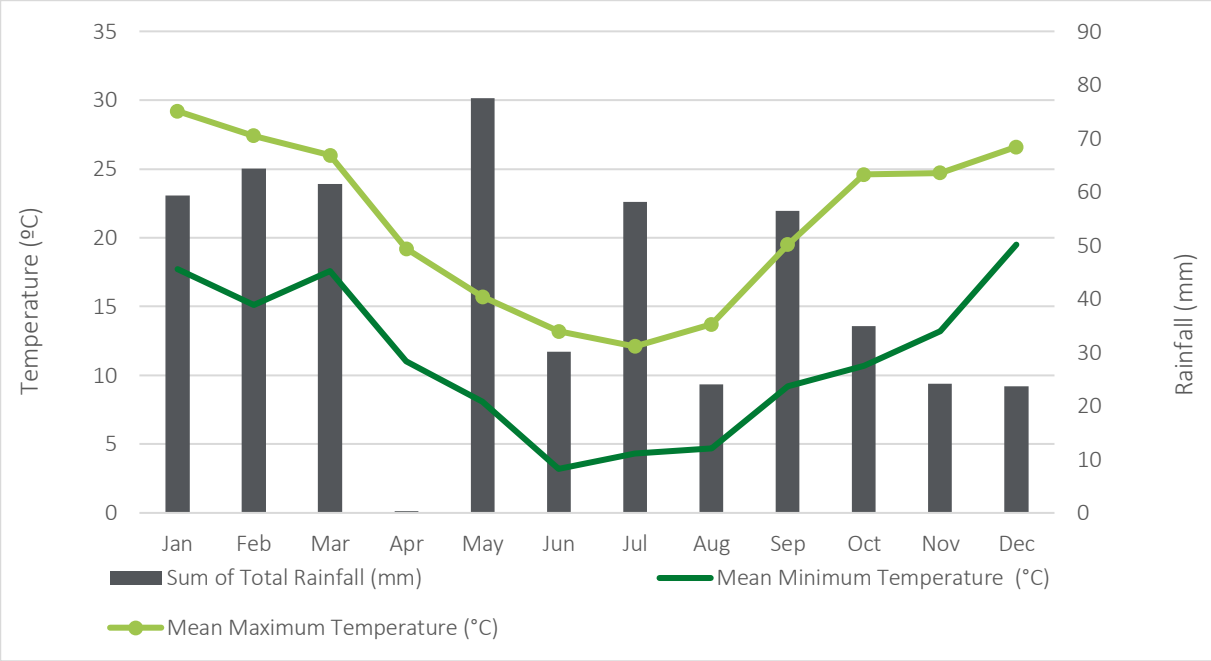

Figure 2: Monthly temperature and rainfall for 2025 (UCMPL 2025)

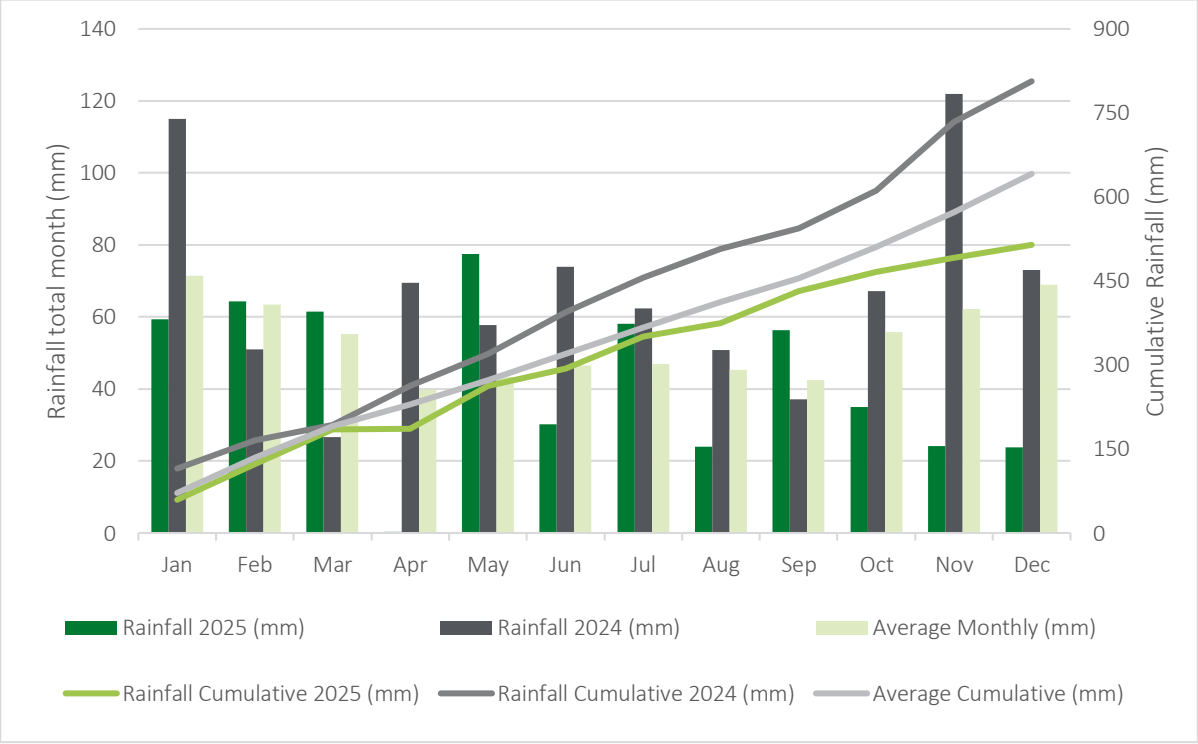

Figure 3: Monthly and cumulative rainfall totals for 2024, 2025 and long term average dating back to 1906

3. Results

3.1. General fauna

3.1.1. Acoustic detection

At least 13 microbat species were definitively recorded via acoustic call detection at general fauna sites monitored in 2025, with a further nine species potentially recorded. Two species (*Chalinolobus gouldii*; Gould's Wattled Bat, *Ozimops planiceps*; (Southern Free-tailed Bat) were recorded at all the 20 general fauna monitoring sites, with *Chalinolobus morio* (Chocolate Wattled Bat) and *Austronomus australis* (White-striped Free-tailed Bat) being recorded at 19 and 20 sites respectfully. At least four present and three potentially present species listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded across the general fauna sites.

Threatened species identified during acoustic surveys are listed in Table 6.

Table 6: Targeted cave-roosting microbat species detected via acoustic call data

Species	Common name	BC Act	EPBC Act	Acoustic detection
Chalinolobus dwyeri	Large-eared Pied Bat	Endangered	Endangered	Definite
Vespadelus troughtoni	Eastern Cave Bat	Vulnerable	Not listed	Definite
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable	Potential
Scoteanax rueppelli	Greater Broad-nosed Bat	Vulnerable	Not listed	Potential

Species richness determined via acoustic call detection has been assessed across the monitoring areas (Table 7) and MZs (Table 8) in which the general fauna sites are located, with results overall proving highly consistent between both monitoring areas and between MZs.

A total of ten microbat species were definitively recorded via acoustic call detection within Biodiversity Offset Area and Open Cut Rehabilitation Areas sites, whilst seven were recorded within the Surface Infrastructure Disturbance Areas, 11 in the Residual Project Area sites and lasty, three were definitively recorded at the general fauna site within the Spring Gully Cliffline Management Area (SG).

Biodiversity Offset Area sites recorded the highest mean species richness (8.88 species per site), after having recorded the second highest mean species richness during the previous survey of general fauna sites in 2023 (Table 7 and ELA 2024). Species richness at these sites ranged from seven species at BO3 to ten species at BO2 and BC1. The total ten microbat species recorded across Biodiversity Offset Area sites, are from four different families (*Emballonuridae, Molossidae, Vespertilionidae* and *Miniopteridae*), which may indicate these areas are developing habitat value for a diverse range of microbat species. A total of three microbat species were recorded at SG (Table 7).

While Residual Project Area sites have the second highest mean species richness of 8.25, these sites had the highest total of species richness of 11. These 11 species are from five different microbat families including the four families, as well as Rhinolophidae, owing the presence of the cave-roosting *Rhinolophus megaphyllus* (Eastern Horseshoe Bat).

Open Cut Rehabilitation Area sites recorded a total of ten microbat species across the four sites and a mean species richness of eight species per site, which represents a decrease from 9.25 species per site in 2023.

Similarly, Surface Infrastructure Disturbance Area sites recorded a total of seven and a mean species richness of 5.5, a notable decrease from eight in the previous 2023 results.

Table 7: Mean species richness and scores for definitely recorded bats per monitoring domain

Domain	Biodiversity Offset Areas	Surface Infrastructure Disturbance Areas	Open Cut Rehabilitation Area	Residual Project Areas	Spring Gully Cliffline Management Area (site SG)
Total Species Richness	10	7	10	11	3
Mean Species Richness	8.88	5.5	8	8.25	3

Management Zone (MZ) 2 recorded the highest total species richness (11 species) when assessed at MZ level, recording an equal mean species level of 8.66 species per site with MZ3, however MZ3 recorded the lowest total species richness (9 species) (Table 8).

MZ1 recorded the lowest mean species richness (7.5 species per site), consistent with 2023 results where it recorded the lowest mean species richness score as well. The low mean species richness recorded for MZ1 sites was driven by low results at sites INF4 (5 species) and SG (3 species). These results demonstrate the natural variability in microbat call detection.

Five microbat families were present during the 2025 general fauna monitoring. The consistent microbat species and family richness results recorded during 2025 monitoring indicate the availability and diversity of habitat present across the UCC is suitable for a range of microbat species.

Table 8: Mean species richness and scores for definitely recorded bats per management zone

Domain	Management Zone 1	Management Zone 2	Management Zone 3	Management Zone 5
Total Species Richness	10	11	9	10
Mean Species Richness	7.5	8.66	8.66	7.66

3.1.2. Harp trapping

Forty-four microbats were captured across the 20 general fauna sites which underwent harp trapping in 2025. Species richness per site ranged from one species at site INF3, through to four species at site BO1. *Vespadelus vulturnus* (Little Forest Bat) was the most abundant and widespread species caught during harp trapping, with a total of twenty-eight individuals caught across five sites, followed by the threatened Large-eared Pied Bat (six individuals at two sites) (Table 9).

The Large-eared Pied Bat was captured at the site BO1 and OC5 and was the second most abundant species during the 2025 monitoring period. From the six individuals caught, one female was lactating from the site OC5. All other individuals captured were identified adults. No other threatened microbat species were caught during the 2025 harp trapping at the general fauna sites.

Table 9: Microbat species recorded from general fauna monitoring sites during 2025

Scientific name	Common name	BC Act	EPBC Act	BC1	BC3	BE1	BE3	BO1	BO2	BO3	BO5	BO6	INF3	INF4	OC3	OC4	OC5	OC6	RES2	RES4	RES6	RES7	SG
Austronomus australis	White-striped Free-tailed Bat			D	D	D	D	D	D	D	D	D	D	D	D	X	D	D	D	D	D	D	D
Chalinolobus dwyeri	**Large-eared Pied Bat**	E	E	D	D	D	D	D, H	D	D	D	D	D	X	D	D	D, H	D	D	D	X	P	X
Chalinolobus gouldii	Gould's Wattled Bat			D	D	D	D	D, H	D	D	D	D	D	D, H	D	D	D	D	D	D	D	D	D
Chalinolobus morio	Chocolate Wattled Bat			D	D	D, H	D	D, H	D	D	D	D	P	D	D	D	D	D	D	D	D	D	D
Falsistrellus tasmaniensi*	**Eastern False Pipistrelle**	V		X	P	P	P	P	P	P	P	P	P	X	P	P	P	P	P	P	P	P	P
Miniopterus orianae oceanensis	**Large Bent-winged Bat**	V		D	D	D	D	P	D	P	D	D	P	P	D	P	D	D	D	D	P	D	P
Nyctophilus corbeni	**Corben's Long-eared Bat**	V	V	P	P	P	P	P	P	P	P	X	P	X	P	X	P	P	X	P	P	P	P
Nyctophilus geoffroyi	Gould's Long-eared Bat			P	P	P	P	P	P	P	P	X	P	X	P	X	P	P	X	P	P	P	P
Nyctophilus gouldi	Lesser Long-eared Bat			P	P	P	P	P	P	P	P	X	P	X, H	P	X	P	P	X	P	P	P	P
Ozimops petersi	Inland Free-tailed Bat			P	X	P	P	X	P	P	P	P	P	X	P	X	X	X	P	P	P	P	P
Ozimops planiceps	Southern Free-tailed Bat			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Ozimops ridei	Ride's Free-tailed Bat			D	D	D	D	D	D	X	D	P	D	D	D	D	X	X	D	D	X	X	X
Rhinolophus megaphyllus	Eastern Horseshoe Bat			X	X	X	X	D	X	X	X	X	X	X	X	D	X	X	X	D	X	X	X

Scientific name	Common name	BC Act	EPBC Act	BC1	BC3	BE1	BE3	BO1	BO2	BO3	BO5	BO6	INF3	INF4	OC3	OC4	OC5	OC6	RES2	RES4	RES6	RES7	SG
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat			D	D	D	X	D	D	X	X	X	X	X	X	X	X	X	X	X	D	D	D
Scoteanax rueppellii	**Greater Broad-nosed Bat**	V		X	P	P	P	P	P	P	P	P	P	X	P	P	P	P	P	P	P	P	P
Scotorepens balstoni	Inland Broad-nosed Bat			X	P	P	P	P	P	P	P	P	P	X	P	P	P	P	P	P	P	P	P
Scotorepens greyii	Little Broad-nosed Bat			X	P	P	P	P	P	P	P	P	P	X	P	P	P	P	P	P	P	P	P
Vespadelus darlingtoni	Large Forest Bat			D	P	P	D	D	D	D	D	D	P	P	D	P	X	X	D	P	D	D	D
Vespadelus regulus	Southern Forest Bat			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Vespadelus troughtoni	**Eastern Cave Bat**	V		X	P	P	P	X	P	X	P	P	X	X	P	X	X	D	D	X	X	D	X
Vespadelus vulturnus	Little Forest Bat			D	D	D, H	D	P, H	D	D	D	D	D, H	P, H	D	P	D, H	D	D	P	P	D	P

E = Endangered, V = Vulnerable, D = Definitely recorded via call detection, P = Potentially recorded via call detection, X = Not detected at all via call detection, H =Harp Trap

3.2. Targeted cliffline — Control sites

3.2.1. Acoustic detection

In total, at least 11 microbat species from four separate families were definitively recorded via acoustic call detection across all targeted cliffline monitoring – control sites, with a further ten species potentially present (Table 10). Species richness at control sites was relatively high, ranging from at least six species at SG5 and SG6, to 11 species at site UG1, with a mean species richness across all sites of 9.11. This does however represent a slight decrease in overall mean species richness compared to 2023 and 2024 (10.9 species and 9.6 species per site respectively). The natural variability inherent in microbat call detection is evident in sites SG5 and SG6, both recording the lowest species richness (six species), whilst SG7, a site located within the same area (Spring Gull Cliffline Management Area) detected 10 species.

Overall, six species and eight potentially present species were recorded via acoustic call detection across all eight control sites, which included three threatened microbat species under the BC Act and/or EPBC Act: Large-eared Pied Bat, *Nyctophilus corbeni* (Corben's Long-eared Bat), and *Falsistrellus tasmaniensis* (Eastern False Pipistrelle).

Ten other microbat species were recorded including the Lesser Long-eared Bat, Gould's Wattled Bat and *Nyctophilus geoffroyi* (Gould's Long-eared Bat).

The consistent recording of target threatened species at these sites confirms their suitability for use of the control sites in the UCMPL microbat monitoring program.

3.2.2. Harp trapping

Twenty-six microbat species were caught during the 2025 monitoring, across eight control sites. Species richness per site ranged from one at SG8 to three species at BD6 and BD8. The most abundant species within the control sites was the Little Forest Bat, with Gould's Wattled Bat and the threatened Large-eared Pied Bat coming in at second with an equal five individuals (Table 10).

A total of five Large-eared Pied Bat individuals were captured across control sites during 2025, with two individuals caught at BD8, and SG7 and one caught at UG1. Four of the individuals were identified as female adults and were lactating. The presence of adult lactating females is indicative of breeding occurring within the UCMPL control sites.

Table 10: Microbat species recorded – Control sites during 2025 monitoring.

