



# Koodaideri Iron Ore Project

Pilbara Leaf-nosed Bat

Environmental Management Plan

September 2018

RTIO-HSE-0325714

Mount Bruce Mining Pty Limited

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## 1 SUMMARY

This Pilbara Leaf-nosed Bat (**PLNB**) Environmental Management Plan (**EMP**) relates to the Koodaideri Iron Ore Mine and Infrastructure Project as approved by Ministerial Statement 999 (and EPBC Decision Approval 2012/6422) and has been developed in accordance with condition 7 of Ministerial Statement 999.


The table below presents the environmental criteria to measure achievement of the condition environmental outcome that must be met through implementation of this PLNB EMP.

|   |   |
|---|---|
| <b>Title of proposal</b>  | Koodaideri Iron Ore Mine and Infrastructure Project   |
| <b>Proponent</b>  | Mt Bruce Mining Pty Limited   |
| <b>Ministerial Statement</b>  | 999   |
| <b>Purpose of this EMP</b>  | The PLNB EMP fulfils the requirements of condition 7 of MS 999  |
| <b>EPA's environmental objective for the key environmental factor</b> | Protect terrestrial fauna so that biological diversity and ecological integrity are maintained.   |
| <b>Condition environmental outcome</b>                                | Ensure that the PLNB colony continues to use the important foraging locations of Koodaideri Spring Gorge and the gorge containing the KBH12 site, and ensure that the PLNB colony remains in the K75W Adit/Cave System.   |
| <b>Early Response criteria</b><br>(triggering further investigations) | <ol style="list-style-type: none"> <li>1. Total nightly calls at the K75W Adit/Cave System remain below 500 for 52 consecutive nights.</li> <li>2. Noise levels exceed 50 dB (over a 30 minute period) or vibration levels exceed 10 mms-1 peak particle velocity for any single peak event at the K75W Adit/Cave System.</li> <li>3. Total nightly calls at the Koodaideri Spring Gorge bat monitoring stations remain below 200 for 54 consecutive nights.</li> <li>4. Reported incidents of Koodaideri Project related direct activity interactions (e.g. vehicle strike) resulting in PLNB mortality exceeding a rate of over 24 individuals annually, commencing January each year.</li> </ol> |
| <b>Trigger criteria</b>   | <ol style="list-style-type: none"> <li>1. Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights.</li> <li>2. Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights.</li> </ol>   |
| <b>Threshold criteria</b>   | <ol style="list-style-type: none"> <li>1. Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights following implementation of the Trigger Criteria management actions.</li> <li>2. Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights following implementation of the Trigger Criteria management actions.</li> <li>3. Direct unauthorised ground disturbing activity within the exclusion zones of the K75W Adit/Cave System, the Koodaideri Spring Gorge and KBH12.</li> </ol>  |

**Corporate endorsement**

I hereby certify that to the best of my knowledge, the provisions within this Pilbara leaf-nosed bat Environmental Management Plan are true and correct and address the legal requirements of condition 7 of Ministerial Statement 999.

**Name:** Chris Richards

**Signed:** 

**Designation:** GM State Agreements and Approvals

**Date:** 27 September 2018

## 2 CONTEXT, SCOPE AND RATIONALE

### 2.1 THE PROJECT

Mt Bruce Mining Pty Limited (the **Proponent**) received approval for the Koodaideri Iron Ore Mine and Infrastructure Project (**Koodaideri Project**) via Ministerial Statement 999 (**MS 999**) under Part IV of the *Environmental Protection Act 1986* (**EP Act**) by the Minister for Environment on 10 March 2015. Approval Decision EPBC 2012/6422 was also granted under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) by the Commonwealth Minister for the Environment on 9 May 2015. Both approvals contain environmental conditions relevant to this PLNB EMP.

The Koodaideri Project is situated approximately 110 km northwest of Newman in the Pilbara region of Western Australia (Figure 2-1) and includes the construction of an open-cut iron ore mining and processing operation with product transported to existing ports via Rio Tinto's heavy freight railway network. The Development Envelope (Figure 2-2) for the Koodaideri Project comprises three components:

- Mine/Plant Area (**MPA**) - contains the planned mine pit areas (K75W, K58W and K38W) and associated ore processing facilities. The mine pit schedule allows for the development of the K58W mine pit first, then the K75W mine pit<sup>1</sup>, followed by the K38W mine pit.
- Western Rail Corridor (**WRC**) - linking the MPA to Rio Tinto's existing main line rail networks.
- Southern Infrastructure Corridor (**SIC**) - potentially linking the MPA to Rio Tinto's existing Central Pilbara Railway and other infrastructure. The SIC may also carry alignments for power, water, communication towers and road infrastructure.

### 2.2 KEY ENVIRONMENTAL FACTORS

The Environmental Protection Authority (**EPA**) Report and Recommendations (EPA 2014) identified terrestrial fauna as a key environmental factor for the Koodaideri Project and specifically recommended management strategies for the Pilbara leaf-nosed bat (*Rhinonictis aurantia*).

#### 2.2.1 Regulatory Requirements

The regulatory requirements for the Koodaideri Project relating to the management of the PLNB are detailed in MS 999 (Appendix 1). These conditions include the following requirements:

- maintain exclusion zones around important habitat: K75W Adit/Cave System; the Koodaideri Spring Gorge; and important foraging areas (Condition 6-1 and 6-2);
- complete a structural report on the full extent of the K75W Adit/Cave System (Condition 7-2 and 7-3); and

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<sup>1</sup> Development of the K75W mine pit will commence approximately 5 to 7 years after the commencement of the K58W mine pit.



- prepare and submit a PLNB EMP to EPA Services of the Department of Water and Environmental Regulation (**DWER**), with advice from the Department of Parks and Wildlife (now the Department of Biodiversity, Conservation and Attractions) (Condition 7-4 to 7-11).

