MITIGATION MEASURES TO AVOID IMPACTS TO BATS DURING CONSTRUCTION

Mitigation measures will be implemented to ensure that PLNB, Ghost Bats and other cave roosting bats are safely and completely excluded from Python Cave prior to clearing activities.

The following sections provide an overview of the standard mitigation measures that will be implemented to ensure bats have vacated a cave prior to clearing being undertaken. These measures are further discussed in the General Exclusion Procedure also outlined below.

Fauna Licences

The Department of Biodiversity, Conservation and Attractions issues licences under the *Biodiversity Conservation Act 2016 (WA)* to manage certain interactions with fauna, including excluding native fauna from its natural habitat and the removal of fauna habitat.

All required licences will be obtained prior to exclusion activities commencing, which may include:

- Fauna taking (biological assessment) licence;
- Fauna disturbing (commercial interaction) licence; and/or
- Fauna taking (relocation) licence.

Timing

Roost exclusion will be limited to the months of April, May and June to avoid the breeding period of the cave roosting species, particularly Ghost Bats and PLNB. The potential for injury and death to bats is likely to be much higher during the breeding period due to the presence of dependent young and/or juveniles. Dependent young are less likely to vacate the roost and there is a risk that juveniles would be abandoned in the roost by adults. There is also a risk that attempts to remove juveniles from the roost are likely to result in death or injury due to stress. Exclusion of bats outside of the breeding season will therefore reduce the potential for impact on dependent young and/or juveniles.

Identify entry and exit points

An assessment will be undertaken to document and map internal structure (including sub-chambers and cavities) and all entry/exit points for Python Cave. This is to ensure that all areas of the cave can be accounted for during the exclusion process and removes the potential entrapment of bats via re-entry to the cave during or post-exclusion.

Exclusion Techniques

The table below outlines the multiple exclusion techniques that may be employed at Python Cave, within the limits of site access constraints and occupational health and safety considerations.

Technique	Operation	Risk of injury or fatality
One-way exit device – Temporary device consisting of flexible wire mesh/gauze or thick cloth sheet place over vertical surface (e.g. cave opening)	Allow bats to leave structure but no re-enter. Must be constructed from flexible, lightweight material. If wire mesh or gauze it must be small gauge (50mm grid) to prevent entanglement and not made of sharp material.	Low – although bat can collide with device there is an ability to gradually adjust size of the opening and place multiple devices within a cave system to slow the flight speed of bats and reduce the population within the cave over time.
Hanging barrier – Temporary device consisting of thick cloth sheet hanging from the ceiling	Slow flight speed of bats exiting and returning to the cave to reduce risk of injury and provide a soft barrier to the movement of bats through the cave system.	Low – although bat can collide with device it will be soft and flexible (not fixed).
Light deterrent – Temporary device (must be used in conjunction with one way device)	Bright lights mounted on a stand (such as portable LED workshop lights) facing at the ceiling or into roosting areas and turned on 24/7 will deter bats from using the roost. Must be used as a secondary method	Low – unlikely to cause any physical harm to bats. However, can attract insects which may indirectly lure bats to the cave.
Noise deterrent – Temporary device (must be used in conjunction with one way device)	Portable speaker with mounted within the cave playing noise/music at a loud volume 24/7 will deter bats from using the roost.	Low – unlikely to cause any physical harm to bats.
Permanent seal entry/exit – Permanent exclusion with durable, long-lasting material	Bats cannot gain access. All entry/exit points permanently sealed. Heavy duty, corrosion resistant, fine mesh pinned/bolted to opening. Note: Only required if there will be an extended period of time (>8 weeks) between using temporary devices and clearing activities.	Low – highly unlikely to cause harm assuming a staged approach using temporary devices has been undertaken.

General Exclusion Procedure

The three-phase approach below provides a general guide to how the exclusion of bats from Python Cave will be undertaken. A formal exclusion procedure document will be produced, supported by best-practice and standard operating procedures detailing the methods, timeframes, applicable licences and responsibilities.

Phase 1: Pre-exclusion monitoring

1. Obtain fauna relevant fauna licences

2. Monitor cave chamber and entrances for two nights prior to exclusion (IR video and ultrasonic detectors).

Phase 2: Commence exclusion

3. Following the emergence period (1.5 hours following sunset), install a one-way flap over the cave entrance(s). Ensure installation allows for a small gap to allow terrestrial fauna to escape but not allow bats to re-enter.

4. Monitor the inside of chamber for a period of 3 consecutive nights.

5. On second night, check one-way flap and adjust if necessary.

6. Following second night, review surveillance footage from main chamber, detector data and emergence counts for evidence of bat occupation. Performance indicator = no bats observed in cave for 1 day and 1 night AND no bat calls recorded for 1 day and 1 night.

7. If bats are still occupying the main chamber, install 24-hour lighting and noise deterrents within the chamber (following the emergence period) for a period of two additional nights.

8. Following the two additional nights review surveillance footage from inside of main chamber and detector data for evidence of bat occupation. Performance indicator = no bats observed in main chamber for 1 day and 1 night AND no bat calls recorded for 1 day and 1 night (the second night of using lights).

9. If bats have abandoned the main chamber, remove deterrents and immediately seal entrance(s) with permanent solution to ensure bats cannot re-occupy. A small gap (150mm wide x 100mm high) must be maintained at the main entrance to allow for other terrestrial fauna to vacate the cave.

10. In the case that bats are still occupying the main chamber following the additional deterrents, continue with additional lights and/or brightness until bats have vacated the cave.

Phase 3: Post-exclusion monitoring

11. One bat detector must remain within the cave to continue the post-exclusion monitoring for 24 hours a day for 7 consecutive days.

12. One IR video camera should remain within the cave to continue the post exclusion monitoring for a period of 3 consecutive days. The camera must be set to record from 60 minutes before sunset through to 60 minutes past sunrise each day.

13. A report will be produced to document the exclusion process, including methods and summary of results within 2 weeks after the completion of post-exclusion monitoring.