Scientific name	Common name	EPBC Act	BC Act	BD7	SG5	UG1	BD9	SG7	BD6	BD8	SG8
Austronomus australis	White-striped Free-tailed Bat			D	D	D	D	D	D	D	D
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	D	D	D	D	D, H	D	D, H	D, H
Chalinolobus gouldii	Gould's Wattled Bat			D	D	D	D	D	D, H	D, H	D
Chalinolobus morio	Chocolate Wattled Bat			D	D	D	D	D	D	D	D
Falsistrellus tasmaniensis	Eastern False Pipistrelle		V	P	P	P	P	P	P	P	P
Miniopterus orianae oceanensis	Large Bent-winged Bat		V	D	P	D	P	D	D	D	P
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	P	P	P	P	P	P	P	P
Nyctophilus geoffroyi	Gould's Long-eared Bat			P	P	P	P	P	P, H	P	P
Nyctophilus gouldi	Lesser Long-eared Bat			P	P	P, H	P	P	P	P	P
Ozimops petersi	Inland Free-tailed Bat			P	P	P	P	P	P	P	X
Ozimops planiceps	Southern Free-tailed Bat			D	D	D	D	D	D	D	D
Ozimops ridei	Ride's Free-tailed Bat			D	D	D	D	D	D	D	D
Rhinolophus megaphyllus	Eastern Horseshoe Bat			X	X	D	D	D	D	D	X
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat			D	P	D	X	D	X	D	X
Scoteanax rueppellii	Greater Broad-nosed Bat		V	P	P	P	P	P	P	P	P
Scotorepens balstoni	Inland Broad-nosed Bat			P	P	P	P	P	P	P	P
Scotorepens greyii	Little Broad-nosed Bat			P	P	P	P	P	P	P	P
Vespadelus darlingtoni	Large Forest Bat			D	P	D	P	P	P	P	P
Vespadelus regulus	Southern Forest Bat			P	P	P	P	P	P	P	P
Vespadelus troughtoni	Eastern Cave Bat		V	P	P	X	P	P	X	P	X
Vespadelus vulturnus	Little Forest Bat			D	P	D, H	D	D	P, H	D, H	P

E = Endangered, V = Vulnerable, D = Definitely recorded via call detection, P = Potentially recorded via call detection, X = Not detected at all via call detection, H =Harp Trap

3.3. Targeted cliffline — Impact sites

3.3.1. Pre-mining surveys

Pre-mining surveys identified the presence of potential cave-bat roosting habitat on UW LW10.

Acoustic detection undertaken at UW LW10 sites identified the presence of Large-eared Pied Bat at three out of six sites, including at UW LW10a, UW LW10c and UW LW10d. Call activity across the monitoring period was low at these sites, ranging from one to five. Sites with known Large-eared Pied Bat roosts (control sites SG5, SG7 and SG8) recorded 132 to 825 calls during the monitoring period.

3.3.2. Acoustic detection

In total, 11 microbat species from five separate families were definitively recorded via acoustic call detection across all impact sites, with a further ten species potentially present (Table 11).

Species richness at the impact sites ranged from six species at sites UWLW8q, UWLW9b and UWLW10b to ten species at site UWLW10c. The mean species richness across all impact sites was 10.66, this represents an increased overall mean species richness compared to 2023 and 2024 (10.2 species and 9.5 species per site respectively). Overall mean species richness during 2025 was highest at UWLW8 (8.14 species per site), while UWLW9 has the lowest mean species richness at 7.5 species per site. UWLW8 had been undermined prior to the 2025 monitoring, this indicates that a diverse range of microbat species, including cave-dwelling species, at the targeted cliffline sites, are still present and utilising the habitat, post-mining.

Three definitively detected threatened species and four potentially detected threatened species listed under the BC Act and/or the EPBC Act were recorded via call detection at impact sites during 2025. The target threatened cave-roosting/tree-roosting microbat species, Large-eared Pied Bat, Large-Bent-winged Bat and *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat) were definitively recorded at eight sites, twelve sites and five sites, respectfully (Table 11). None of the threatened microbat species were detected at all seventeen impact sites. The Yellow-bellied Sheath-tailed Bat had not been recorded at impact sites since the commencement of monitoring in 2018 and 2019, until the 2023 monitoring period. This species was recorded at the impact sites in 2024 and 2025.

3.3.3. Harp trapping

Harp trapping was undertaken at four impact sites, including UWLW8q, UWLW8a, UWLW8g and UWLW8n during 2025. Two *Nyctophilus gouldi* (Lesser Long-eared Bat) and one Little Forest Bat was caught at UWLW8n (Table 11). No cave dependent microbats were caught during the surveys.

Table 11: Microbat species recorded from impact sites during 2025 monitoring

Species name	Common name	EPBC Act	BC Act	UWL W8a	UWL W8f	UWL W8g	UWL W8k	UWL W8n	UWL W10e	UWL W10c	UWL W8q	UWL W8o	UWL W9a	UWL W9b	UWL W9c	UWL W9d	UWL W10a	UWL W10b	UWL W10d	UWL W10f
Austronomus australis	White-striped Free-tailed Bat			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	D	X	X	P	D	X	D	D	D	X	X	D	X	D	P	D	P
Chalinolobus gouldii	Gould's Wattled Bat			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Chalinolobus morio	Chocolate Wattled Bat			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Falsistrellus tasmaniensis	Eastern False Pipistrelle		V	P	X	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Miniopterus orianae oceanensis	Large Bent-winged Bat		V	P	D	D	P	D	D	D	P	D	D	P	D	D	D	D	D	P
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Nyctophilus geoffroyi	Gould's Long-eared Bat			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Nyctophilus gouldi	Lesser Long-eared Bat			P	P	P	P	P, H	P	P	P	P	P	P	P	P	P	P	P	P
Ozimops petersi	Inland Free-tailed Bat			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	X	P
Ozimops planiceps	Southern Free-tailed Bat			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Ozimops ridei	Ride's Free-tailed Bat			D	D	D	P	D	D	D	D	D	D	D	D	D	D	D	D	D
Rhinolophus megaphyllus	Eastern Horseshoe Bat			D	X	D	D	X	D	D	X	X	X	X	X	D	X	X	D	X

Species name	Common name	EPBC Act	BC Act	UWL W8a	UWL W8f	UWL W8g	UWL W8k	UWL W8n	UWL W10e	UWL W10c	UWL W8q	UWL W8o	UWL W9a	UWL W9b	UWL W9c	UWL W9d	UWL W10a	UWL W10b	UWL W10d	UWL W10f
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat		V	D	D	D	D	X	X	D	P	X	X	P	D	P	X	X	X	X
Scoteanax rueppellii	Greater Broad-nosed Bat		V	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Scotorepens balstoni	Inland Broad-nosed Bat			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Scotorepens greyii	Little Broad-nosed Bat			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Vespadelus darlingtoni	Large Forest Bat			D	D	P	D	D	D	D	P	D	D	P	D	P	P	P	P	D
Vespadelus regulus	Southern Forest Bat			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Vespadelus troughtoni	Eastern Cave Bat		V	X	X	P	X	P	P	P	P	P	P	P	X	X	P	P	X	P
Vespadelus vulturnus	Little Forest Bat			D	D	P	P	D, H	P	P	P	P	D	D	P	D	P	P	P	D

E = Endangered, V = Vulnerable = Definitely recorded via call detection, P = Potentially recorded via call detection, X = Not detected at all via call detection, H =Harp Trap

4. Discussion

The UCMPL BMP (UCMPL 2024) outlines the monitoring requirements and performance criteria to be achieved with regards to the management of threatened microbat species. The following section provides a summary of progress criteria against the monitoring requirement and/or performance criteria relevant to the 2025 UCMPL microbat monitoring program.

4.1. Progress of management objectives and completion criteria

Table 12 details the management objectives and completion criteria for the Management Domain, along with a comment regarding results of 2025 monitoring. All requirements and criteria are currently being met.

Table 12: Management Zone performance criteria management aim and relevant results from 2025 monitoring

Domain	Objective	Completion Criteria	Comments
Fauna habitat available	Prescence of a range of fauna habitats	A range of habitat is available	Hollow-bearing trees and cliffline microhabitat recorded at General Fauna sites. Ten confirmed and a further ten potential microbat species recorded during 2025 monitoring. Three of the 10 confirmed microbat species were threatened, and 3 of the potentially present were identified as threatened.

4.2. Provision of threatened species habitat

Section 7.11.4 of the BMP (UCMPL 2024) outlines the following Trigger Action Response Plan (TARP) for the Provision of Threatened Species Habitat for threatened microbats:

- *A species of threatened microbat previously identified within Spring Gully Cliff Line Management Area or Brokenback Conservation Area for two or more consecutive monitoring periods, not detected in these areas during two or more subsequent consecutive monitoring periods.*

If this is found to have occurred, the proposed action is to investigate whether a lack of habitat may be a potential factor in the species not being detected. Table 14 below lists the threatened microbat species recorded within Spring Gully Management Area, during previous monitoring periods and whether they require investigation under the TARP. Sites within Brokenback and Spring Gully were not monitored in 2016 and as such, if a species was recorded in both 2015 and 2017, this is considered to constitute consecutive monitoring periods.

As demonstrated below in Table 13, three threatened species, Large-eared Pied Bat, Large Bent-winged Bat and Yellow-bellied Sheath-tailed Bat, have been recorded within the Brokenback Conservation Area for two or more consecutive monitoring periods, with the Yellow-bellied Sheath-tailed Bat being recorded for two consecutive periods for the first time since 2011 microbat monitoring, in the Brokenback Conservation Area.

As such, the Provision of Threatened Species Habitat for threatened microbats TARP is not triggered. As shown in Table 14 the Large-eared Pied bat, Large Bent-winged Bat and the Yellow-bellied Sheath-tailed Bat have been detected within the Spring Gully Cliffline Management Area for two or more consecutive monitoring periods. All three species were recorded during 2025 monitoring and as such, the Provision of Threatened Species Habitat for threatened microbats TARP is not triggered for these species.

Table 13: Threatened microbat species definitively recorded in Brokenback Conservation Area from 2011 to present and their respective TARP assessment

Species	BC Act	EPBC Act	2011	2012	2013	2014	2015	2017	2018	2019	2020	2021	2022	2023	2024	2025	TARP triggered
Yellow-bellied Sheath-tailed Bat	V		-	-	-	-	D	-	D	-	D	-	-	D	-	D	No
Large-eared Pied Bat	V	V	D, H	D, H	D, H	D, H	D	D, H	D	D	D, H	D	D, H	D, H	D, H	D, H	No
Little Pied Bat	V		-	-	-	-	-	-	-	D	-	-	-	-	-	-	No
Large Bent-winged Bat	V		D	D, H	D	D	D	D	D	D	D	D	D	D	-	D	No

V= Vulnerable to extinction; D = Definitely recorded via call detection; H = captured in Harp trap; P = Potentially recorded via call detection

Table 14: Threatened microbat species definitively recorded in Spring Gully Cliffline management Area from 2011 to present and their respective TARP assessment

Species	BC Act	EPBC Act	2011	2012	2013	2014	2015	2017	2018	2019	2020	2021	2022	2023	2024	2025	TARP triggered
Yellow-bellied Sheath-tailed Bat	V		-	-	-	-	-	-	-	D	D	-	-	D	-	D	No
Large-eared Pied Bat	V	V	D	D	D	D, H	D	D, H	D	D, H	D, H	D, H	D, H	D, H	D, H	D, H	No
Little Pied Bat	V		-	-	-	-	-	-	-	D	-	-	-	-	-	-	No
Large Bent-winged Bat	V		D	D	-	D	D	D	D	-	D	D	D	D	-	D	No

V= Vulnerable to extinction; D = Definitely recorded via call detection; H = captured in Harp trap; P = Potentially recorded via call detection

4.3. Targeted threatened cave-roosting microbat species activity

The call activity of the threatened cave-roosting microbat species, Large-eared Pied Bat and Large Bent-winged Bat is assessed in order to identify any potential impacts on these species resulting from mining induced subsidence.

Section 7.21.5 of the BMP (UCMPL 2024) and Table 21 of the EP (UCMPL 2022) outlines the following performance indicator for this assessment:

- *Analysis of micro-bat monitoring data identifies decreasing activity levels (>10% decline) of endangered micro-bat species during cliff line monitoring within the mined area over two or more monitoring periods, outside of seasonal variations.*

Given that control sites are not undermined, they do not have pre- and post-mining periods of direct relevance to impact sites within the mined area. This reduces their use as a means of comparison for seasonal variation, however, where they have been monitored across the same time period as impact sites (excluding 2016 when control sites were not monitored), general comparisons in both mean call activity and percent change in mean call activity can be made.

Despite these limitations, analysis of target species mean call activity pre and post mining has been undertaken for both all undermined UW LW1-8 sites and UWLW8 sites separately. The same analysis has been undertaken within the mined area (all undermined Ulan Underground and Ulan West sites) to assess the UCMPL BMP performance indicator (UCMPL 2024) (see Section 7.20.5).).

Additionally, analysis of target species mean call activity at control sites from 2013 onwards was also undertaken to provide a comparative assessment of seasonal variation, as required by the UCMPL performance indicator.

4.3.1. Large-eared Pied Bat

Large-eared Pied Bat mean call activity per night across undermined EP Application Area (UWLW1-8) impact sites, as well as control sites is presented in Figure 4 below. Mean call activity in 2025 recorded at control sites was 91.42 calls per night and 7.75 calls per night at undermined UWLW1-8 Application Area impact sites. Control sites recorded an increase of 81.72% in call activity compared to the previous year, while UWLW1-8 impact sites recorded a decrease of 110.32%.

While there is a decrease at the impact sites in 2025, this is considered to be due to seasonal variation as the mean call activity is consistent with previous monitoring periods. Therefore, the performance indicator is not exceeded. Decreases in mean call activity have been recorded in previous monitoring years, such as 2021 where the mean call activity per night dropped from 32.30 calls per night in 2020 to 4.00 calls per night in 2021 (87.61% decrease). Furthermore, Large-eared Pied Bat mean call activity decreases have not been recorded over two or more consecutive monitoring periods and therefore, the performance indicator has not been exceeded.

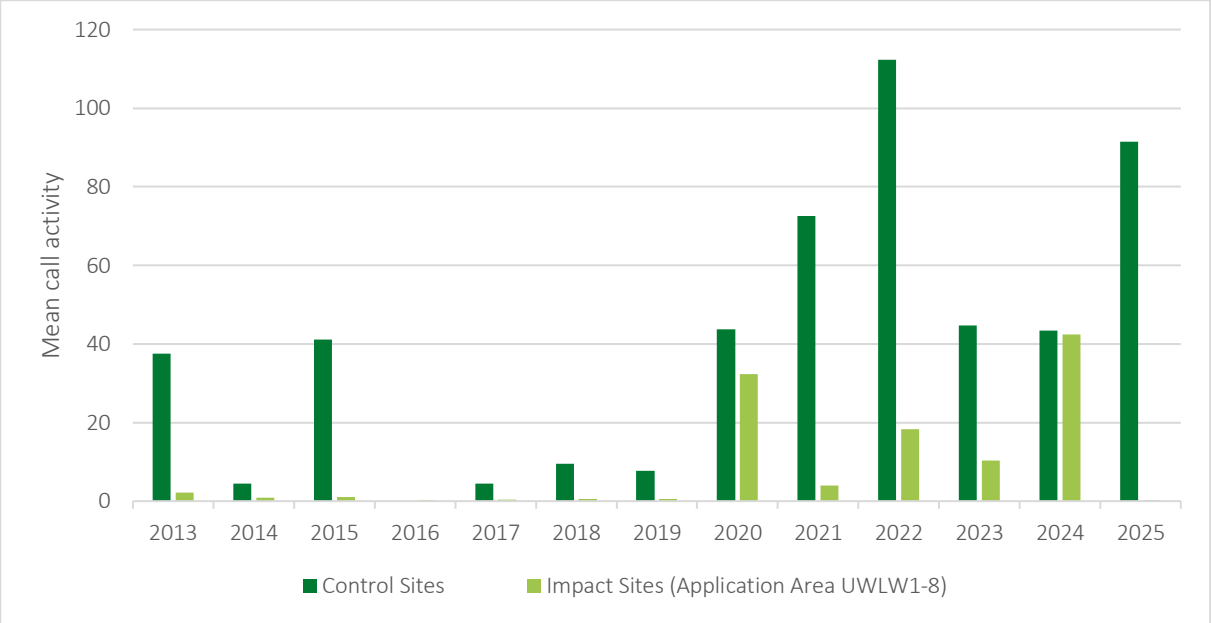

Figure 4: Mean Large-eared Pied Bat call activity across both control and undermined Application Area (UWLW1-8) impact sites, 2013 – 2025

Mean Large-eared Pied Bat call activity was calculated separately for UWLW8 impact sites only, for the respective pre-mining (2020-22) and post-mining (2023-25) period. This analysis is displayed alongside control sites mean call activity in Figure 5 below. Mean call activity was 7.75 calls per night at UWLW8 impact sites in 2025, representing a decrease of 110.32% compared to 2024 increase of 864%.

Despite the post-mining decline recorded in Large-eared Pied Bat call activity in 2025, with the large increase in call activity recorded in 2024 (864%), decreases have not been recorded over two or more monitoring periods and therefore, the performance indicator has again, not been exceeded.