Condition 7-2 requires the completion of a Structural Report of the K75W Adit/Cave System prior to the commencement of mining of the future K75W pit; this Structural Report will not be finalised until closer to the commencement of mining at K75W (5 to 7 years after the K58W mine pit is developed) and is therefore not included in this PLNB EMP. Work undertaken to identify the lateral extent of the K75W Adit/Cave System to date is outlined in Section 4.5.

In addressing the above-mentioned conditions of MS 999, this PLNB EMP also complies with Condition 2(b) of the Commonwealth Decision Approval EPBC 2012/6422 (Appendix 1), which requires the Proponent to comply with condition 7 of MS 999 for the better protection of the PLNB.

### 2.3 ENVIRONMENTAL OBJECTIVE

Condition 7 of MS 999 identifies the management requirements for the PLNB, with Condition 7-1 requiring the Proponent to ensure that the Koodaideri Project is implemented in a manner that ensures the PLNB colony:

- continues to use the important foraging locations of Koodaideri Spring Gorge and the gorge containing the KBH12 site (condition 7-5 (1)); and
- remains in the K75W Adit/Cave System (condition 7-5 (2)).

This objective is aligned with the EPA's broader environmental objective for terrestrial fauna to: *"Protect terrestrial fauna so that biological diversity and ecological integrity are maintained"*.