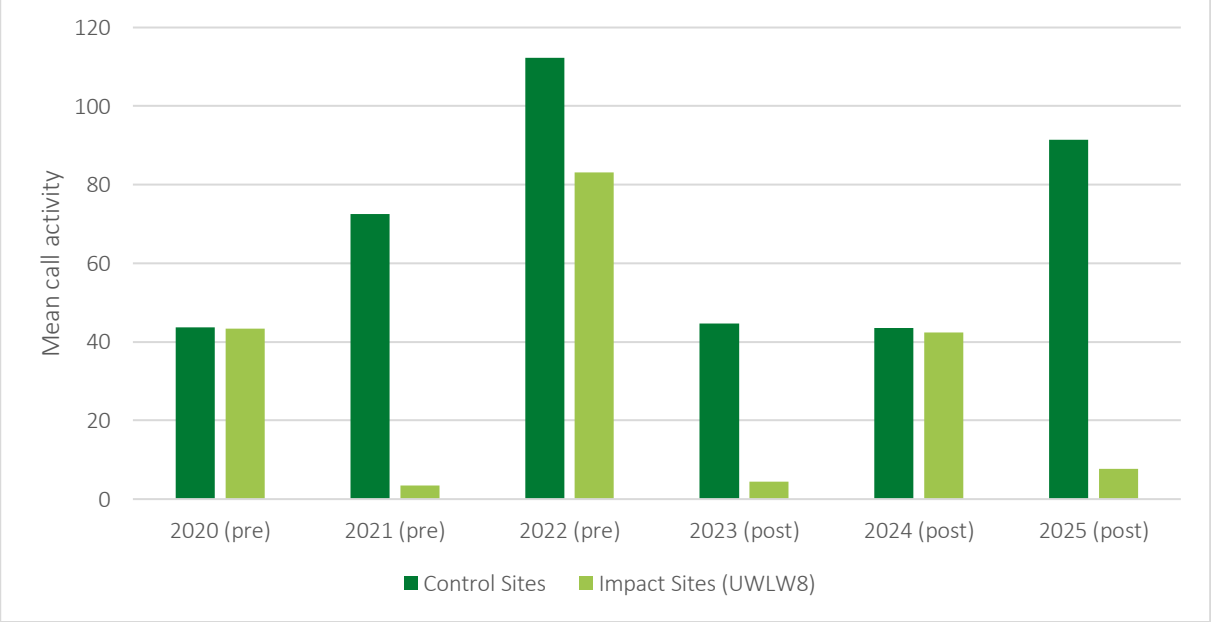

Figure 5: Mean Large-eared Pied Bat call activity across both control and UWLW8 impact sites, 2020 – 2025

Large-eared Pied Bat mean call activity was also calculated separately for both control and undermined sites within the mined area (Ulan Underground and Ulan West), across all available survey years and sites (Figure 6).

Mean call activity in 2025 recorded at control sites was 3.32 calls per night and 91.42 calls per night at undermined sites. Control sites recorded an increase of 110.31% in call activity compared to the previous year (2024), while the undermined mined area impact sites recorded a decrease of 85.22%. Decreases have not been recorded over two or more monitoring periods and therefore, the performance indicator has again, not been exceeded.

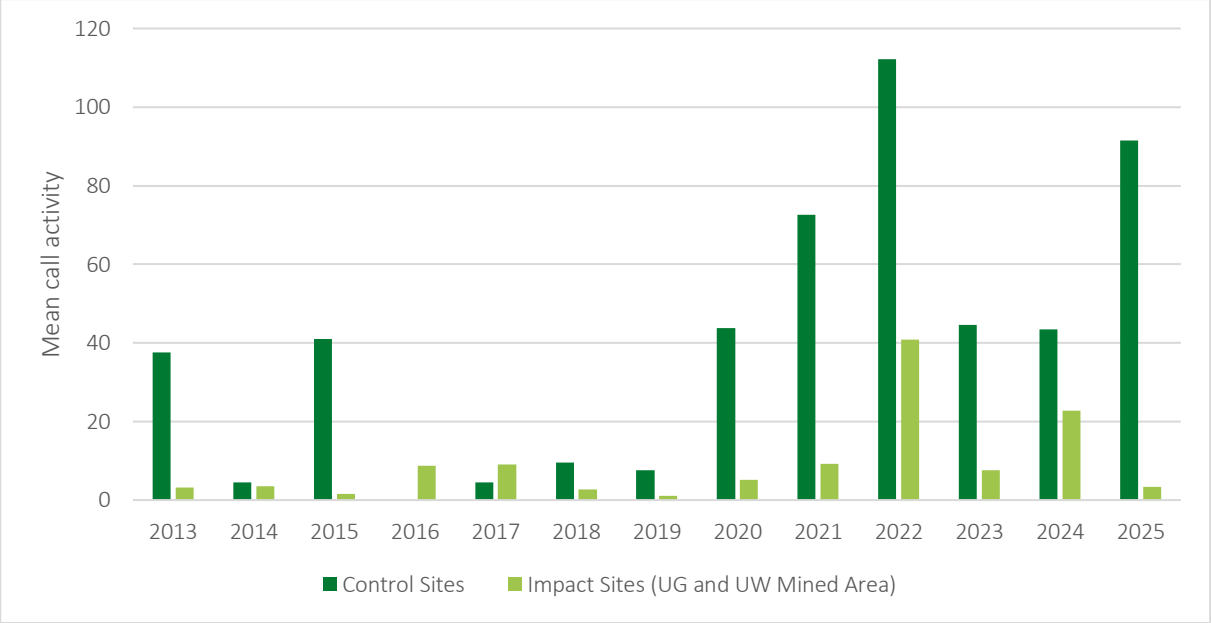

Figure 6: Mean Large-eared Pied Bat call activity across both control and mined area (UG and UW) impact sites, 2013-2025

4.3.2. Large Bent-winged Bat

Large Bent-winged Bat mean call activity per night across undermined UWLW1-8 impact sites, as well as control sites is presented in Figure 7 below.

Mean call activity in 2025 recorded at control sites was 43.12 calls per night and 21.28 calls per night at undermined impact sites. This represents a significant increase in call activity for both control and EP Application Area impact sites compared to the previous monitoring year (2024) and represents an increase of >100% for both UWLW1-8 impact sites and control sites.

As shown in Figure 7 the Large Bent-winged Bat call activity recorded in 2025 was an outlier in comparison to most other years (2023 is the exception). With this large post mining increase in Large Bent-winged Bat call activity recorded in 2023 and 2025, Large Bent-winged Bat call activity has not decreased over two or more consecutive monitoring periods.

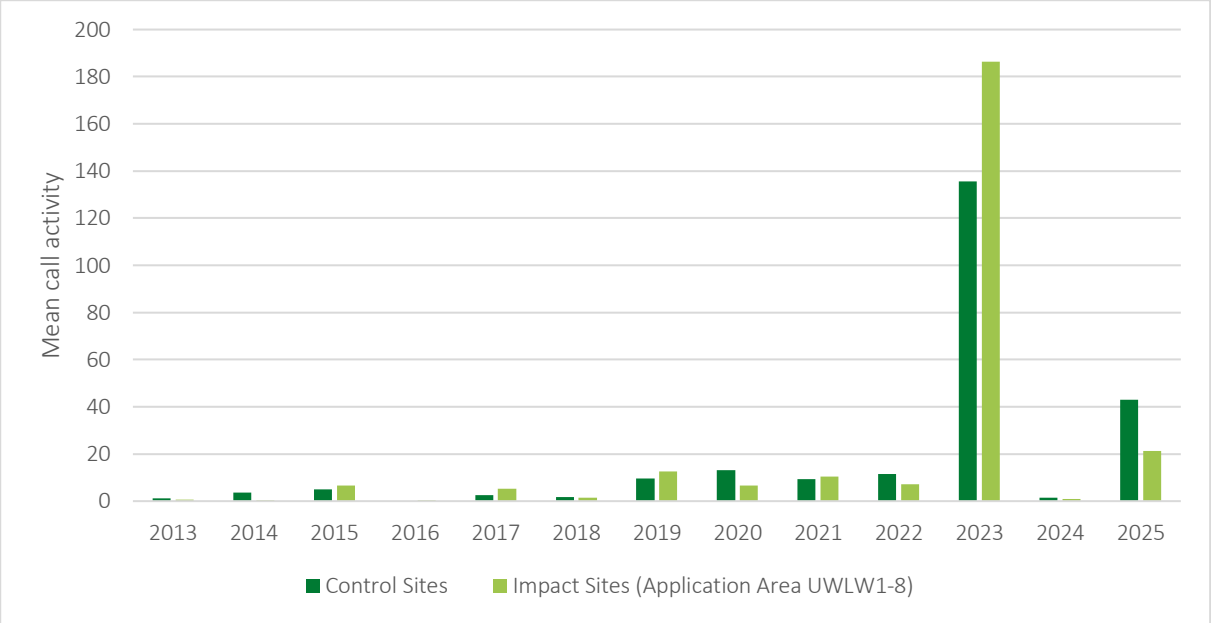

Figure 7: Mean Large Bent-winged Bat call activity across both control and undermined Application Area (UWLW1-8) impact sites, 2013-2025

Mean Large Bent-winged Bat call activity has also been calculated separately for UWLW8 impact sites only. As was the case with the full EP Application Area, UWLW8 impact sites also recorded substantially high mean call activity in 2025, while there was considerably lower mean call activity in 2024 (Figure 8). However, given the large post-mining increase in Large Bent-winged Bat call activity in 2023 and 2025, the relevant performance indicator has not been exceeded for UWLW8 sites across the full two-year post-mining monitoring period.

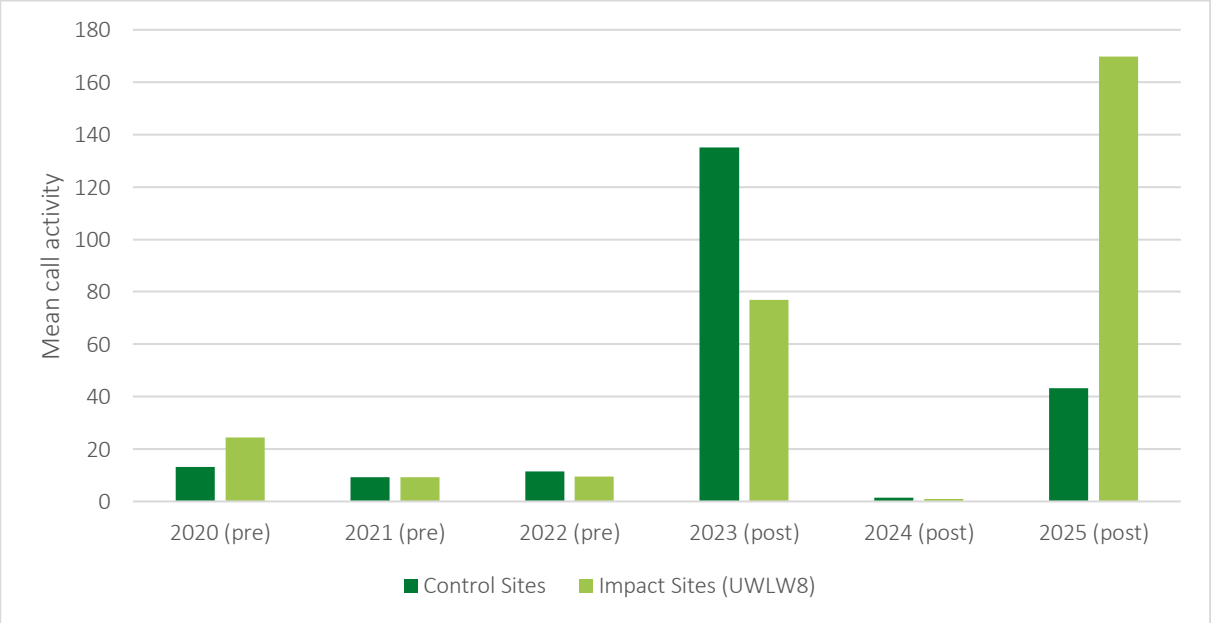

Figure 8: Mean Large Bent-winged Bat call activity across both control and UWLW8 impact sites, during the pre (2020-22) and post-mining monitoring period (2023-25)

Mean Large Bent-winged Bat call activity was calculated separately for both control and undermined impact sites within the mined area (Ulan Underground and Ulan West), across all available survey years and sites (Figure 9).

Mean call activity in 2025 was 43.12 calls per night at control sites and 33.73 calls per night at undermined impact sites. There was a notable increase in call activity compared to the previous monitoring year, representing an increase of >100% for both control sites and undermined impact sites, compared to 2024. Call activity has not declined over two or more monitoring periods and as such, the BMP (UCMPL 2024) performance criteria indicator has not been exceeded.

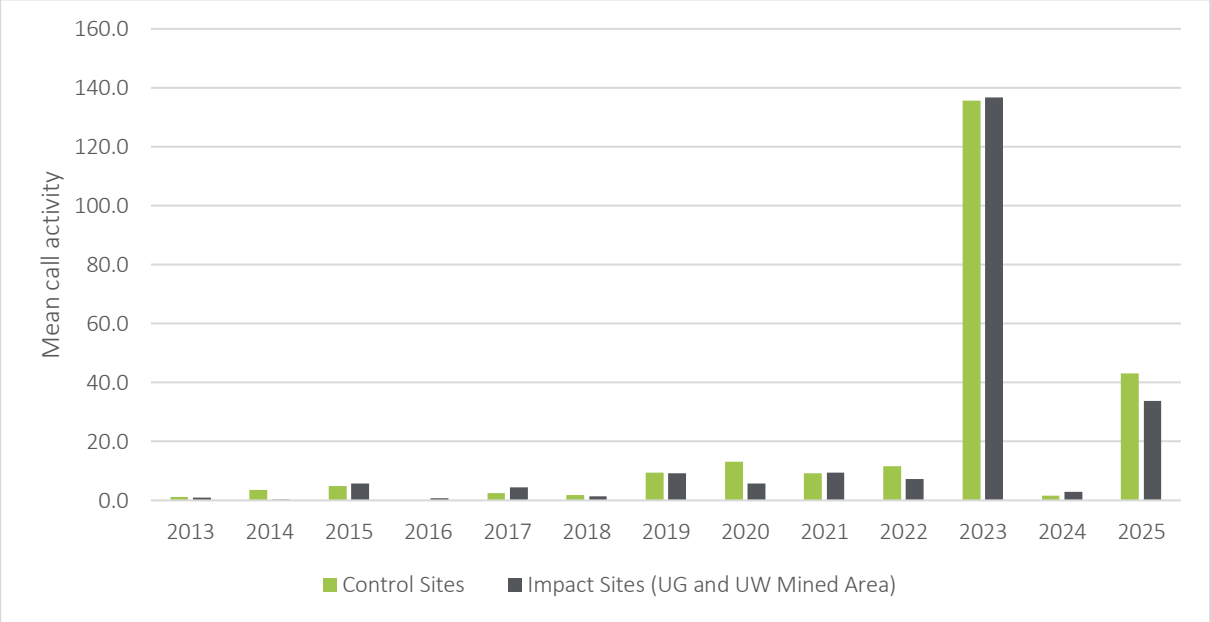

Figure 9: Mean Large Bent-winged Bat call activity across both control and mined area (UG and UW), impact sites, 2013 – 2025

5. Conclusion and recommendations

Microbat monitoring was undertaken across the UCC in 2025, utilising both acoustic call detection and harp trapping at general fauna and targeted cliffline monitoring sites, including control and impact sites. Monitoring was successfully completed at forty-three sites. The definitive recording of ten microbat species, including four threatened species, across all monitoring areas confirms the adherence to the monitoring objectives and completion criteria detailed in the BMP (UCMPL 2024).

A total of seventy-three individual microbats were caught during harp trapping across eleven different sites within the UCC, including sites previously undermined. Large-eared Pied Bat which is listed as Endangered under the BC Act and EPBC Act, was caught during harp trapping at five sites. Both lactating and post-lactating adult Large-eared Pied Bat females were caught, confirming the ongoing breeding success of this species within the UCC. These results indicate that the UCC continues to provide habitat for threatened microbat species, including previously undermined cliffline habitats.

All previously recorded threatened microbat species within the Brokenback Conservation Area and Spring Gully Cliffline Management Area were again recorded during the 2025 monitoring. This included abundant call activity of Large-eared Pied Bat and Large Bent-winged Bat, with individual Large-eared Pied Bats also caught in three of the harp traps set within these sites, no Large Bent-winged Bats were captured in the harp traps within these two areas. Given these results, the Provision of Threatened Species Habitat TARP for threatened microbat species within the Brokenback Conservation Area and Spring Gully Cliffline Management Area was not triggered.

Monitoring continued at eight previously established targeted cliffline – control sites and fifteen targeted cliffline – impact sites. Both control and impact sites recorded relatively high and consistent micro bat species richness from acoustic call detection surveys, with mean species richness of 9.11 and 10.66 recorded across control and impact sites respectfully. Both control and impact sites definitively recorded at least eleven microbat species in total, which includes at least four threatened microbat species.

A decrease in Large-eared Pied Bat call activity recorded at undermined impact sites from 2024 to 2025 (Figure 4– Figure 6), is considered to be due to seasonal variation, validated by previous monitoring data which demonstrates a trend of Large-eared Pied Bat call activity fluctuating across each monitoring period. The performance indicator for Large-eared Pied Bat has not been exceeded.

Large Bent-winged Bat call activity substantially increased at undermined impact sites from 2024 to 2025 (Figure 7– Figure 9). While no Large Bent-winged Bats were caught in the harp traps, the call detection of this threatened species has ensured that the Large Bent-winged Bat still inhabits the selected clifflines and habitat within the UCMPL undermined areas. The performance indicator for Large Bent-winged Bat has not been exceeded.

The presence of Large-eared Pied Bat at UW LW10a, UW LW10c and UW LW10d warrants further assessment during 2026 to determine the presence of breeding roosts. Harp trapping at these sites is recommended in accordance with the BMP (UCMPL 2024).

Given the successful implementation of the microbat monitoring program in 2025 and the results detailed in this report, UCMPL is compliant with their relevant project approval conditions.

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Appendix A Threatened target cave-roosting microbat species acoustic call data

Species Name	Common Name	Control Sites Number of calls recorded							
		BD6	BD7	BD8	BD9	SG5	SG7	SG8	UG1
Chalinolobus dwyeri	Large-eared Pied Bat	85	75	997	2	371	825	132	75
Miniopterus orianae oceanensis	Large Bent-winged Bat	233	790	44	55	24	27	0	207

Species Name	Common Name	Impact Sites UWLW7 Number of calls recorded						
		UWLW8a	UWLW8f	UWLW8g	UWLW8k	UWLW8n	UWLW8o	UWLW8q
Chalinolobus dwyeri	Large-eared Pied Bat	152	0	0	0	21	38	6
Miniopterus orianae oceanensis	Large Bent-winged Bat	37	28	85	163	26	68	189

Species Name	Common Name	Impact Sites UWLW8 Number of calls recorded			
		UWLW9a	UWLW9b	UWLW9c	UWLW9d
Chalinolobus dwyeri	Large-eared Pied Bat	0	0	1	0
Miniopterus orianae oceanensis	Large Bent-winged Bat	41	537	383	54

Species Name	Common Name	Impact Sites UWLW9 Number of calls recorded					
		UWLW10a	UWLW10b	UWLW10c	UWLW10d	UWLW10e	UWLW10f
Chalinolobus dwyeri	Large-eared Pied Bat	5	0	2	1	0	0
Miniopterus orianae oceanensis	Large Bent-winged Bat	157	37	90	22	49	328

Table 15: General fauna sites acoustic call data for the threatened targeted cave-roosting microbat species definite calls

Species Name	Common Name	General fauna Sites Number of calls recorded																			
		BC1	BC3	BE1	BE3	BO1	BO2	BO3	BO5	BO6	INF3	INF4	OC3	OC4	OC5	OC6	RES2	RES4	RES6	RES7	SG
Chalinolobus dwyeri	Large-eared Pied Bat	1	8	22	9	25	10	1	1	19	1	0	8	7	11	1	2	0	0	26	0
Miniopterus orianae oceanensis	Large Bent-winged Bat	11	20	17	23	12	88	2	25	25	101	14	13	9	32	357	41	38	50	46	0

Appendix B Harp trapping data

Table 16: Microbat species captures from targeted cliffline (Control, Impact and General Fauna Sites) monitoring sites during 2025

Scientific Name	Common Name	BC Act	EPBC Act	Control Sites					Impact Sites	General Fauna Sites					
				BD6	BD8	SG7	SG8	UG1	UWLW8n	OC5	BE3	BE1	BO1	INF4	INF3
Chalinolobus dwyeri	Large-eared Pied Bat	V	E	0	2	2	1	0	0	1	0	0	5	0	0
Chalinolobus gouldii	Gould's Wattled Bat			4	1	0	0	0	0	0	0	0	2	1	0
Chalinolobus morio	Chocolate Wattled Bat			0	0	0	0	0	0	0	0	3	1	0	0
Nyctophilus geoffroyi	Lesser Long-eared Bat			3	0	0	0	1	2	0	0	0	0	3	0
Nyctophilus gouldii	Gould's Long-eared Bat			0	0	0	0	0	0	0	0	0	0	0	0
Vespadelus troughtoni	Eastern Cave Bat	V		0	0	0	0	0	0	0	0	0	0	0	0
Vespadelus vulturnus	Little Forest Bat			5	1	0	0	6	1	3	0	4	10	7	4

V = Vulnerable, E = Endangered

Appendix C Microbat call identification report

Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Ulan Coal Mining Pty Ltd - Microbat Call Identification Report 2025 Survey Period
Eco Logical Australia Pty Ltd
Prepared for Rebecca Croak

Prepared by RA Environmental Consultants

ABN – 63 6685 875 27

1

Project aim

The purpose of this survey and microbat call identification report is to identify the following:

- The microbat species that are present, or potentially present within the Ulan Coal Mine study area (hereafter known as the study area).
- The distribution and activity levels among the threatened *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Miniopterus orianae oceanensis* (Large Bent-winged Bat).

Methods

Survey effort

The subject land is located approximately 50 km north of Mudgee in New South Wales (NSW). The submitted data was collected on 20 Song Meter SM4BAT FS (Wildlife Acoustics) and three Anabat Swift (Titley Scientific). Each detector was:

- Deployed for two or four consecutive survey nights between 24 November and 9 December 2025 (Table 1).
- Programmed and deployed by Eco Logical Australia.
- Programmed to begin recording 30 minutes before sunset and conclude recording 30 minutes after sunrise (from dusk to dawn).

One hundred and forty survey nights (up to 1,400 hours of recording time, based on ~10 hours of recording time per survey night (see Sunrise and sunset times in Mudgee, December 2025)) were achieved during this survey period (Table 1). The detectors used, the overall survey effort, and the number of full-spectrum files submitted for analysis are described in Table 1.

Candidate species list

The subject land is located within the Slopes and Plains biogeographical region of NSW, as described by Pennay *et al.* (2004). Before analysing the submitted microbat call data, a candidate list of microbat species known to or are deemed likely to occur in the region (in this instance, region acquaints to a 30 km radius of subject land) was prepared by completing a search and a review of Australian Bat Society 'Bat Maps' (BatMap - Ausbats), NSW Bionet database search tool, Atlas of Living Australia (Atlas of Living Australia – Open access to Australia's biodiversity data (ala.org.au)), Churchill (2008), Pennay *et al.* (2011) as well as Van Dyck and Strahan (2008).

This review identified 21 microbat species known to or considered likely to occur within a 30 km radius of the subject lands (Appendix 1).

Data analysis

One hundred and eleven thousand, two hundred and thirty-nine Waveform Audio File Format (WAV) sound files were submitted for analysis (Table 1). A noise-removal filter included with Anabat Insight software package (Version 2.1.7-0-ge456fe0, Titley Scientific) was used to remove non-microbat noise. During this process, 20,994 noise-only files were excluded. The remaining 90,245 files passed by the noise filter were subject to a Decision Tree (DT) analysis to:

- Sort the microbat call sequences into broad groups based on the average characteristic frequency (Fc).
- Attach a label to each file that best represents the species or species complex that could be responsible for making the call.

Following this process, the sorted and labelled microbat call sequences were manually reviewed in Anabat Insight. Species and species complex identifications were confirmed by comparing the call sequence characteristics of the recorded microbat calls to the call parameters published in:

- The *Region based guide to the echolocation calls of microbats in New South Wales* (Pennay *et al.* 2004) (Bat Calls of New South Wales (PDF - 1.4MB) (nsw.gov.au).
- The Key to the bat calls of south-east Queensland and north-east New South Wales (Reinhold *et al.* 2001).
- Australian Bats Field Guide. Mobile App (Thomson *et al.* 2024).

While reviewing the recorded microbat call sequences, the following protocols (adapted from Lloyd *et al.* 2006) were applied:

- Recorded call sequences containing fewer than three pulses are generally excluded from the analysis. These calls are often too short to confidently identify the species producing them (Law *et al.* 1999).
- For those call sequences that can be used to identify a microbat species (or a species complex), two categories of confidence were used (Mills *et al.* 1996):
    - Present – the Fc, quality, and structure of the call sequence (e.g., pulse characteristics) (as per Rienhold *et al.* 2001; Pennay *et al.* 2004 and Thomson *et al.* 2024) are such that the identity of the microbat species making the call can be resolved with a relatively high degree of confidence.
    - Potentially present – the quality and structure of the call sequence are such that there is some uncertainty about the identity of the species that produced the call sequence. Alternatively, there is some likelihood of confusion with another species that produces a similar (overlapping) call sequence. Therefore, making it impossible to resolve or attribute that call profile to a single microbat species.
- Unusual call sequences (e.g., possible social calls, intra- and inter-species interaction, trills, forage or feeding buzzes) that could not be used to identify a microbat species were labelled as being of 'low' quality or dismissed from the analysis.
- Sequences that cannot be attributed to an echolocating microbat (e.g. insect buzzes, wind, train, and vehicle movements), were dismissed from the analysis.

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Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Table 1. Sites surveyed, detectors used, survey effort, and the number of WAV format files submitted for analysis.

Survey Site	Detector Type	Reference number	Nights surveyed	Survey nights	Files submitted
Impact survey sites					
UWLW8a	Song Meter Mini Bat	SMU02702	4, 5, 6, and 7 December 2025	4	4,489
UWLW8f	Song Meter Mini Bat	2MU02070	24, 25, 26, and 27 November 2025	4	1,276
UWLW8g	Song Meter Mini Bat	SMU0362	5, 6, 7, and 8 December 2025	4	3,141
UWLW8k	Song Meter Mini Bat	SMU02645	24, 25, 26, and 27 December 2025	4	1,463
UWLW8n	Song Meter Mini Bat	SMU02676	4, 5, 6, and 7 December 2025	4	2,234
UWLW8o	Song Meter Mini Bat	2MU01758	4, 5, 6, and 7 December 2025	4	1,846
UWLW8q	Song Meter Mini Bat	2MU01695	4, 5, 6, and 7 December 2025	4	2,073
UWLW9a	Song Meter Mini Bat	2MU02070	5, 6, 7, and 8 December 2025	4	4,146
UWLW9b	Song Meter Mini Bat	SMU02642	24, 25, 26, and 27 November 2025	4	4,809
UWLW9c	Song Meter Mini Bat	2MU01687	24, 25, 26, and 27 November 2025	4	3,407
UWLW9d	Song Meter Mini Bat	SMU01284	24, 25, 26, and 27 November 2025	4	3,559
UWLW10a	Song Meter Mini Bat	2MU01693	1, 2, 3, and 4 December 2025	4	2,040
UWLW10b	Song Meter Mini Bat	2MU02070	1, 2, 3, and 4 December 2025	4	1,547
UWLW10c	Song Meter Mini Bat	2MU01681	1, 2, 3, and 4 December 2025	4	1,333
UWLW10d	Song Meter Mini Bat	2MU1687	1, 2, 3, and 4 December 2025	4	1,262
UWLW10e	Song Meter Mini Bat	2MU01655	1, 2, 3, and 4 December 2025	4	3,843
UWLW10f	Song Meter Mini Bat	2MU01688	5, 6, 7, and 8 December 2025	4	6,221
Control survey sites					
BD6	Song Meter Mini Bat	SMU02645	9, 10, 11, and 12 December 2025	4	1,675
BD7	Anabat Swift	605692	5, 6, 7, and 8 December 2025	4	9,408

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Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Survey Site	Detector Type	Reference number	Nights surveyed	Survey nights	Files submitted
BD8	Song Meter Mini Bat	SMU02699	3, 4, 5, and 6 December 2025	4	4,361
BD9	Song Meter Mini Bat	SMU01284	3, 4, 5, and 6 December 2025	4	1,932
SG5	Anabat Swift	802997	1, 2, 3, and 4 December 2025	4	3,286
SG7	Song Meter Mini Bat	SMU02642	1, 2, 3, and 4 December 2025	4	3,221
SG8	Song Meter Mini Bat	SMU03063	1, 2, 3, and 4 December 2025	4	2,522
UG1	Song Meter Mini Bat	2MU01688	24, 25, 26, and 27 December 2025	4	4,464
General fauna					
BC1	Song Meter Mini Bat	SMU02702	27 and 28 November 2025	2	958
BC3	Song Meter Mini Bat	SMU02676	27 and 28 November 2025	2	763
BE1	Song Meter Mini Bat	SMU01758	27 and 28 November 2025	2	671
BE3	Song Meter Mini Bat	2MU01695	27 and 28 November 2025	2	1,405
BO1	Song Meter Mini Bat	2MU01655	25 and 26 November 2025	2	2,902
BO2	Song Meter Mini Bat	SMU02699	27 and 28 November 2025	2	1,845
BO3	Song Meter Mini Bat	SMU02676	25 and 26 November 2025	2	2,843
B05	Song Meter Mini Bat	2MU01695	25 and 26 November 2025	2	1,157
BO6	Song Meter Mini Bat	2MU01681	25 and 26 November 2025	2	2,832
INF3	Song Meter Mini Bat	SMU03262	25 and 26 November 2025	2	3,100
INF4	Song Meter Mini Bat	2MU01695	2 and 3 December 2025	2	373
OC3	Song Meter Mini Bat	2MU01693	26 and 27 November 2025	2	524
OC4	Anabat Swift	802997	26 and 27 November 2025	2	338
OC5	Anabat Swift	605648	26 and 27 November 2025	2	1,182

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Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Survey Site	Detector Type	Reference number	Nights surveyed	Survey nights	Files submitted
OC6	Song Meter Mini Bat	SMU03063	26 and 27 November 2025	2	2,474
RES6	Song Meter Mini Bat	SMU01758	24 and 25 November 2025	2	1,117
RES2	Song Meter Mini Bat	SM02699	24 and 25 November 2025	2	4,601
RES4	Anabat Swift	605648	2 and 3 December 2025	2	775
RES7	Song Meter Mini Bat	SMU02072	25 and 26 November 2025	2	1,655
SG	Song Meter Mini Bat	SMU03262	1 and 2 December 2025	2	166
Total				**140**	**111,239**

Results and Discussion

Overview

Ten microbat species were identified as being present in the subject land (Table 2 and Table 3). A further ten species were determined to be potentially present (Table 2 and Table 3). Examples of the recorded microbat species and species complex call sequences are shown in Figure 1 to Figure 21.

Threatened species information.

Four threatened microbats listed as Vulnerable under the BC Act were determined to be present in the subject land (Table 2 and Table 3). The four threatened species determined to be present include:

- *Chalinolobus dwyeri* (Large-eared Pied Bat).
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat).
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat).
- *Vespadelus troughtoni* (Eastern Cave Bat).

Three further microbat species listed as Vulnerable under the BC Act were determined to be potentially present (Table 2 and Table 3). The threatened species determined to be potentially present include:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle).
- *Nyctophilus corbeni* (Corben's Long-eared Bat).
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

The Large-eared Pied Bat and Corben's Long-eared Bat are listed as Endangered and Vulnerable, respectively, under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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Activity attributed to the Large-eared Pied Bat, Large Bent-winged Bat, and the Eastern Cave Bat.

***Chalinolobus dwyeri* (Large-eared Pied Bat)**

There were 3,669 confidently identified and potential call sequences assigned to the Large-eared Pied Bat (Table 4 - Table 8). Of the 3,669 Large-eared Pied Bat call sequences, 2,940 were confidentially assigned to this species.

Of the confidently identified and potential Large-eared Pied Bat call sequences:

- 256 Large-eared Pied Bat call sequences were recorded at the Impact Survey Sites. This included 226 call sequences that were confidently assigned to this species (Table 4 and Table 6).
- 3,199 Large-eared Pied Bat call sequences were recorded at the Control Survey Sites. This includes 2,562 call sequences that were confidently assigned to this species (Table 4 and Table 7).
- 214 Large-eared Pied Bat call sequences were recorded at the General Fauna Survey Sites. This included 152 call sequences that were confidently assigned to this species (Table 4 and Table 8).

Confidently identified Large-eared Pied Bat call sequences were recorded at:

- Eight Impact survey sites, including UWLW8a, WULW8n, UWLW8o, UWLW8q, UWLW9c, UWLW10a, UWLW10c, and UWLW10d.
- All Control Survey Sites.
- All General Fauna Surveys sites, except INF4, RES4, RES6 and SG.

***Miniopterus orianae oceanensis* (Large Bent-winged Bat)**

There were 33,279 call sequences attributed to the Large Bent-winged Bat (either as a single species or to a species complex with *Chalinolobus morio* (Chocolate Wattled Bat), and the *Vespadelus* species (Forest Bat) complex (the Forest Bat species complex consists of *Vespadelus darlingtoni* (Large Forest Bat), *V. regulus* (Southern Forest Bat), and *V. vulturnus* (Little Forest Bat)) (Table 4 - Table 8). These call sequences were recorded at all Impact, Control, and Fauna survey sites (Table 4 and Table 8). The number of call sequences attributed to the Large Bent-winged Bat (either as a single species, or in a species complex) varied between Impact, Control, and Fauna survey sites, including:

- 1,941 Large Bent-winged Bat, Chocolate Wattled Bat, and Little Forest Bat species complex call sequences were recorded. These call sequences were recorded across all BBCL and SGCCl survey sites, as described below:
  - 925 call sequences attributed to this species complex were recorded at the Impact Survey Sites (Table 4 and Table 6).
  - 463 call sequences attributed to this species complex were recorded at the Control Survey Sites (Table 4 and Table 7).
  - 553 call sequences attributed to this species complex were recorded at the General Fauna Survey Sites (Table 4 and Table 8).

- 4,580 Large Bent-winged Bat and/or Large Forest Bat species complex call sequences were recorded. These call sequences were recorded across all four survey sites, as described below:
  - 2,294 call sequences attributed to this species complex were recorded at the Impact Control Survey Sites (Table 4 and Table 6).
  - 1,380 sequences attributed to this species complex were recorded at the Control Survey Sites (Table 4 and Table 7).
  - 906 call sequences attributed to this species complex were recorded at the General Fauna Survey Sites (Table 4 and Table 8).