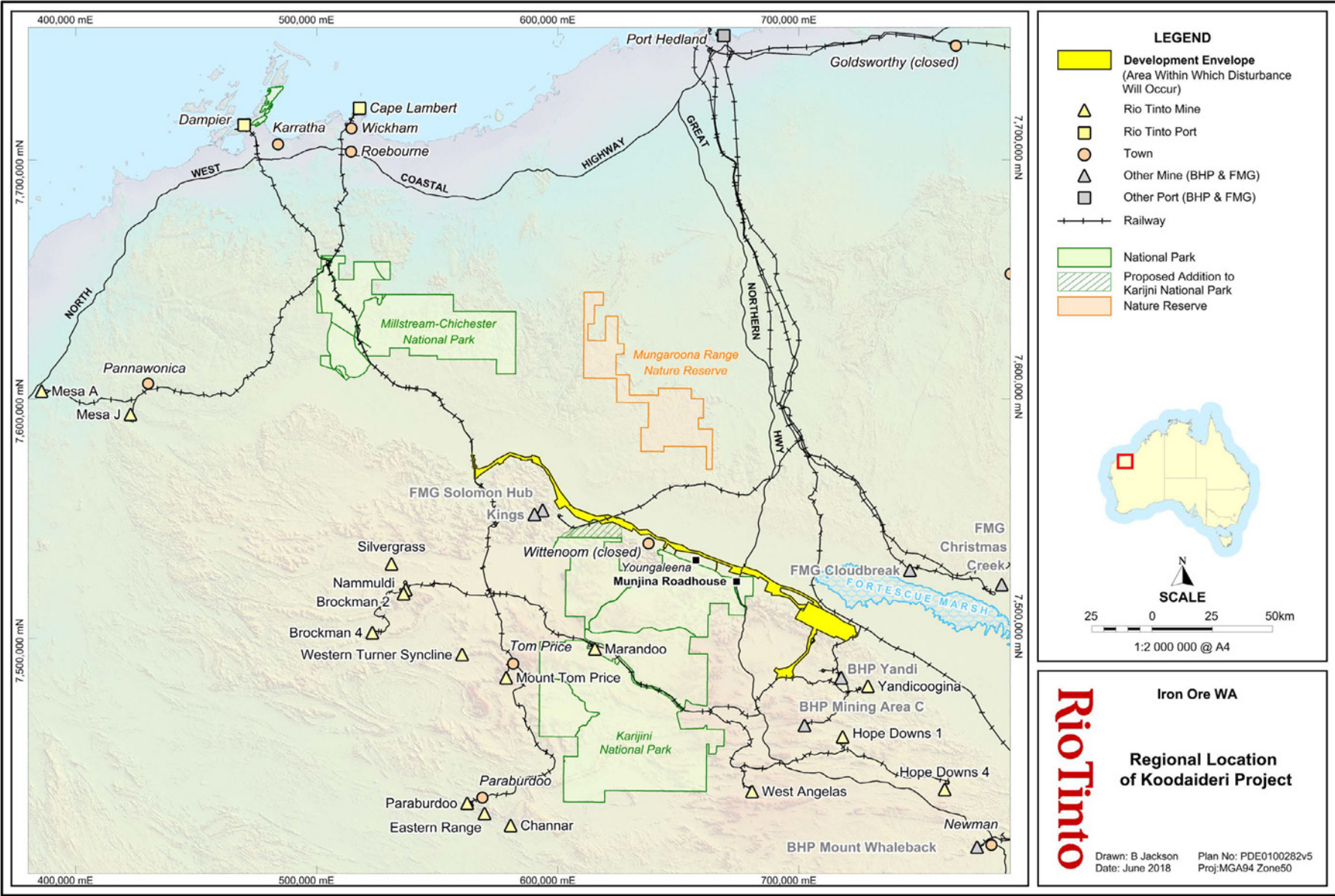


Figure 2-1: Regional Location Map



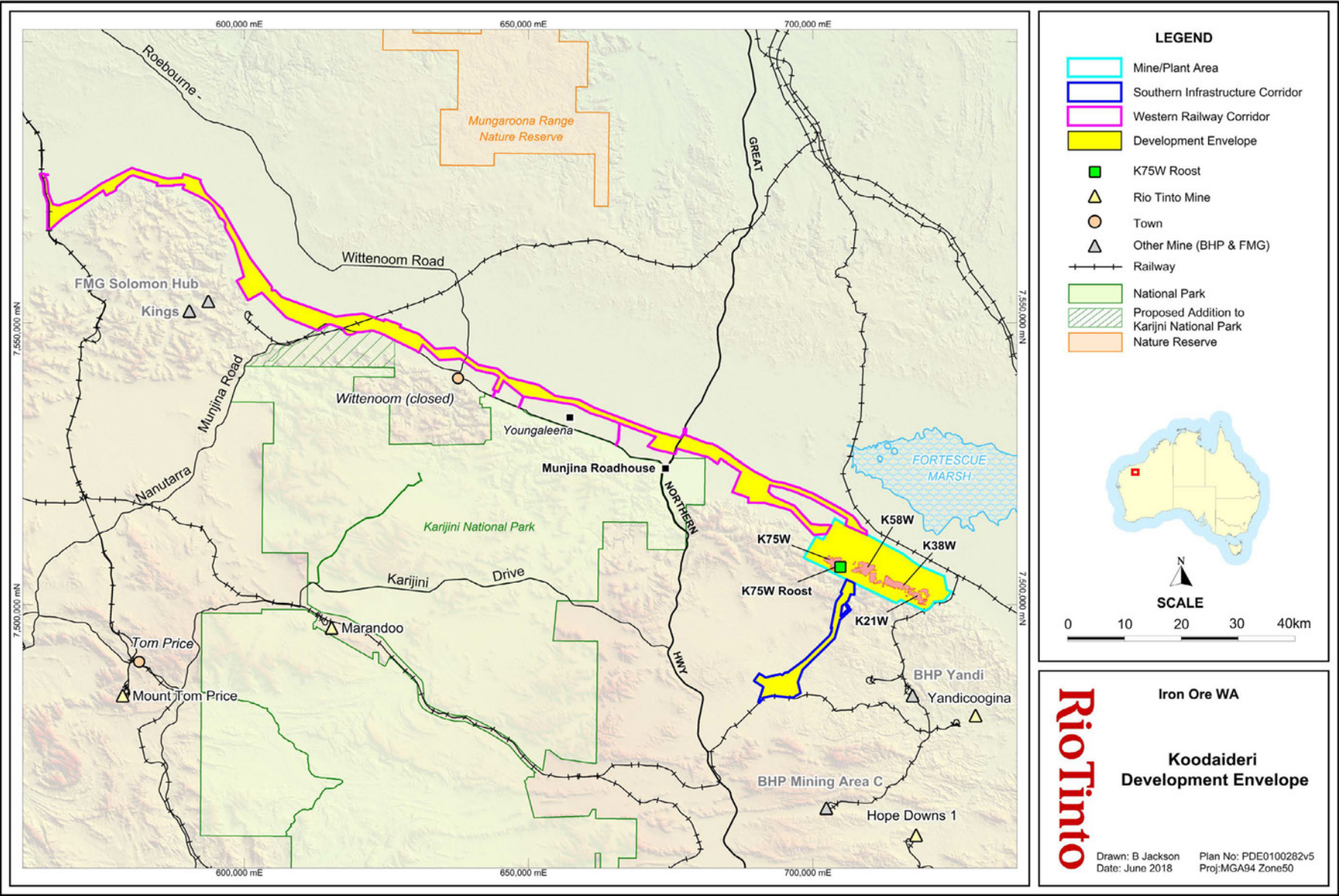


Figure 2-2: Koodaideri Development Envelope

### **3 RATIONALE AND APPROACH IN MEETING THE ENVIRONMENTAL OUTCOME**

Results of baseline surveys and a number of assumptions and uncertainties informed the management approach for meeting the environmental outcome. The identified trigger criteria and management actions, and the threshold criteria and contingency actions are aligned with the overall management approach.

#### **3.1 THE PLNB COLONY AT KOODAIKERI**

The Orange Leaf-nosed Bat (*Rhinonictis aurantia*) occurs in north-west Queensland, across the top end and into the Kimberley (Churchill 2008). An isolated population of the species occurs in the Pilbara and is recognised as a separate form (the Pilbara Leaf-nosed Bat) with evidence of divergence in call structure and skull morphology (Armstrong 2003).

Preliminary fauna surveys conducted at Koodaideri recorded the PLNB from an old mine adit adjacent to the K75W deposit within the MPA. Subsequent investigations documented that the adit intersects a large natural cavern and that over 400 PLNBs utilise the K75W Adit/Cave System (Biota 2012). PLNB roosts in the Pilbara typically range in size between 200 and 500 individuals (Bob Bullen, pers. comm. July 2017).

The colony represents one of 26 known maternal roosts in the Pilbara and one of approximately 10 known in the Hamersley Range. There are no other confirmed diurnal roosts along the north-eastern Hamersley Range or the Southern Chichester Range adjacent to the Fortescue Marsh (Bullen 2013a, 2014); however, there is a suspected PLNB roost around Wittenoom but this has not yet been located. The K75W PLNB colony is therefore currently considered to be regionally significant.

#### **3.2 BASELINE MONITORING OF THE PLNB COLONY**

Condition 7-6 (1) requires a baseline survey utilising ultrasonic bat call detection methods to ascertain the population size (based on bat call numbers) of the PLNB colony and to map the movement and foraging activity of the bats in relation to the known important foraging areas of the Koodaideri Spring Gorge and KBH12.

In order to document long-term PLNB activity at the K75W Adit/Cave System and Koodaideri Spring Gorge, two bat monitoring stations were established in February 2013 (Table 3-1; Figure 3-1). As a result, several years of baseline data is available for these two important areas prior to the implementation of the Koodaideri Project (Biota 2018)<sup>2</sup>. The existing monitoring station at the K75W Adit/Cave System has been upgraded to collect additional data that may be used to inform any potential change in bat activity during construction or operations, comprising:

- Noise logger (a Wildlife Acoustics SongMeter configured for audible noise).
- Vibration recorder (a Texcel triaxial geophone vibration logger).

- A motion sensitive camera installed at a height of 50 cm above the ground level at the entrance of the K75W Adit/Cave System in order to detect any other fauna or human entry into the adit that may cause disturbance without the camera being triggered by normal bat activity.