Of the 4,580 Large Bent-winged Bat and/or Large Forest Bat species complex call sequences, 574 were confidently assigned to the Large Bent-winged Bat (Table 4).

- 26,564 Large Bent-winged Bat, Southern Forest Bat, and Little Forest species complex call sequences were recorded. These call sequences were recorded across all three treatments, as described below:
  - 16,668 call sequences attributed to this species complex were recorded at the Impact Control Survey Sites (Table 4 and Table 6).
  - 4,934 sequences attributed to this species complex were recorded at the Control Survey Sites (Table 4 and Table 7).
  - 4,962 call sequences attributed to this species complex were recorded at the General Fauna Survey Sites (Table 4 and Table 8).
- 194 Large Bent-winged Bat, Southern Forest Bat, and Little Forest species complex call sequences were recorded. These call sequences were recorded across all three treatments, as described below:
  - 97 call sequences attributed to this species complex were recorded at the Impact Control Survey Sites (Table 4 and Table 6).
  - 23 sequences attributed to this species complex were recorded at the Control Survey Sites (Table 4 and Table 7).
  - 74 call sequences attributed to this species complex were recorded at the General Fauna Survey Sites (Table 4 and Table 8).

***Vespadelus troughtoni* (Eastern Cave Bat)**

There were 70 confidently identified and potential call sequences assigned to the Eastern Cave Bat (Table *4* - Table 8). Of the 70 Eastern Cave Bat call sequences, three were confidentially assigned to this species.

Of the confidently identified and potential Large-eared Pied Bat call sequences:

- 28 Eastern Cave Bat potential call sequences were recorded at the Impact Survey Sites (Table 4 and Table 6).
- 8 Eastern Cave Bat potential call sequences were recorded at the Control Survey Sites (Table 4 and Table 7).

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- 34 Eastern Cave Bat call sequences were recorded at the General Fauna Survey Sites. This included three call sequences that were confidently assigned to this species (Table 4 and Table 8).

The confidently identified East Cave Bat call sequences were recorded at the General Fauna Survey Sites OC6 and RES7 (Table 8 and Figure 20).

The potentially identified Eastern Cave Bat call sequences were recorded at:

- All Impact survey sites, except UWLW8a, WULW8f, UWLW8k, UWLW9c, UWLW9d, and UWLW10d (Table 6).
- Five of the eight Control Survey Sites, including BD7, BD8, BD9, SG5 and SG7 (Table 7).
- Nine of the General Fauna Surveys sites, including BC3, BE1, BE3, BO2, BO5, BO6, OC3, OC6 and RES4 (Table 8).

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Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Table 2. Microbats that were identified during the 2025 survey.

Species name	Common name	Conservation status		Present / potentially present
		EPBC Act 1999	BC Act 2016	
Austronomus australis	White-striped Free-tailed Bat			Present
Chalinolobus dwyeri	Large-eared Pied Bat	Endangered	Endangered	Present
Chalinolobus gouldii	Gould's Wattled Bat			Present
Chalinolobus morio	Chocolate Wattled Bat			Present
Falsistrellus tasmaniensis	Eastern False Pipistrelle		Vulnerable	Potentially present
Miniopterus orianae oceanensis	Large Bent-winged Bat		Vulnerable	Present
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable	Potentially present
Nyctophilus geoffroyi	Gould's Long-eared Bat			Potentially present
Nyctophilus gouldi	Lesser Long-eared Bat			Potentially present
Ozimops petersi	Inland Free-tailed Bat			Potentially present
Ozimops planiceps	Southern Free-tailed Bat			Present
Ozimops ridei	Ride's Free-tailed Bat			Present
Rhinolophus megaphyllus	Eastern Horseshoe Bat			Present
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat		Vulnerable	Present
Scoteanax rueppellii	Greater Broad-nosed Bat		Vulnerable	Potentially present
Scotorepens balstoni	Inland Broad-nosed Bat			Potentially present
Scotorepens greyii	Little Broad-nosed Bat			Potentially present
Vespadelus darlingtoni	Large Forest Bat			Present
Vespadelus regulus	Southern Forest Bat			Potentially present
Vespadelus troughtoni	Eastern Cave Bat		Vulnerable	Present
Vespadelus vulturnus	Little Forest Bat			Present

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Table 3. Microbat species recorded at each survey site.

Species name	Common name	Impact Survey Sites	Control Survey Sites	General Fauan Survey SIte s
Austronomus australis	White-striped Free-tailed Bat	Present	Present	Present
Chalinolobus dwyeri * and 1	**Large-eared Pied Bat**	Present	Present	Present
Chalinolobus gouldii	Gould's Wattled Bat	Present	Present	Present
Chalinolobus morio	Chocolate Wattled Bat	Present	Present	Present
Falsistrellus tasmaniensis*	**Eastern False Pipistrelle**	Potentially present	Potentially present	Potentially present
Miniopterus orianae oceanensis*	**Large Bent-winged Bat**	Present	Present	Present
Nyctophilus corbeni* and 2	**Corben's Long-eared Bat**	Potentially present	Potentially present	Potentially present
Nyctophilus geoffroyi	Gould's Long-eared Bat	Potentially present	Potentially present	Potentially present
Nyctophilus gouldi	Lesser Long-eared Bat	Potentially present	Potentially present	Potentially present
Ozimops petersi	Inland Free-tailed Bat	Potentially present	Potentially present	Potentially present
Ozimops planiceps	Southern Free-tailed Bat	Present	Present	Present
Ozimops ridei	Ride's Free-tailed Bat	Present	Present	Present
Rhinolophus megaphyllus	Eastern Horseshoe Bat	Present	Present	Present
Saccolaimus flaviventris*	**Yellow-bellied Sheath-tailed Bat**	Present	Present	Present
Scoteanax rueppellii*	**Greater Broad-nosed Bat**	Potentially present	Potentially present	Potentially present

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Species name	Common name	Impact Survey Sites	Control Survey Sites	General Fauan Survey SIte s
Scotorepens balstoni	Inland Broad-nosed Bat	Potentially present	Potentially present	Potentially present
Scotorepens greyii	Little Broad-nosed Bat	Potentially present	Potentially present	Potentially present
Vespadelus darlingtoni	Large Forest Bat	Present	Present	Present
Vespadelus regulus	Southern Forest Bat	Potentially present	Potentially present	Potentially present
Vespadelus troughtoni*	**Eastern Cave Bat**	Potentially present	Potentially present	Present
Vespadelus vulturnus	Little Forest Bat	Present	Present	Present

Threatened species are shown in bold text. *Represents those species listed as Vulnerable under the BC Act, 1 represents those listed as Endangered under the EPBC Act, and 2 represents those listed as Vulnerable under the EPBC Act.

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Table 4. Activity among Eastern Cave Bat, Large-eared Pied Bat, Large Bent-winged Bat, and associated species complexes.

Survey site	Number of survey nights	Resolved call sequences	Potential (unresolved) call sequences	Total calls	Mean calls per survey night
***Chalinolobus dwyeri* (Large-eared Pied Bat)**					
Impact	68	226	30	256	3.76
Control	32	2,562	637	3,199	99.96
General fauna survey sites	40	152	62	214	5.35
Total	140	2,940	729	3,669	26.21
***Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Chalinolobus morio* (Chocolate Wattled Bat), or *Vespadelus vulturnus* (Little Forest Bat)**					
Impact	68	0	925	925	13.6
Control	32	0	463	463	14.47
General fauna survey sites	40	0	553	553	13.83
Total	140	0	1,941	1,941	13.86
***Miniopterus orianae oceanensis* (Large Bent-winged Bat) and/or *Vespadelus darlingtoni* (Large Forest Bat)**					
Impact	68	29	2,265	2,294	33.74
Control	32	317	1,063	1,380	43.13
General fauna survey sites	40	228	678	906	22.65
Total	140	574	4006	4,458	32.71
***Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Vespadelus regulus* (Southern Forest Bat) or *Vespadelus vulturnus* (Little Forest Bat) complex**					
Impact	68	0	16,668	16,668	245.12
Control	32	0	4,934	4,934	154.19
General fauna survey sites	40	0	4,962	4,962	124.05
Total	140	0	26,564	26,564	189.74
***Miniopterus orianae oceanensis* (Large Bent-winged Bat) or *Vespadelus vulturnus* (Little Forest Bat) complex**					
Impact	68	0	97	97	1.43

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Survey site	Number of survey nights	Resolved call sequences	Potential (unresolved) call sequences	Total calls	Mean calls per survey night
Control	32	0	23	23	0.72
General fauna survey sites	40	0	74	74	1.85
Total	140	0	194	194	1.39
***Chalinolobus morio* (Chocolate Wattled Bat), *Vespadelus troughtoni* (Eastern Cave Bat), or *Vespadelus vulturnus* (Little Forest Bat) complex**					
Impact	68	0	28	28	0.41
Control	32	0	8	8	0.25
General fauna survey sites	40	3	31	31	0.85
Total	140	3	67	70	0.50

Table 5. Acronyms used in this report (modified from Specialised Zoology 2022).

Species Code	Species name	Common name
Individual species		
Family Molossidae		
Aa	*Austronomus australis*	White-striped Free-tailed Bat
Or	*Ozimops ridei*	Ride's Free-tailed Bat
Family Rhinolophidae		
Rm	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat
Family Vespertilionidae		
Cd	***Chalinolobus dwyeri**** [and 1]	**Large-eared Pied Bat**
Cg	*Chalinolobus gouldii*	Gould's Wattled Bat
Cm	*Chalinolobus morio*	Chocolate Wattled Bat
Species complexes		
Family Miniopteridae / Family Vespertilionidae		
CmMoVv	*Chalinolobus morio*, ***Miniopterus orianae oceanensis****, or *Vespadelus vulturnus*	Chocolate Wattled Bat, **Large Bent-winged Bat**, and/or Little Forest Bat

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CmVtVv	*Chalinolobus morio,* ***Vespadelus troughtoni****, or *Vespadelus vulturnus*	Chocolate Wattled Bat, **Eastern Forest Bat**, and/or Little Forest Bat
MoVd	***Miniopterus orianae oceanensis****, and/or *Vespadelus darlingtoni*	**Large Bent-winged Bat** and/or Large Forest Bat
MoVrVv	***Miniopterus orianae oceanensis****, *Vespadelus regulus,* or *Vespadelus vulturnus*	**Large Bent-winged Bat**, Southern Forest Bat, and/or Little Forest Bat
MoVv	***Miniopterus orianae oceanensis**** or *Vespadelus vulturnus*	**Large Bent-winged Bat** or Little Forest Bat
Family Molossidae		
OpOp	*Ozimops petersi* or *Ozimops planiceps*	Inland Free-tailed Bat or Southern Free-tailed Bat
Family Vespertilionidae		
Nycto_spp	***Nyctophilus corbeni**** [and 2,] *Nyctophilus geoffroyi*, or *Nyctophilus gouldi*	**Corben's Long-eared Bat**, Lesser Long-eared Bat, or Gould's Long-eared Bat
Scoto	***Falsistrellus tasmaniensis****, ***Scoteanax rueppellii****, *Scotorepens balstoni,* and/or *Scotorepens greyii*	**Eastern False Pipistrelle**, **Greater Broad-nosed Bat**, Inland Broad-nosed Bat, and/or Little Broad-nosed Bat
VrVv	*Vespadelus regulus* / *Vespadelus vulturnus*	Southern Forest Bat, and/or Little Forest Bat

Threatened species are shown in bold text. *Represents those species listed as Vulnerable under the BC Act, 1 represents those listed as Endangered under the EPBC Act, and 2 represents those listed as Vulnerable under the EPBC Act. See Specialised Zoology (2022) and Appendix 2 for explanations of these species and species-complex codes.

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Table 6. Target species night-by-night activity and presence of a selected species, and species complexes across the Impact Survey Sites (the species and common names for each abbreviation are provided in Table 5 and Appendix 2, Source Specialised Zoology 2022).

Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv[a]
UWLW8a	4/12/2025	X	20	X	X	29	30	583	N	X	X	X	X	X	X	N
UWLW8a	5/12/2025	X	29	X	X	19	4	313	3	X	X	N	N	X	X	N
UWLW8a	6/12/2025	X	99	X	X	3	1	139	N	X	X	X	X	X	X	N
UWLW8a	7/12/2025	X	4	X	X	0	2	190	1	N	X	X	X	X	X	N
UWLW8f	24/11/2025	N	N	X	X	7	14	119	N	X	X	X	N	N	X	N
UWLW8f	25/11/2025	X	N	X	X	3	1	58	N	X	X	N	N	N	X	N
UWLW8f	26/11/2025	X	N	X	X	9	3	83	1	X	X	N	N	N	X	N
UWLW8f	27/11/2025	N	N	X	X	11	10	98	N	X	X	X	N	N	X	N
UWLW8g	5/12/2025	X	N	X	X	3	35	376	1	X	X	N	N	X	X	N
UWLW8g	6/12/2025	X	N	X	X	2	12	488	1	X	X	X	N	N	X	N
UWLW8g	7/12/2025	X	N	X	X	6	20	737	N	X	X	X	N	X	X	X
UWLW8g	8/12/2025	X	N	X	X	16	18	322	N	X	X	X	X	X	X	X
UWLW8k	24/11/2025	X	N	X	X	7	45	124	1	N	X	N	N	N	X	N
UWLW8k	25/11/2025	X	N	X	X	17	29	60	N	X	X	N	N	X	X	N
UWLW8k	26/11/2025	N	N	X	X	7	39	152	2	X	X	N	X	N	X	N
UWLW8k	27/11/2025	N	N	X	X	18	50	100	N	X	X	N	N	X	X	N
UWLW8n	4/12/2025	X	2	X	X	2	8	139	N	X	X	N	N	X	X	N
UWLW8n	5/12/2025	X	4	X	N	4	3	64	N	N	X	X	N	N	X	N
UWLW8n	6/12/2025	X	6	X	X	3	10	45	12	X	X	X	N	N	X	N

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Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv[a]
UWLW8n	7/12/2025	X	9	X	X	8	5	90	17	X	X	X	N	X	X	X
UWLW8o	4/12/2025	X	9	X	X	8	38	256	1	X	X	X	N	X	X	X
UWLW8o	5/12/2025	X	8	X	X	0	13	116	N	X	X	X	N	N	X	N
UWLW8o	6/12/2025	X	13	X	X	3	2	274	N	X	X	X	N	N	X	N
UWLW8o	7/12/2025	X	8	X	X	4	15	95	N	X	X	X	N	N	X	N
UWLW8q	4/12/2025	X	2	X	X	2	115	244	4	X	X	N	N	X	X	N
UWLW8q	5/12/2025	X	3	X	X	5	21	166	19	X	X	N	N	X	X	N
UWLW8q	6/12/2025	X	1	X	N	0	1	44	5	X	X	X	N	N	X	N
UWLW8q	7/12/2025	X	N	X	N	1	52	193	14	X	X	X	N	N	X	X
UWLW9a	5/12/2025	X	N	X	X	0	9	344	N	X	X	X	N	X	X	X
UWLW9a	6/12/2025	X	N	X	X	0	9	492	N	X	X	X	N	X	X	X
UWLW9a	7/12/2025	X	N	X	X	9	14	668	1	X	X	X	X	X	X	X
UWLW9a	8/12/2025	X	N	X	X	4	9	216	N	N	X	X	N	X	X	N
UWLW9b	24/11/2025	X	N	X	X	5	125	386	1	X	X	N	N	X	X	X
UWLW9b	25/11/2025	X	N	X	X	5	133	326	N	X	X	X	N	X	X	X
UWLW9b	26/11/2025	X	N	X	X	5	219	239	N	X	X	X	N	X	X	X
UWLW9b	27/11/2025	N	N	X	X	24	60	164	N	X	X	N	N	N	X	X
UWLW9c	24/11/2025	X	N	X	X	15	190	258	N	X	X	X	N	N	X	N
UWLW9c	25/11/2025	X	1	X	X	17	82	69	N	X	X	X	N	X	X	N
UWLW9c	26/11/2025	X	N	X	X	5	63	64	N	X	X	X	N	X	X	N

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Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv*
UWLW9c	27/11/2025	N	N	X	X	1	48	110	N	N	X	X	N	N	X	N
UWLW9d	24/11/2025	X	N	X	X	5	16	98	N	X	X	N	N	N	X	N
UWLW9d	25/11/2025	X	N	X	X	7	26	179	N	X	X	X	N	X	X	N
UWLW9d	26/11/2025	X	N	X	X	3	2	155	N	X	X	X	N	N	X	N
UWLW9d	27/11/2025	X	N	X	X	6	10	254	N	X	X	N	X	N	X	N
UWLW10a	1/12/2025	N	N	X	X	0	0	18	N	N	X	N	N	N	X	N
UWLW10a	2/12/2025	N	3	X	X	38	39	233	N	N	X	X	N	N	X	X
UWLW10a	3/12/2025	N	1	X	X	19	42	280	N	X	X	X	N	X	X	X
UWLW10a	4/12/2025	X	1	X	X	20	76	321	N	X	X	X	N	X	X	N
UWLW10b	1/12/2025	N	N	X	X	0	0	3	N	X	X	X	N	N	N	N
UWLW10b	2/12/2025	N	N	X	X	0	4	146	N	X	X	X	N	N	X	N
UWLW10b	3/12/2025	X	N	X	X	2	8	130	N	X	X	X	N	X	X	N
UWLW10b	4/12/2025	X	N	X	X	0	25	174	N	X	X	X	N	X	X	X
UWLW10c	1/12/2025	N	N	X	N	0	3	29	N	X	X	N	N	N	X	N
UWLW10c	2/12/2025	X	N	X	X	19	14	129	N	X	X	N	N	N	X	N
UWLW10c	3/12/2025	X	2	X	N	16	27	276	N	X	X	X	N	X	X	X
UWLW10c	4/12/2025	X	N	X	N	36	46	299	N	X	X	X	X	X	X	N
UWLW10d	1/12/2025	N	N	X	N	0	0	14	N	N	X	N	N	N	X	N
UWLW10d	2/12/2025	N	N	X	X	1	4	48	N	X	X	N	N	X	X	N
UWLW10d	3/12/2025	X	N	X	X	14	8	119	N	X	X	X	N	X	X	N

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Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv[a]
UWLW10d	4/12/2025	X	1	X	X	69	10	207	N	X	X	X	X	X	X	N
UWLW10e	1/12/2025	N	N	X	X	17	2	143	N	X	N	N	X	N	X	N
UWLW10e	2/12/2025	N	N	X	X	49	3	213	N	X	X	X	N	N	X	X
UWLW10e	3/12/2025	X	N	X	X	4	26	399	N	X	X	X	N	X	X	N
UWLW10e	4/12/2025	X	N	X	X	28	18	708	N	X	X	X	N	X	X	X
UWLW10f	5/12/2025	X	N	X	X	59	94	926	1	X	X	X	N	X	X	N
UWLW10f	6/12/2025	X	N	X	X	24	39	710	N	X	X	X	N	X	X	N
UWLW10f	7/12/2025	X	N	X	X	189	85	1,040	12	X	X	X	N	X	X	N
UWLW10f	8/12/2025	X	N	X	X	13	110	413	N	X	X	X	N	X	X	X
Total			226			925	2,294	16,668	97							

Please note that only the positively identified Large-eared Pied Bat call sequences were used in this table.

'X' represents detected, while * in this column X represents potentially present, 'N' represents not detected.

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Table 7. Target species night-by-night activity and presence of a selected species, and species complexes across the Control Survey Sites (the species and common names for each abbreviation are provided in Table 5 and Appendix 2, Source Specialised Zoology 2022).

Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv*
BD6	9/12/2025	X	13	X	X	1	36	117	0	X	X	X	N	X	X	N
BD6	10/12/2025	X	51	X	N	7	73	259	1	X	X	X	X	N	X	N
BD6	11/12/2025	X	8	X	N	2	105	53	0	X	X	X	X	N	N	N
BD6	12/12/2025	X	13	X	N	2	19	111	0	X	X	X	X	N	X	N
BD7	5/12/2025	X	16	X	X	4	108	265	2	X	X	X	N	X	X	N
BD7	6/12/2025	X	45	X	X	27	218	640	0	X	X	N	N	X	X	X
BD7	7/12/2025	X	10	X	X	40	442	579	0	X	X	X	N	N	X	N
BD7	8/12/2025	X	4	X	X	11	22	97	0	X	X	X	N	X	X	X
BD8	3/12/2025	X	188	X	X	17	7	67	0	X	X	X	N	X	X	N
BD8	4/12/2025	X	204	X	X	21	4	126	0	X	X	X	X	X	X	N
BD8	5/12/2025	X	214	X	X	31	9	193	1	X	X	X	X	X	X	X
BD8	6/12/2025	X	391	X	X	35	24	268	0	N	X	X	X	X	X	N
BD9	3/12/2025	X	2	X	X	2	4	24	0	X	X	X	N	X	X	N
BD9	4/12/2025	X	N	X	X	22	18	72	1	X	X	N	X	X	X	N
BD9	5/12/2025	X	N	X	X	3	12	98	3	X	X	X	N	X	X	N
BD9	6/12/2025	X	N	X	X	12	21	131	0	X	X	X	N	X	X	X
SG5	1/12/2025	N	40	N	N	0	0	1	0	N	N	N	N	N	N	N
SG5	2/12/2025	X	109	X	X	11	14	108	0	N	X	X	N	X	X	N
SG5	3/12/2025	X	61	X	X	2	3	45	0	N	X	X	N	X	X	N

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Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv*
SG5	4/12/2025	X	161	X	X	22	7	211	0	X	X	X	N	X	X	X
SG7	1/12/2025	X	19	N	N	0	0	1	0	N	N	N	N	N	N	N
SG7	2/12/2025	N	79	X	X	30	6	211	8	N	N	X	N	X	X	X
SG7	3/12/2025	X	309	X	X	40	5	174	3	X	X	X	N	X	X	X
SG7	4/12/2025	X	418	X	X	45	16	457	2	X	X	X	X	X	X	N
SG8	1/12/2025	X	54	X	X	0	0	1	0	N	N	N	N	N	X	N
SG8	2/12/2025	N	5	N	X	3	0	29	0	N	N	N	N	X	X	N
SG8	3/12/2025	N	22	X	X	1	0	9	0	N	N	N	N	N	X	N
SG8	4/12/2025	X	51	X	X	1	0	6	0	N	N	N	N	N	N	N
UG1	24/11/2025	X	3	X	X	5	17	60	N	X	X	X	X	X	X	N
UG1	25/11/2025	X	29	X	X	18	52	146	0	X	X	X	X	X	X	N
UG1	26/11/2025	X	34	X	X	25	114	222	2	X	X	X	X	X	X	N
UG1	27/11/2025	X	9	X	X	23	24	153	0	X	X	X	X	X	X	N
Total			2,562			463	1,380	4,934	23							

Please note that only the positively identified Large-eared Pied Bat call sequences were used in this table.

X' represents detected, while * in this column X represents potentially present, 'N' represents not detected.

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Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Table 8. Target species night-by-night activity and presence of a selected species, and species complexes across the General Fauna Survey Sites (the species and common names for each abbreviation are provided in Table 5 and Appendix 2, Source Specialised Zoology 2022).

Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv*
BC1	27/11/2025	X	N	X	X	0	4	80	N	X	X	X	N	N	X	N
BC1	28/11/2025	X	1	X	X	56	7	339	9	X	X	X	N	N	X	N
BC3	27/11/2025	N	4	X	X	3	4	121	1	X	X	X	N	X	X	X
BC3	28/11/2025	X	4	X	X	23	16	322	7	X	X	X	N	X	X	X
BE1	27/11/2025	X	14	X	X	3	7	44	N	X	X	X	N	X	X	X
BE1	28/11/2025	X	8	X	X	6	10	105	N	X	X	X	N	X	X	X
BE3	27/11/2025	X	8	X	X	4	15	112	11	X	X	X	N	X	X	X
BE3	28/11/2025	X	1	X	X	6	8	123	N	N	X	X	N	X	X	X
BO1	25/11/2025	X	3	X	X	10	7	39	N	X	X	X	N	X	X	N
BO1	26/11/2025	X	22	X	X	32	5	242	N	X	X	N	X	X	X	N
BO2	27/11/2025	X	9	X	X	9	61	220	3	X	X	X	N	X	X	X
BO2	28/11/2025	X	1	X	X	10	27	250	23	X	X	N	N	X	X	X
BO3	25/11/2025	X	1	X	X	34	0	38	3	X	N	N	N	X	X	N
BO3	26/11/2025	X	N	X	X	80	2	31	8	X	X	N	N	X	X	N
BO5	25/11/2025	X	1	X	X	11	8	140	N	N	X	X	N	X	X	X
BO5	26/11/2025	X	N	X	X	3	17	175	1	X	X	X	N	X	X	X
BO6	25/11/2025	X	3	X	X	10	14	68	N	N	X	N	N	X	X	X
BO6	26/11/2025	X	16	X	X	17	11	91	N	N	X	N	N	X	X	X

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Ulan Coal Mine Pty Ltd Microbat Monitoring 2025 Survey Period

Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv*
INF3	25/11/2025	X	N	X	X	20	67	92	N	X	X	X	N	X	X	N
INF3	26/11/2025	X	1	X	X	5	34	62	N	X	X	X	N	X	X	N
INF4	2/12/2025	N	N	X	X	0	10	75	N	X	X	X	N	N	X	N
INF4	3/12/2025	X	N	X	X	3	4	38	N	X	X	X	N	N	X	N
OC3	26/11/2025	X	6	X	X	2	5	136	2	X	X	X	N	X	X	X
OC3	27/11/2025	X	2	X	X	0	8	8	N	X	X	X	N	N	X	X
OC4	26/11/2025	N	3	X	X	0	2	7	1	N	X	X	N	N	X	N
OC4	27/11/2025	N	4	X	X	1	7	21	N	N	X	N	X	X	X	N
OC5	26/11/2025	X	6	X	N	2	0	38	N	N	X	N	N	N	X	N
OC5	27/11/2025	X	5	X	X	0	32	64	N	X	X	N	N	X	X	N
OC6	26/11/2025	X	N	X	X	23	145	257	N	N	X	X	N	X	X	N
OC6	27/11/2025	X	1	X	X	36	212	372	N	N	X	X	N	X	X	2
RES2	24/11/2025	N	1	X	X	7	16	184	N	X	X	X	X	X	X	N
RES2	25/11/2025	X	1	X	X	4	25	197	N	X	X	N	X	X	X	N
RES4	2/12/2025	N	N	X	X	3	2	21	N	X	X	N	N	X	X	X
RES4	3/12/2025	X	N	X	X	55	18	194	5	X	X	N	N	X	X	X
RES6	24/11/2025	N	N	X	X	11	16	209	N	N	X	N	N	X	X	N
RES6	25/11/2025	X	N	X	X	26	34	209	N	X	X	N	N	X	X	N
RES7	25/11/2025	X	24	X	X	31	31	185	N	X	X	X	N	X	X	1
RES7	26/11/2025	X	2	X	X	5	15	45	N	X	X	X	N	X	X	N

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Survey Site	Survey night	Species and species complexes														
		Aa	Cd	Cg	Cm	CmVvMo	MoVd	MoVrVv	MoVv	Nycto spp.	OpOp	Or	Rm	Scoto	VrVv	CmVtVv*
SG	1/12/2025	N	N	X	N	0	0	0	N	X	N	N	N	X	X	N
SG	2/12/2025	N	N	X	X	2	0	8	N	X	X	N	N	N	X	N
Total			**152**			**553**	**906**	**4,962**	**74**							**3**

Please note that only the positively identified Large-eared Pied Bat call sequences were used in this table.

'X' represents detected, while * in this column X represents potentially present, 'N' represents not detected.

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Survey limitations - unresolved call sequences

A microbat species was deemed to be present or potentially present when the recorded call characteristics matched those described in Pennay *et al.* (2004) and Thomson *et al.* (2024). In the Slopes and Plains bioregion of NSW, several species can have overlapping call sequences (Pennay *et al.* 2004). These overlapping call sequences can have similar Fc ranges and identical pulse characteristics, making it difficult, or at times impossible, to attribute (or resolve) a microbat call profile to a single species. If an overlap has been deemed to occur, that call sequence will be considered 'unresolved' and given a multi-species complex label. Unless specified elsewhere, those species included in an unresolved call sequence will be determined as being 'potentially present' only. The following species recorded during this survey may exhibit overlapping call sequences.

- The call sequences of the non-threatened *Chalinolobus gouldii* (Gould's Wattled Bat), *Ozimops petersi* (Inland Free-tailed Bat), *O. planiceps* (Southern Free-tailed Bat), and *O. ridei* (Ride's Free-tailed Bat) can overlap. See Figure 3, Figure 12, Figure 13, and Figure 14 for the resolved and unresolved call sequences of these species.
- The call sequences of the non-threatened *C. morio* (Chocolate Wattled Bat) and *V. vulturnus* (Little Forest Bat) can overlap with the threatened Eastern Cave Bat. See Figure 4, Figure 20, and Figure 21 for the resolved and unresolved call sequences for the Chocolate Wattled Bat, Eastern Cave Bat, and Little Forest Bat.
- The call sequences of Eastern False Pipistrelle, Greater Broad-nosed Bat, Inland Broad-nosed Bat, and *S. greyii* (Little Broad-nosed Bat) can overlap. See Figure 5 for an example of the unresolved call sequences for these species.
- In this region, the call sequences of the threatened Large Bent-winged Bat, the non-threatened *V. darlingtoni* (Large Forest Bat), *V. regulus* (Southern Forest Bat), and Little Forest Bat can overlap. See Figure 7, Figure 8, Figure 9, Figure 10, Figure 17, Figure 18, Figure 19, and Figure 21 for examples of the resolved and unresolved call sequences for these species.
- In this region, the call sequence of the threatened Southern Myotis and Corben's Long-eared Bat can overlap with the call sequences of the non-threatened *Nyctophilus geoffroyi* (Lesser Long-eared Bat), and *N. gouldi* (Gould's Long-eared Bat). No potential or confidentially identified Southern Myotis call sequences were recorded during the 2025 survey. See Figure 11 for an example of an unresolved Long-eared Bat call sequence.
- The call sequences of the threatened Eastern Cave Bat and the non-threatened *V. vulturnus* (Little Forest Bat) can overlap. See Figure 20 and Figure 21 for resolved and unresolved call sequences for the Eastern Cave Bat and the Little Forest Bat.
- The non-threatened Large Forest Bat, Southern Forest Bat, and Little Forest Bat can overlap. See Figure 17, Figure 10Figure 18, Figure 19, and Figure 21 for examples of the resolved and unresolved call sequences for these species.

Identifying a microbat call depends on the quality of the recorded data. The quality of the recorded data can be affected by the detectors used, detector settings, detector/microphone placement and health, vegetation densities, climatic conditions (rain, relative humidity, wind direction and speed), distance between a passing bat and the microphone (e.g., detection range) (Adams *et al.* 2009; Runkel *et al.* 2021).

Reporting and nomenclature

This microbat call identification report follows the recommended reporting requirements provided by the Australian Bat Society (Reardon 2003). Microbat species and common names follow Armstrong *et al.* (2020), except for *Miniopterus orianae oceanensis,* which is referred to as the Large Bent-winged Bat (Office of Environment and Heritage 2019). Large Bent-winged Bat – profile viewed at Large Bent-winged Bat - profile | NSW Environment, Energy and Science)

Disclaimer

The statements made in this report are made to inform Eco Logical Australia Pty Ltd. Rod Armistead Environmental Consultants will not be liable for any loss or damage that might arise from the use of this report by any third party.

Rod Armistead Environmental Consultants, if required, reserves the right to re-analyse, review, and/or discuss the labeling and identification of the species identified in this assessment.

Examples of the resolved and unresolved call sequences

Examples of the resolved and unresolved microbat call sequences recorded during this survey. The call sequences shown below are displayed with overlapping full-spectrum and zero-crossing file formats. Unless otherwise specified, all the call sequences are shown with the time compressed (viewed with one millisecond between pulses), time per tick is set at F7 (10 milliseconds), Auto FS is on, and the smoothness is set at auto or at 5 (Penney *et al.* 2004; Titley Scientific 2025). The x-axis represents time in milliseconds, and the y-axis represents the average characteristic frequency in Kilohertz. The metrics for each call sequence, detector type, detector serial number, location, date, and time of each recording are shown in the two information panels located on the right-hand side of each call sequence.

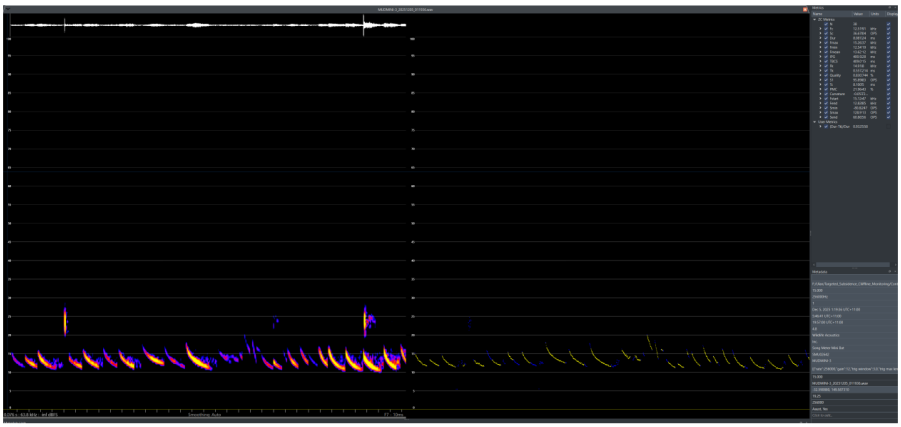

Figure 1. Call sequence for *Austronomus australis* (White-striped Free-tailed Bat).