The echolocation call recording component of the bat monitoring stations comprises a full spectrum continuous sound recorder (e.g. Wildlife Acoustics SongMeter) equipped with adequate storage capacity for long-term deployment. The units are set to automatically activate 30 minutes before sunset and return to standby mode 30 minutes after sunrise. Baseline data is uploaded quarterly to a backed up hard drive administered by Biota Environmental Sciences (Biota). This data is then analysed by Biota on a quarterly basis and the results summarised for Rio Tinto. Data is provided to Rio Tinto annually.

Additional bat monitoring stations, comprising bat call recording equipment, have been installed at sites KBH12 and KBH25 (Table 3-1; Figure 3-1). These were established to enable pre-construction data to be collected prior to the commencement of Project activity at the K75W deposit (the deposit closest to the Roost) (Biota 2018). These stations will provide reference data sets against which to assess bat call activity levels in the vicinity of the future K75W pit during operations.

In order to collect reference data on natural fluctuations in PLNB populations more broadly across the region, a bat monitoring station has also been installed at Kalgan Creek, located approximately 80 km south-east of the K75W Roost (Table 3-1; Figure 3-1) (Biota 2018). Confirmation of a PLNB colony was previously obtained at Kalgan Creek following an initial bat survey conducted in 2014. Monitoring at Kalgan Creek, in the vicinity of the roost was conducted until the roost was located in early 2018. Since April 2018, monitoring at Kalgan Creek has been conducted at the roost itself and was discontinued at Kalgan Creek. While not protected from disturbance, the Kalgan Creek population represents an analogous population occurring in the eastern part of the Hamersley Interim Biographic Regionalisation for Australia subregion (PIL3).

**Table 3-1: Locations of Bat Monitoring Stations**

| Site Location                     | Easting (mE)      | Northing (mN) | Installation Date |
|-----------------------------------|-------------------|---------------|-------------------|
| K75W adit entrance                | 705633            | 7507131       | February 2013     |
| Koodaideri Spring Gorge           | 711580            | 7505958       | February 2013     |
| KBH12                             | 703074            | 7508710       | November 2015     |
| KBH25                             | 695032            | 7512266       | November 2015     |
| Kalgan Creek in vicinity of roost | 775965            | 7433149       | November 2015     |
| Kalgan Creek roost area           | Location withheld |               | April 2018        |

<sup>2</sup> Biota (2018) report is provided in a CD attached to the back cover of this hard document and is submitted as a separate document to support this PLNB EMP.

Rio Tinto also monitors other PLNB roost populations in the vicinity of some of its operations in the Pilbara. Data from these can be applied for comparative assessments with data from the Koodaideri population, as and when needed. Monitoring of the K75W roost chamber (SM4 echolocation recorder inserted down drill hole KOOD0018) will commence in Q4 2018. This monitor will establish an ongoing 24-hour/day baseline PLNB call record within the chamber and inform potential future management/mitigation actions (refer to Section 5). This baseline will be important as mining activities approach within 400 m of the K75W Adit/Cave System Exclusion Zone required by Condition 6-1 of MS 999 during the future development of K75W.



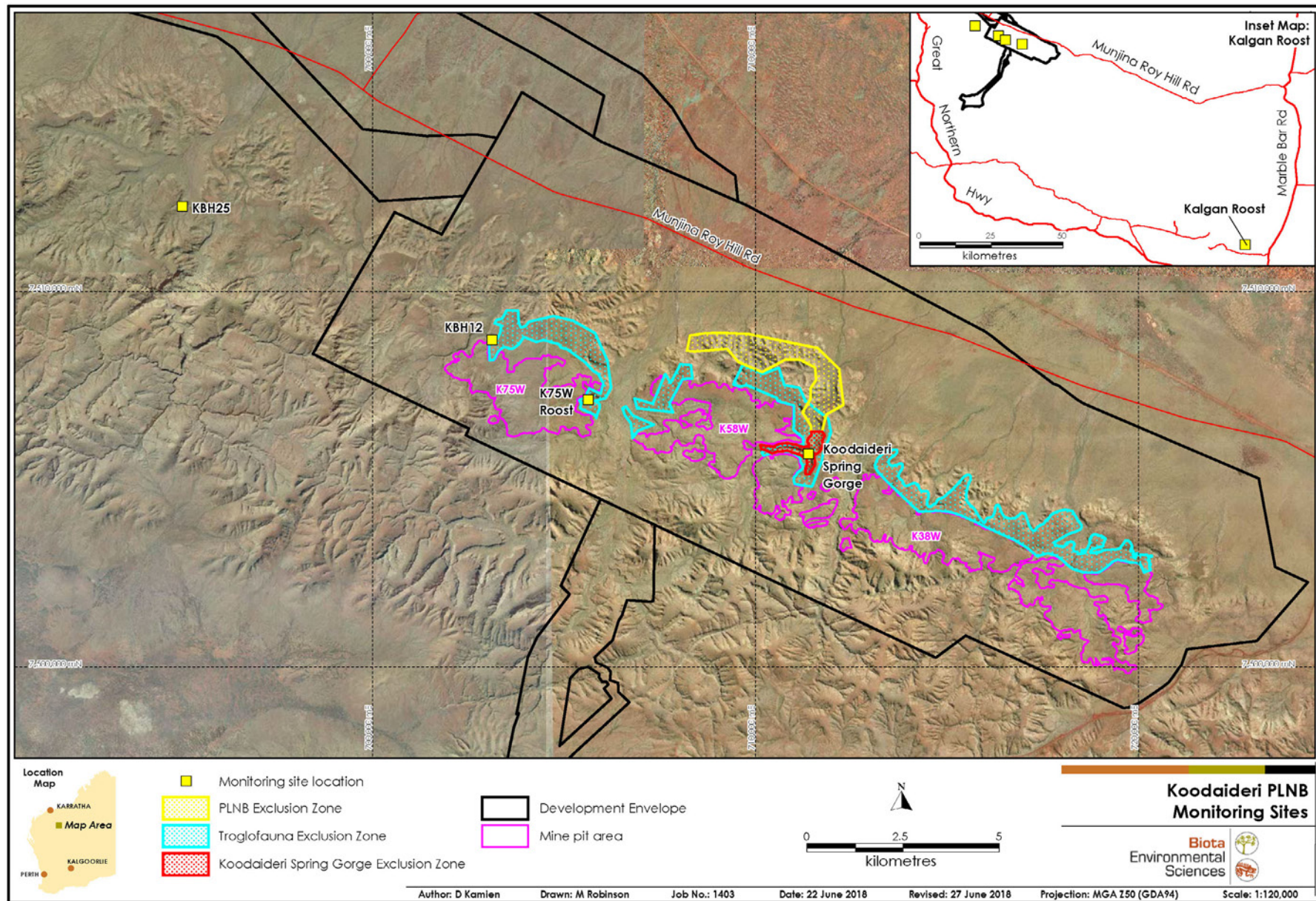


Figure 3-1: PLNB Monitoring Stations

### 3.3 MAPPING IMPORTANT ROUTES

Condition 7-6(1) of MS 999 requires this PLNB EMP to include baseline data delineating the distribution of PLNB movement and foraging activity between the K75W Roost, Koodaideri Spring Gorge and KBH12. This requirement has, in part, already been addressed through a combination of desktop mapping of likely habitat and ground-truthing via deployment echolocation call-recorders (Biota 2012, 2013a, Bullen 2013b, 2013c). Additionally, a multi-phase study specifically investigating PLNB movement and foraging activity was conducted in November 2015, March 2016 and May 2017 (Biota 2016, 2017<sup>3</sup>).

The results of the May 2017 study indicated that during dry conditions, the PLNBs were taking a relatively direct route between the K75W Roost and the Koodaideri Spring Gorge. Call activity was recorded along a broad corridor across the future K58W Pit (Figure 3-2). Additionally, data suggest direct movement of PLNBs across the future K75W Pit between the K75W Roost and KBH12 (Figure 3-2).

Current data indicates that PLNBs do utilise the PLNB and Troglafauna Exclusion Zone designated by Condition 6 (Figure 3-2). However, in general the exclusion zones do not stand out as areas of potentially high PLNB activity.

The Exclusion Zones may offer alternative routes of movement to the important foraging locations once implementation of the Koodaideri Project commences. That is, PLNBs may be capable of modifying foraging routes in response to disturbance factors as indicated in Biota (2014a).

Investigation of key foraging routes has also contributed baseline data required to fulfil Condition 7-6(5)<sup>4</sup>. The environmental assessment for the Koodaideri Project, specifically addressed the possibility that the PLNB may fly directly across the future K58W Pit area to access the Spring (Biota 2014b). Specialist opinion was sought on the potential impact to the population if this was the case (Biota 2014b). Sue Churchill, an author with several publications relating to the PLNB (Churchill *et al.* 1988, 2008, Churchill 1991) was of the opinion that dispersal routes are unlikely to be constrained to an extent that PLNBs would not be able to modify their foraging routes in response to construction. PLNBs are likely to have only a generalised foraging route, which can be modified nightly to suit conditions (Churchill 2014).

As the data indicate a number of sites of PLNB activity within the future K58W Pit area, development of management protocols under Condition 7-6(5) are required, but it is likely that PLNB foraging routes would be adjustable in response to future change and do not follow set flight paths.

Despite this likelihood, the Proponent is examining additional alternative methods to enhance the current understanding of PLNB foraging patterns/routes at Koodaideri. The

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<sup>3</sup> Biota (2017) report is provided in a CD attached to the back cover of this hard copy document and is submitted as a separate document to support this PLNB EMP.

<sup>4</sup> Protocols to enable the PLNB to adapt to impacts of construction and operation including a schedule of clearing of bat foraging habitat within the proposed K58W and K75W pits.



aim is to individually track the movements of a subset of the Koodaideri PLNB population via coded VHF transmitters. The Proponent plans to establish this trial in late 2018, with data available from early 2019.

If successful, this methodology could also be implemented concurrently with previously adopted acoustic monitoring techniques (Biota 2016, 2017) in order to supplement data provision in relation to Condition 7-6(3). That is, monitor the PLNB movement and foraging activity between the K75W Adit/Cave System and the Koodaideri Spring Gorge during development of the future K58W Pit.