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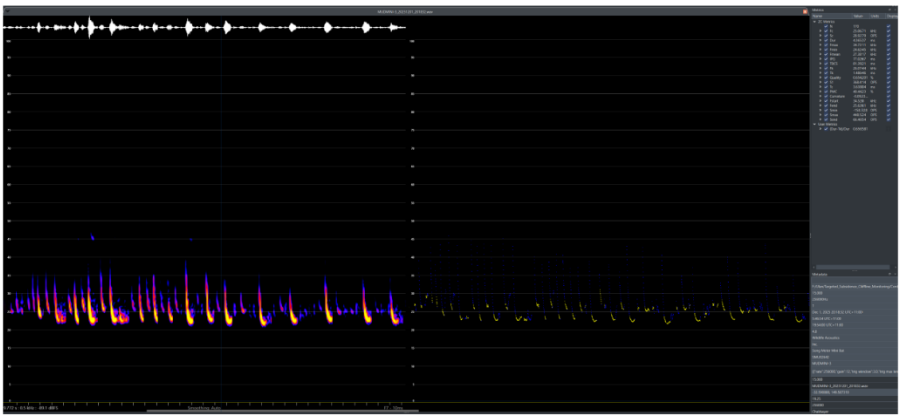

Figure 2. Call profile for *Chalinolobus dwyeri* (Large-eared Pied Bat).

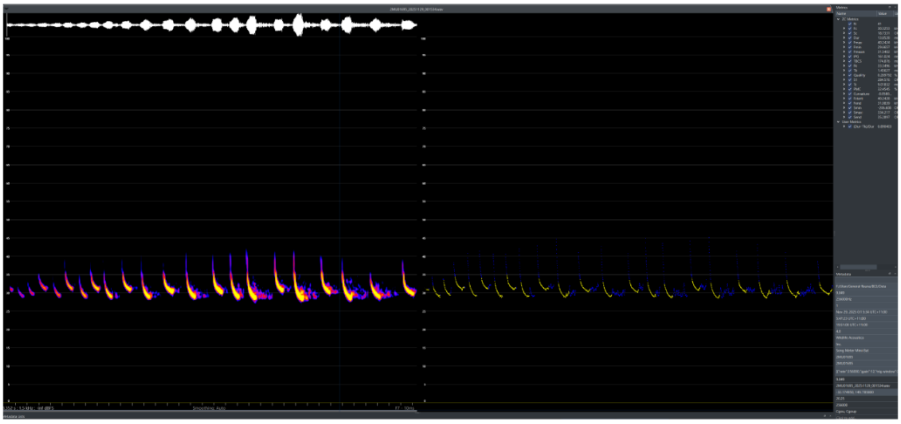

Figure 3. Call sequence for *Chalinolobus gouldii* (Gould's Wattled Bat).

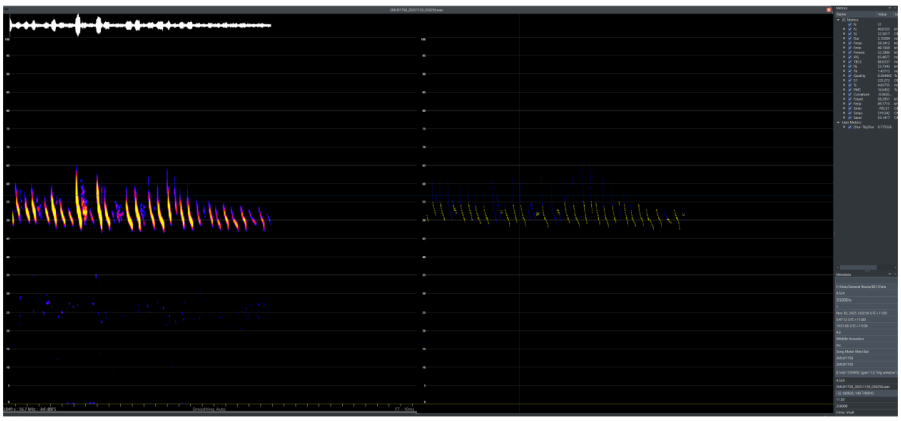

Figure 4. Call sequence for *Chalinolobus morio* (Chocolate Wattled Bat).

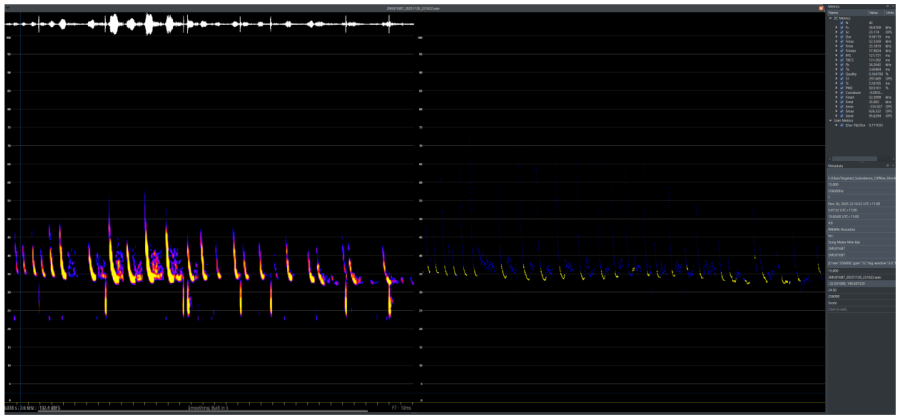

Figure 5. Potential call sequence for *Falsistrellus tasmaniensis* (Eastern False Pipistrelle), *Scoteanax rueppellii* (Greater Broad-nosed Bat), *Scotorepens balstoni* (Inland Broad-nosed Bat), or *Scotorepens greyii* (Little Broad-nosed Bat).

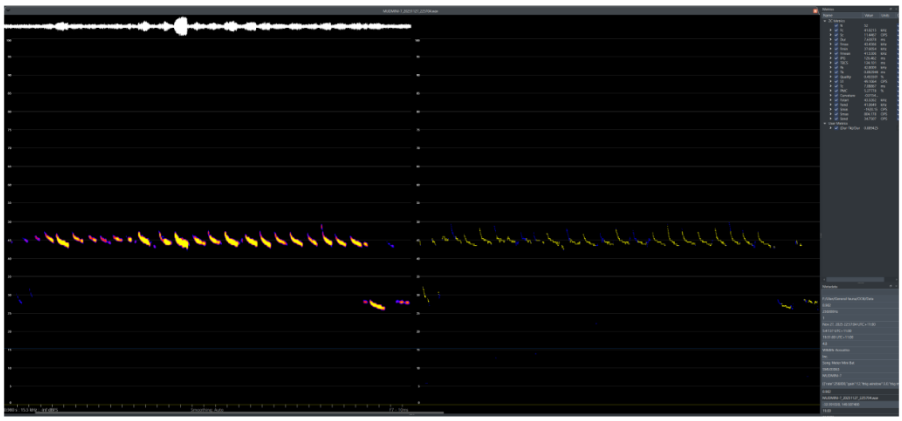

Figure 6. Call sequence for *Miniopterus orianae oceanensis* (Large Bent-winged Bat).

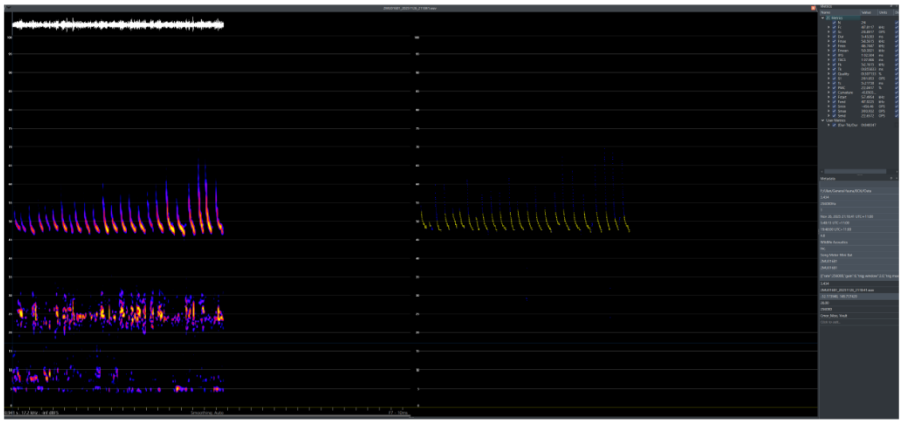

Figure 7. Potential Call sequence for *Miniopterus orianae oceanensis* (Large Bent-winged Bat) or *Chalinolobus morio* (Chocolate Wattled Bat).

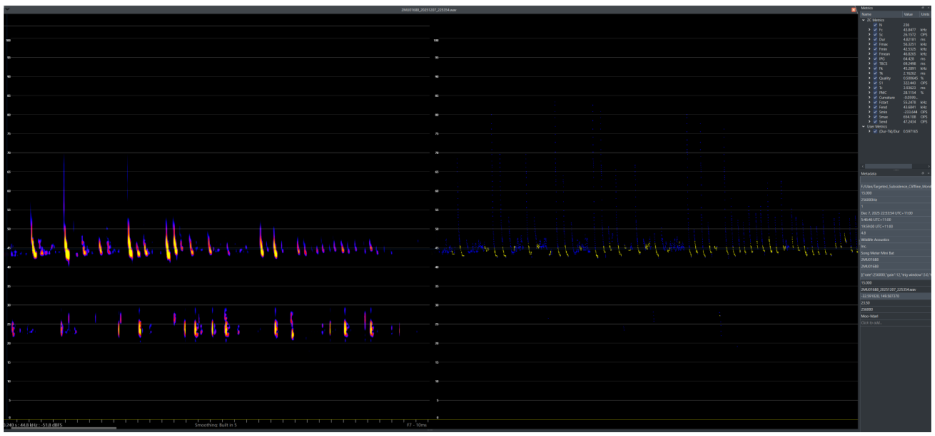

Figure 8. Call sequence for *Miniopterus orianae oceanensis* (Large Bent-winged Bat) or *Vespadelus darlingtoni* (Large Forest Bat).

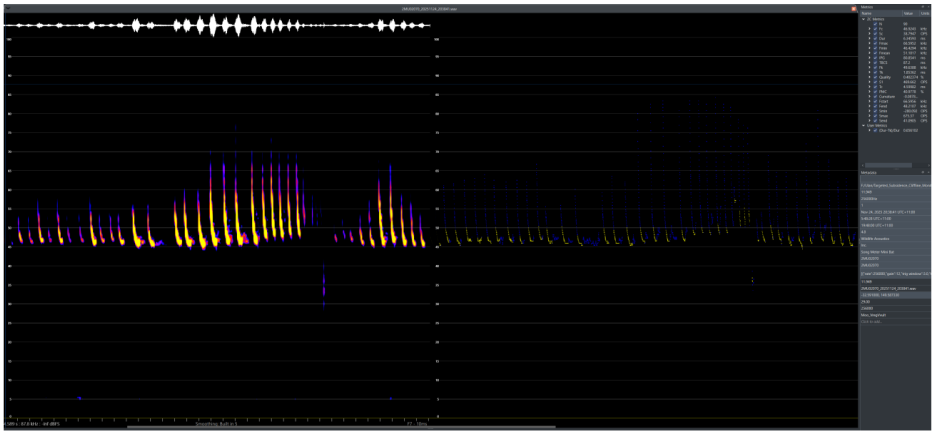

Figure 9. Call sequence for *Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Vespadelus regulus* (Southern Forest Bat), *Vespadelus vulturnus* (Little Forest Bat).

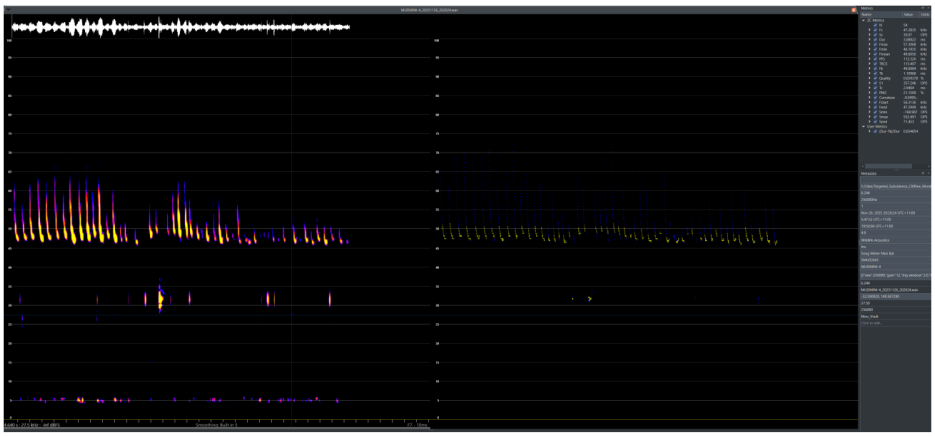

Figure 10. Call sequence for *Miniopterus orianae oceanensis* (Large Bent-winged Bat) or *Vespadelus vulturnus* (Little Forest Bat).

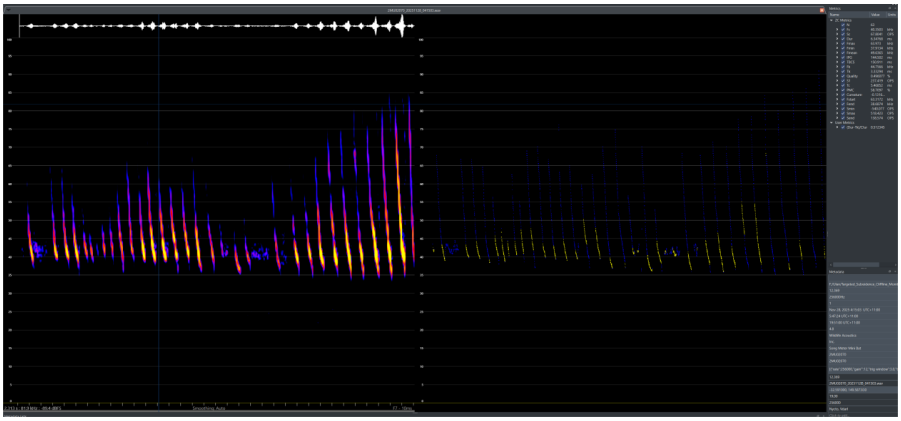

Figure 11. Potential call sequence for *Nyctophilus corbeni* (Corben's Long-eared Bat), *Nyctophilus geoffroyi* (Lesser Long-eared Bat), or *Nyctophilus gouldi* (Gould's Long-eared Bat).

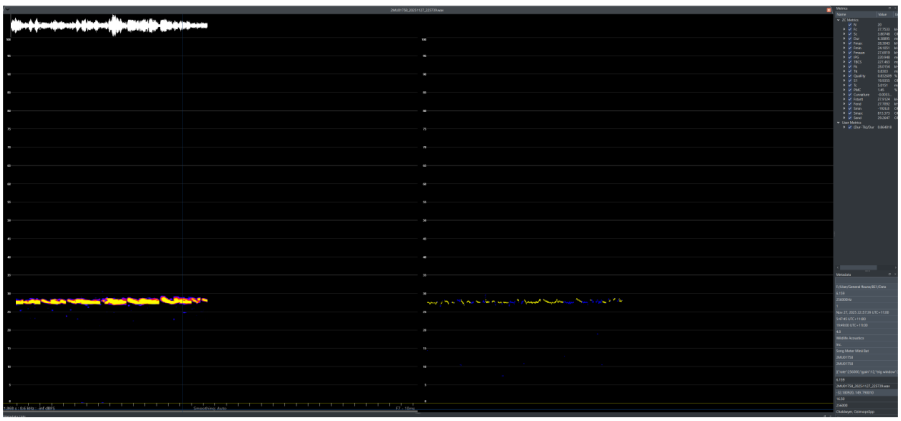

Figure 12. Potential call sequence for *Ozimops petersi* (Inland Free-tailed Bat), *Ozimops planiceps* (Southern Free-tailed Bat), or *Ozimops ridei* (Ride's Free-tailed Bat).

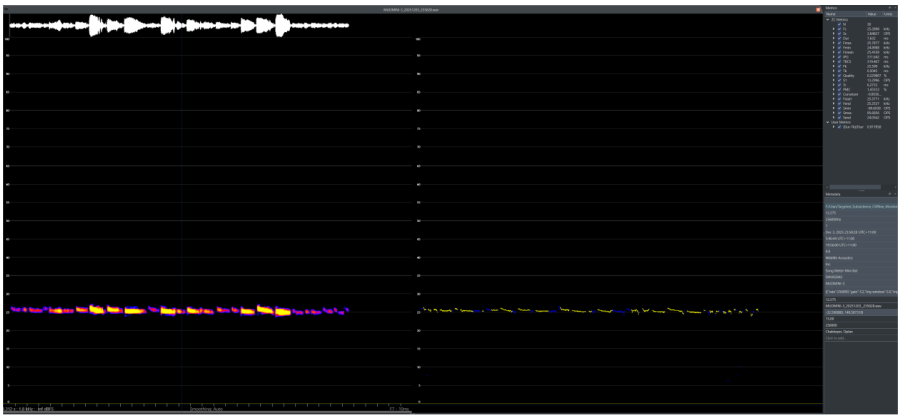

Figure 13. Call sequence for *Ozimops planiceps* (Southern Free-tailed Bat).

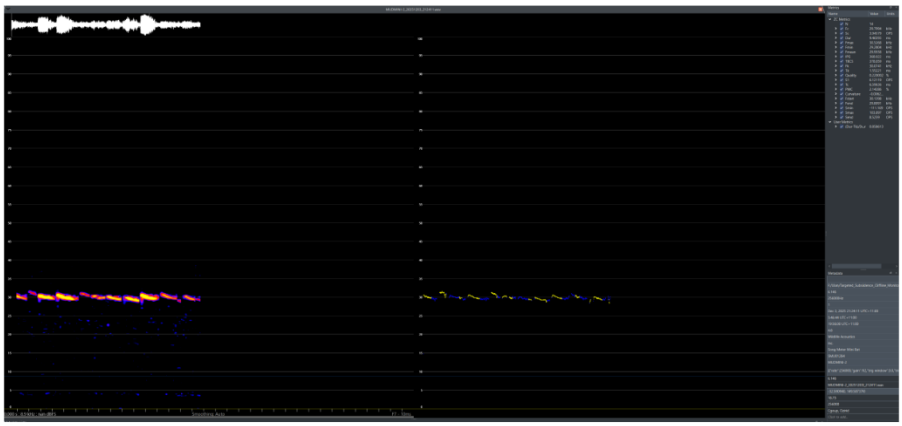

Figure 14. Call profile for *Ozimops ridei* (Ride's Free-tailed Bat).

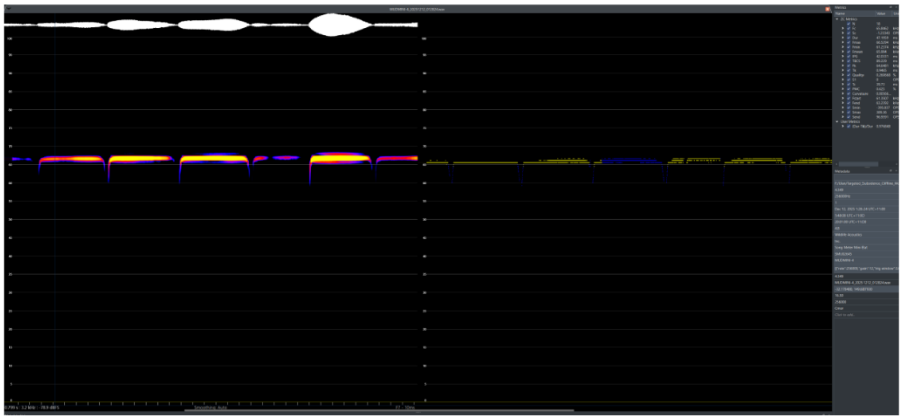

Figure 15. Call profile for *Rhinolophus megaphyllus* (Eastern Horseshoe Bat).

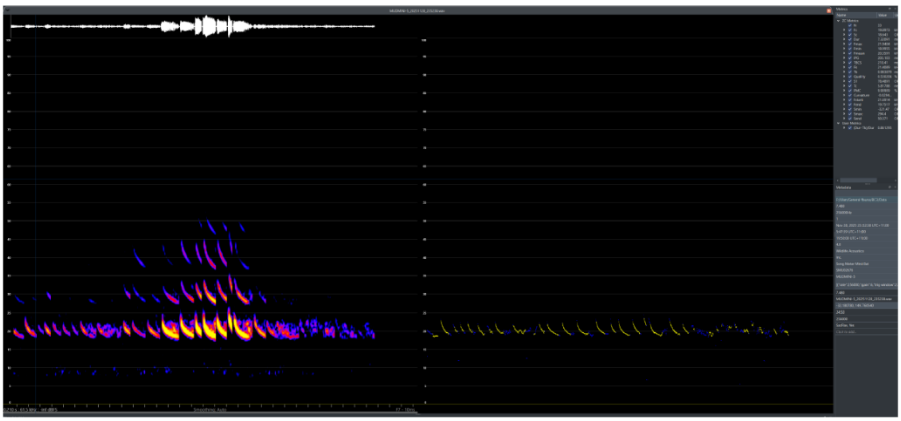

Figure 16. Call sequence for *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat).

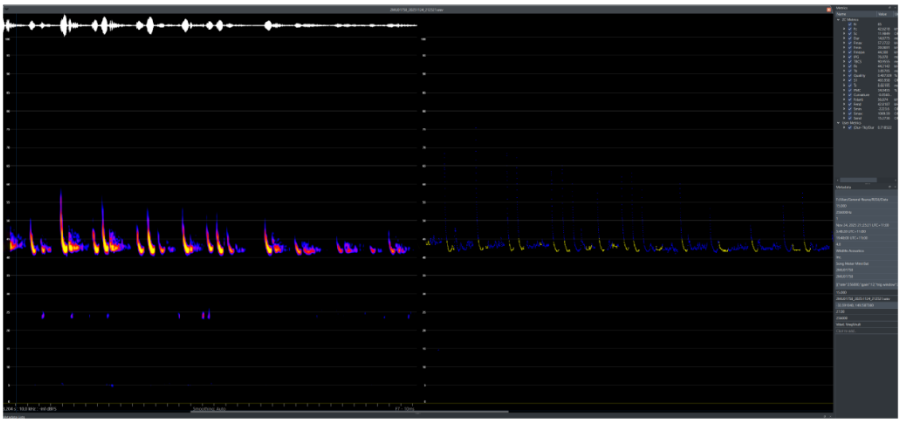

Figure 17. Call sequence for *Vespadelus darlingtoni* (Large Forest Bat).

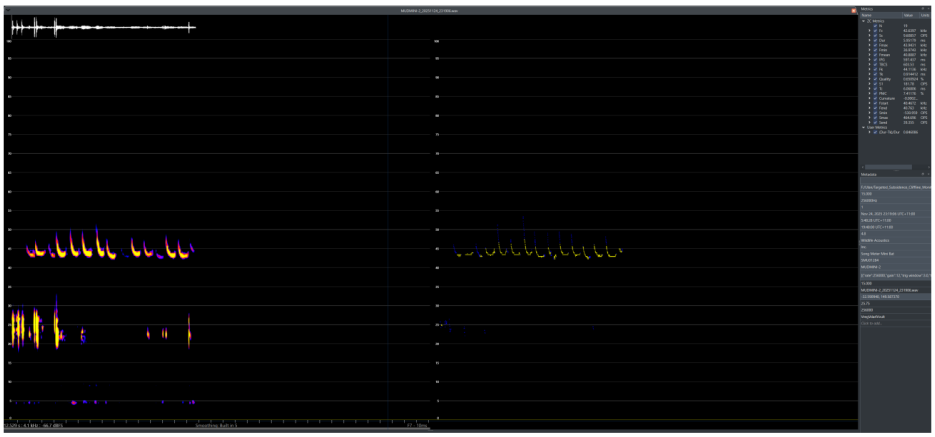

Figure 18. Potential call sequence for *Vespadelus darlingtoni* (Large Forest Bat), *Vespadelus regulus* (Southern Forest Bat), or *Vespadelus vulturnus* (Little Forest Bat).

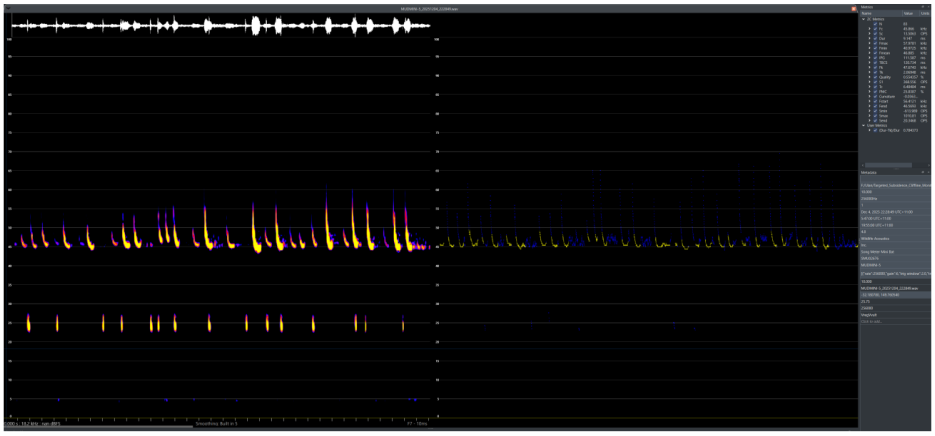

Figure 19. Potential call profile for *Vespadelus regulus* (Southern Forest Bat) or *Vespadelus vulturnus* (Little Forest Bat).

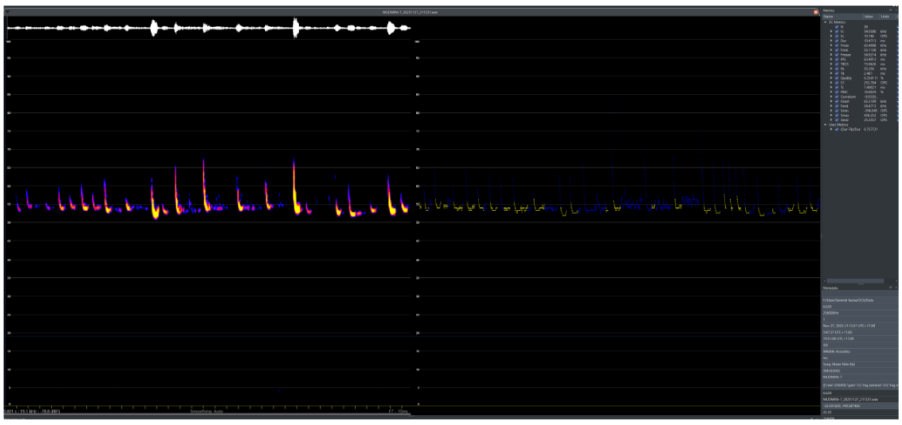

Figure 20. Call profile for *Vespadelus troughtoni* (Eastern Cave Bat).

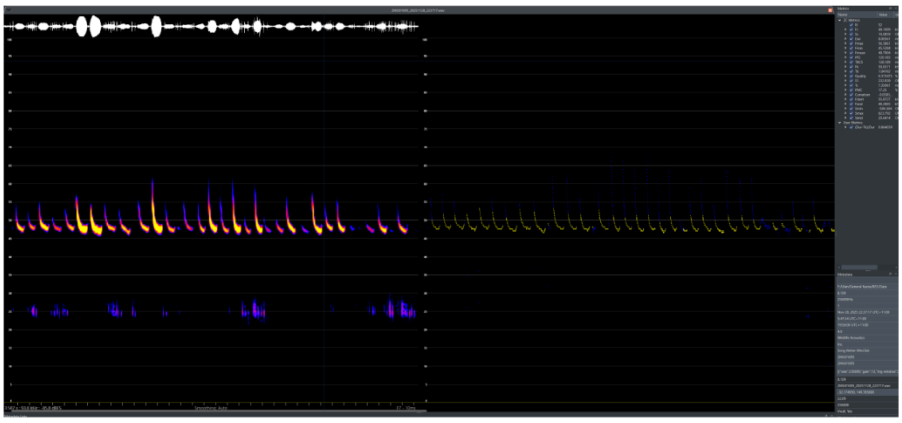

Figure 21. Call profile for *Vespadelus vulturnus* (Little Forest Bat).

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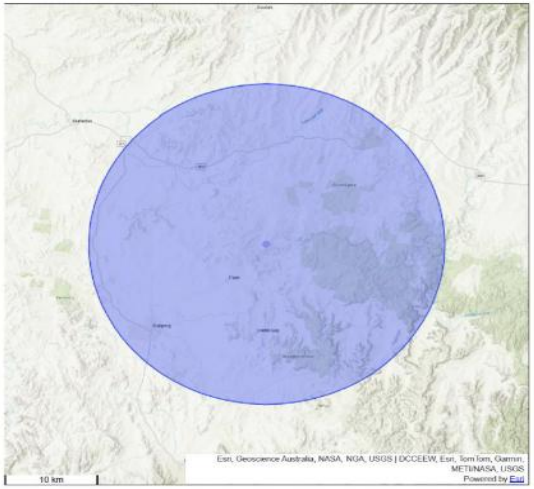
Appendix 1. Microbat species that are predicted to occur or have been previously recorded within a 10 km radius of the subject land (source Australia Bat Society Bat Maps). *Pteropus poliocephalus* (Grey-headed Flying-fox) and *P. scapulatus* (Little Red Flying-fox) while included in the side panel, are non-echolocating megabats and are not considered in this report.

Near Me Report

Area of Interest (AOI) Information

Area: 2,826.22 km²

Date: Sat Dec 20 2025 16:12:29 GMT+1100 (Australian Eastern Daylight Time)



No legend

Bat Species | Total count: 23

#	Species Name	Range Code	Notes
1	Austronomus australis	Current range	*No data*
2	Chalinolobus dwyeri	Current range	*No data*
3	Chalinolobus gouldii	Current range	*No data*
4	Chalinolobus morio	Current range	*No data*
5	Chalinolobus picatus	Current range	*No data*
6	Falsistrellus tasmaniensis	Current range	In SA, within fragmented patches of scrubland and forest.
7	Miniopterus orianae oceanensis	Current range	*No data*
8	Nyctophilus corbeni	Current range	*No data*
9	Nyctophilus geoffroyi	Current range	*No data*
10	Nyctophilus gouldi	Current range	Likely to be only in forested habitats within SA distribution
11	Ozimops planiceps	Current range	*No data*
12	Ozimops ridei	Current range	*No data*
13	Pteropus poliocephalus	Current range	*No data*
14	Pteropus scapulatus	Current range	*No data*
15	Rhinolophus megaphyllus	Current range	*No data*
16	Saccolaimus flaviventris	Current range	*No data*
17	Scotorepens balstoni	Current range	*No data*
18	Scotorepens greyii	Current range	*No data*
19	Vespadelus darlingtoni	Possible range	*No data*
20	Vespadelus darlingtoni	Current range	*No data*
21	Vespadelus regulus	Current range	*No data*
22	Vespadelus troughtoni	Current range	*No data*
23	Vespadelus vulturnus	Current range	In SA, boundaries with low confidence; large ares within SA boundary may have unsuitable habitat.

Appendix 1 Plate 1. 30 Km area search using BatMaps to create a candidate species list.

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Appendix 2. Comments on the identifications used in Table *6*, Table 7, and Table *8*.

The following sections have been paraphrased from Specialised Zoology (2022) and support

Several echolocation call sequences can originate from multiple species. And some species can be distinguished based on diagnostic features of pulse shape, even when the variation in characteristic frequency overlaps with that of other species. Some of this detail was presented in Eco Logical Australia (2021). How echolocation call types were treated in the analysis of 2021 recordings is detailed below.

- **Aa**. The echolocation calls of the White-striped Free-tailed bat, Austronomus australis, usually have a characteristic frequency below 15 kIIz, which makes most identifications of this species unambiguous.
- **Cd**. The allocation of calls to the Large-eared Pied Bat. Examples of the Large-eared Pied Bat call sequences have been submitted to ELA.
- **Cg**. The echolocation calls of Gould's Wattled Bat were distinguished from those of the free-tailed bats *Ozimops* spp. based on the pattern of alternating relatively high and low characteristic frequency in successive pulses.
- **Cm**. The Chocolate Wattled Bat *Chalinolobus morio* was identified unambiguously from pulses with a characteristic frequency of 49 kHz and above, and strongly 'drooped' (decreasing frequency) terminal sections.
- **CmVtVv**. The echolocation call variation of both the Chocolate Wattled Bat, Eastern Cave Bat, and Little Forest Bat can overlap.
- **MoVrVv**. The echolocation call variation of both the Large Forest Bat, Southern Forest Bat and Little Forest Bat *V. vulturnus* overlap with that of the Large Bent-winged Bat.
- **MoVd**. The echolocation call variation of both the Southern Forest Bat *Vespadelus regulus* and Little Forest Bat *V. vulturnus* overlaps partly with that of the Large Bent-winged Bat. The potential calls of Large Bent-winged Bat and Large Forest Bat were avoided. However, the number of confidently and potentially identified Large Bent-winged Bat call sequences are Table *4*.
- **Nycto_sp**. The call sequences of the Long-eared Bats, *Nyctophilus* spp., cannot be distinguished from each other. The Long-eared Bats that could occur in this region of NSW include Corben's Long-eared Bat, Gould's Long-eared Bat, and the Lesser Long-eared Bat. A further possibility with a similar call type is Southern Myotis. As stated previously, no positively or potentially identified Southern Myotis call sequences were recorded.
- **OpOp and Or**. Calls attributed to free-tailed bats *Ozimops* spp. had a more regular pattern of characteristic frequency in sequences than for *C. gouldii*, and occasional single pulses with a higher frequency. Two groups of *Ozimops* calls were recognised based on a characteristic frequency threshold of 29 kHz. Those above are attributed to Ride's Free-tailed Bat (*O. ridei* (Or)) and those below to either the Inland Free-tailed Bat (*O. petersi* (Op)) or the Southern Free-tailed Bat (*O. planiceps* (Op)).
- **Rm**. The Eastern Horseshoe Bat can be identified unambiguously by its long-duration, constant-frequency calls, dominated by a tone slightly below 70 kHz.
- **Scoto**. There are several candidate species for calls that have a characteristic frequency within the range of 35–40 kIIz, all of which are difficult to distinguish reliably and consistently: Eastern False Pipistrelle, Greater Broad-nosed Bat, Inland Broad-nosed Bat, and Little Broad-nosed Bat.

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- **VrVv**. The Southern Forest Bat and Little Forest Bat have similar-shaped pulses, and the variation of their characteristic frequency overlaps, making their separation unreliable.

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