### **3.4 IMPORTANT FORAGING HABITAT**

#### **3.4.1 Koodaideri Spring Gorge**

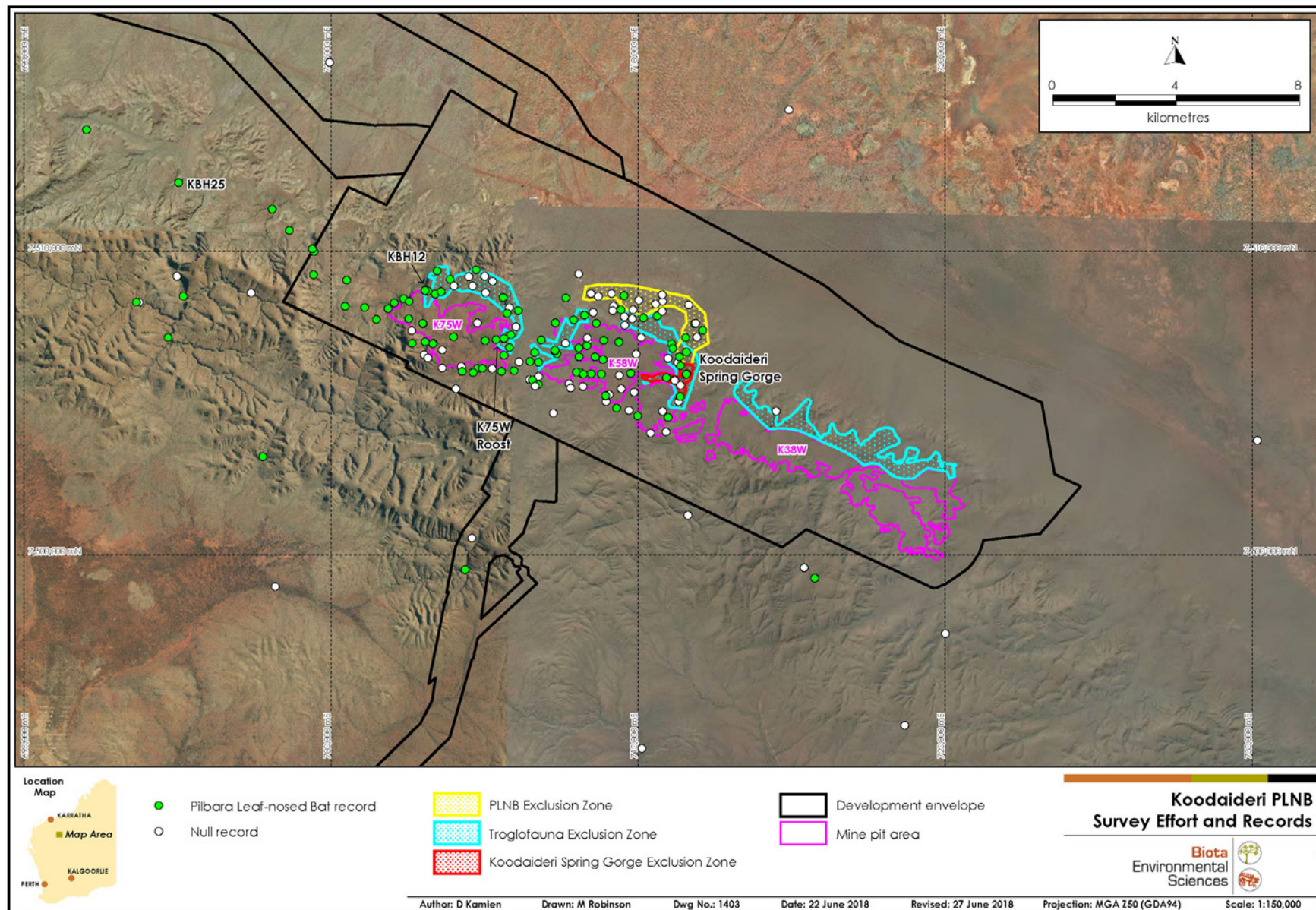
Koodaideri Spring Gorge is located approximately 5 km east of the K75W Roost (Figure 3-3) and it has been demonstrated that PLNBs visit the site nightly (Biota 2013a, Bullen 2013b). Given their susceptibility to dehydration (Churchill 2008), a nearby water-source is considered important in maintaining the population's persistence. PLNB colonies are typically associated with permanent water sources, usually within a flying distance of less than 5 km from the roost site (Bob Bullen pers. comm.).

The future K58W mine pit is located between the K75W Roost and Koodaideri Spring Gorge. The requirement to ensure continued use of the Koodaideri Spring Gorge by the PLNB is highlighted in Condition 7-5(1) of MS 999.

#### **3.4.2 KBH12 and KBH25**

Past echolocation call recording at 36 sites, within and outside the Development Envelope (Biota 2013a), has indicated three locations of high call activity: Koodaideri Spring Gorge; site KBH12; and site KBH25. The timing of call recordings at these three locations was consistent with bats dispersing from the K75W Roost and the high call activity at these locations suggests that they may be locally important foraging areas.

The continued use of the habitat at KBH12 is an objective of this PLNB EMP as detailed in Condition 7-5(1) of MS 999. KBH12 is adjacent to the K75W mine pit while KBH25 is outside the Development Envelope and 11.7 km west of the K75W Roost (Figure 3-3). KBH25 is not identified in MS 999, but is potentially an important local foraging site outside the MPA and it may represent a suitable reference monitoring site.



**Figure 3-2: Koodaideri PLNB Survey Effort and Records**



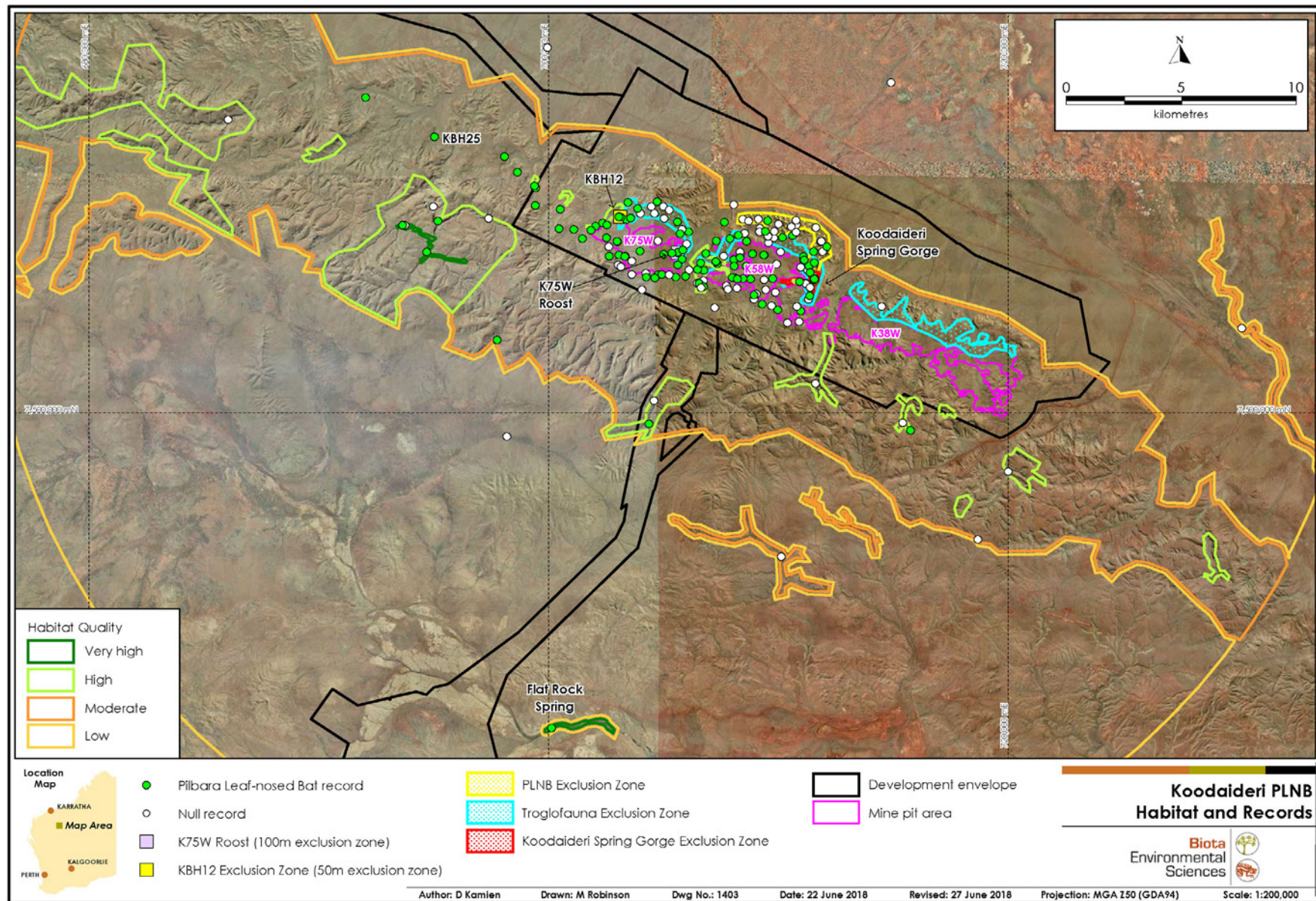


Figure 3-3: Koodaideri PLNB Habitat and Records

## 4 MANAGEMENT APPROACH

An in-depth review of the potential impacts of the Koodaideri Project on the PLNB colony was undertaken during the environmental assessment process (Rio Tinto 2013, EPA 2014). Table 4-1 summarises the potential impacts and mitigation measures to protect the Koodaideri PLNB colony.

**Table 4-1: Summary of potential impacts and corresponding mitigation measures to protect the Koodaideri PLNB colony**

| Potential Impact                              | Potential Adverse Result  | Mitigation and Management   |
|---|---|---|
| Noise and vibration affecting the K75W roost  | Abandonment of the roost  | PLNB Exclusion Zone, Koodaideri Spring Gorge Exclusion Zone, and Troglofauna Exclusion Zones for K38W, K58W and K75W; monitoring; and workforce inductions.   |
| Accidental intersection with the K75W roost   |   | Exclusion zones (as listed above); monitoring; and mapping of K75W Adit/Cave System.  |
| Human or feral animal entry to the K75W roost |   | Exclusion zones (as listed above); feral animal control; adit entry camera; workforce inductions; with any authorised entry (for monitoring/research purposes) into the Roost taking account of PLNB breeding cycles. |
| Koodaideri Spring Gorge habitat impacted      | Removal of important foraging habitat   | Exclusion zones (as listed above); no dewatering of the K58W pit; native vegetation clearing controls; and the Koodaideri Spring Adaptive Management Plan.  |
| Infrastructure                                | Individual injury or death  | Exclusion zones (as listed above); and reporting incidents of wildlife interaction.   |
| Artificial water sources                      | Attraction of bats to areas of Koodaideri project works and modified foraging behaviour | Exclusion zones (as listed above); effective drainage systems to reduce areas of standing water not required for operational needs.   |
| Artificial light                              | Modified foraging behaviour   | Exclusion zones (as listed above); and lighting controls subject to Australian Standards requirements for plant and some infrastructure; in-pit lighting will be used in active mine areas.                           |
| Dust  |   | Exclusion zones (as listed above); and dust control through use of water carts on haul roads and in mine pits.  |
| Vehicle strike                                | Individual injury or death  | Exclusion zones (as listed above); and reporting incidents of wildlife interaction.   |

This PLNB EMP does not include all environmental management measures planned for the Koodaideri Project that are relevant to the PLNB colony. The following documents include additional environmental management commitments, many of which will be of benefit to the PLNB colony:

- RTIO (2011) Rio Tinto Significant Species Management Plan.

- RTIO (2012) Koodaideri Significant Species Management Plan Addendum.
- RTIO (2018) Koodaideri Mine and Rail Project Construction Environmental Management Plan.

The PLNB mitigation and management measures relevant to this PLNB EMP include: exclusion zones; protection of Koodaideri Spring Gorge habitat; staged clearing; bat monitoring stations and 400 m buffer; mapping the extent of the K75W Adit/Cave System; and reporting of 'interactions' defined as individual bat injury or mortality as a result of direct activities associated with the Koodaideri Project (such as vehicle strikes). These are discussed in the following sections.

Specific management protocols/actions to be adopted to assist enable PLNB to adapt to potential impacts of construction and operations include the following:

- Retention of exclusion zones to retain foraging habitat and flight pathways between the K75W Adit/Cave System and Koodaideri Spring Gorge (north of K58W), the exclusion/buffer zone over the K75W Adit/Cave System, plus additional troglotauna exclusion zones at K75W and K38W and the Koodaideri Spring Gorge exclusion zone at K58W
- Application of water on haul roads and in active mine pit areas (to reduce impacts of dust on PLNBs)
- Minimise use of artificial lighting in areas around process plants, workshops, administration offices and active mine pit areas where this does not affect the safety of operations (to reduce impacts of light on PLNB and better facilitate PLNB flights in those areas)
- Adaptive blasting techniques (low intensity blasting, pre-splitting in advance of blasting, controlled blasting) as mining approaches the buffer zone over the K75W Adit/Cave System (to reduce blast/vibration effects on PLNB and acclimatise PLNB)
- Progressive and staged development of mine pits as outlined in Section 4.3 (to prolong the availability of foraging habitat for PLNB)
- Progressive rehabilitation of disturbed areas that are no longer required to be kept open (to re-establish foraging habitat)

#### **4.1 EXCLUSION ZONES**

The exclusion zones required under Condition 6 of MS 999 represent the most significant mitigation measure to the potential impacts of the Koodaideri Project on the PLNB colony. Table 4-1 details the potential impacts mitigated by the exclusion zones.

The exclusion zones protect the K75W Roost and important foraging areas (the Koodaideri Spring Gorge and KBH12) from direct impact (Figure 4-1)

A PLNB exclusion zone also occurs to the north of the future K58W pit along the edge of the range. No ground-disturbing activities will take place within the PLNB exclusion zone with the exception of the allowable maximum of five percent disturbance within the zone for linear infrastructure, required for the future K58W mine development.

Three additional exclusion zones are also stipulated in Condition 6 for the protection of troglofauna habitat (Figure 4-1). These exclusion zones are located north of the future K38W, K58W and K75W mine pits.

While these were not explicitly intended for bat management, the zones associated with K75W and K58W will protect portions of habitat mapped as high quality foraging areas for PLNB, while the remainder of the area of each troglofauna zone protects medium quality PLNB foraging habitat.

There are additional buffer zones stipulated under MS 999 conditions to protect *Lepidium catapycnon* (Hamersley Lepidium) (Condition 9-1) and *Sauropus Koodaideri* detritals (now *Synostemon hamersleyensis*) (Condition 10-4). These buffer zones effectively retain some potential PLNB foraging areas, but are not large enough to be meaningfully considered further in this PLNB EMP.

## 4.2 PROTECTION OF KOODAIKERI SPRING GORGE HABITAT

The Koodaideri Spring Gorge is a very important foraging habitat and water source for the PLNB colony at Koodaideri and will be protected by an exclusion zone (Figure 4-1). To reduce the risk of altering the hydrology of the Koodaideri Spring Gorge, no dewatering of the K58W pit will be undertaken. The Proponent has committed to the protection of the ecological values of the Koodaideri Spring Gorge and to prevent degradation of habitat associated with the system and separate management and monitoring programs will be implemented to address this.

## 4.3 STAGED CLEARING OF VEGETATION

Vegetation clearing in exclusion zones contained in MS 999 will be capped to those limits specified in Condition 6. No clearing will occur within the Koodaideri Spring exclusion zone or K75W Roost or KBH12 areas. Clearing will also be planned to avoid known areas of high bat activity outside those specified exclusion zones and the mine pit areas where possible.

Clearing for main development infrastructure will commence upon initiation of construction and will occur in parallel with the initial mine pit development. All infrastructure will be established in a single construction timeframe, except those facilities associated with wet processing (e.g. wet processing plant, waste fines storage facilities) which is expected to be established around five to seven years after Koodaideri becomes operational.

Clearing for mine pit development will be staged to firstly commence at K58W, then K75W and then K38W. There will some overlap between mine pit developments (i.e. at some times, two or more deposits will be actively mined simultaneously). Mine pit development scheduling and hence clearing sequencing has been prepared for K58W and K75W, with preliminary planning completed for K38W; all mine pit development and clearing sequencing is based on current ore body knowledge and market requirements and thus should be viewed as provisional and subject to change.

Measures have been considered to enable PLNB to adapt to construction and operation impacts, including a clearing schedule of bat foraging habitat at K58W and K75W mine pits. Measures adopted include:

- Progressive development of each deposit through a series of sequential discrete sub-pits;

- Staged clearing of sub-pits rather than clearing of the K58W or K75W mining areas as a single action;
- Backfilling of sections of mined out pits to enable rehabilitation to commence.

Other factors that will contribute to the expectation that PLNB will adapt to construction and mining activities include:

- Presence of 983 ha of exclusion zones (PLNB Exclusion Zone at K58W [324 ha], Troglofauna Exclusion Zones at K58W [340 ha] and K75W [264 ha], and the Koodaideri Spring Gorge Exclusion Zones at K58W [55 ha]) established under Condition 6 of MS 999 (refer Section 4.1)
- Outcome of completed PLNB flight path studies that indicate a lack of existing defined flight paths between the K75W roost and the Koodaideri Spring Gorge
- Advice from PLNB experts (Sue Churchill and Bob Bullen, in Biota 2014b) that PLNB are readily adaptable. That is, PLNB could adapt to the establishment of mine pits between K75W roost and Koodaideri Spring Gorge by negotiating alternative pathways to access water and foraging areas. As previously stated (Section 3.3), Churchill was of the opinion (Biota 2014b; Churchill 2014) that dispersal routes are unlikely to be constrained to an extent that PLNBs would not be able to modify their foraging routes in response to construction. PLNBs are likely to have only a generalised foraging route, which are likely to be modified nightly to suit conditions
- Known continued PLNB foraging activity at some other Rio Tinto mine sites in the Pilbara following years of construction and mining activities
- Implementation of the management and monitoring measures outlined in this PLNB EMP

Within K58W, clearing for mine pit development is expected to commence in the northern central area, and then progress in the numerical sequence as depicted in Figure 4-2. The mining/clearing timeframe for K58W is approximately 17 years.

Clearing for mine pit development at K75W is expected to commence in the northern central area and then progress in the numerical sequence as depicted in Figure 4-3. Mine development clearing will only commence at K75W in advance of when ore is sequenced to be sourced from that deposit to supplement ore being extracted from K58W. The mining/clearing timeframe for K75W is approximately 14 years.

Staging of clearing (pit development) for K38W has not yet been finalised, but in broad terms it is expected to commence in the western end and progress eastwards, with the mining/clearing timeframe is expected to be approximately 20 years. Similar to K75W, clearing for mine development at K38W will only be commenced in advance of when ore is to be sourced in sequence from that deposit to supplement ore being extracted from K58W/K75W.



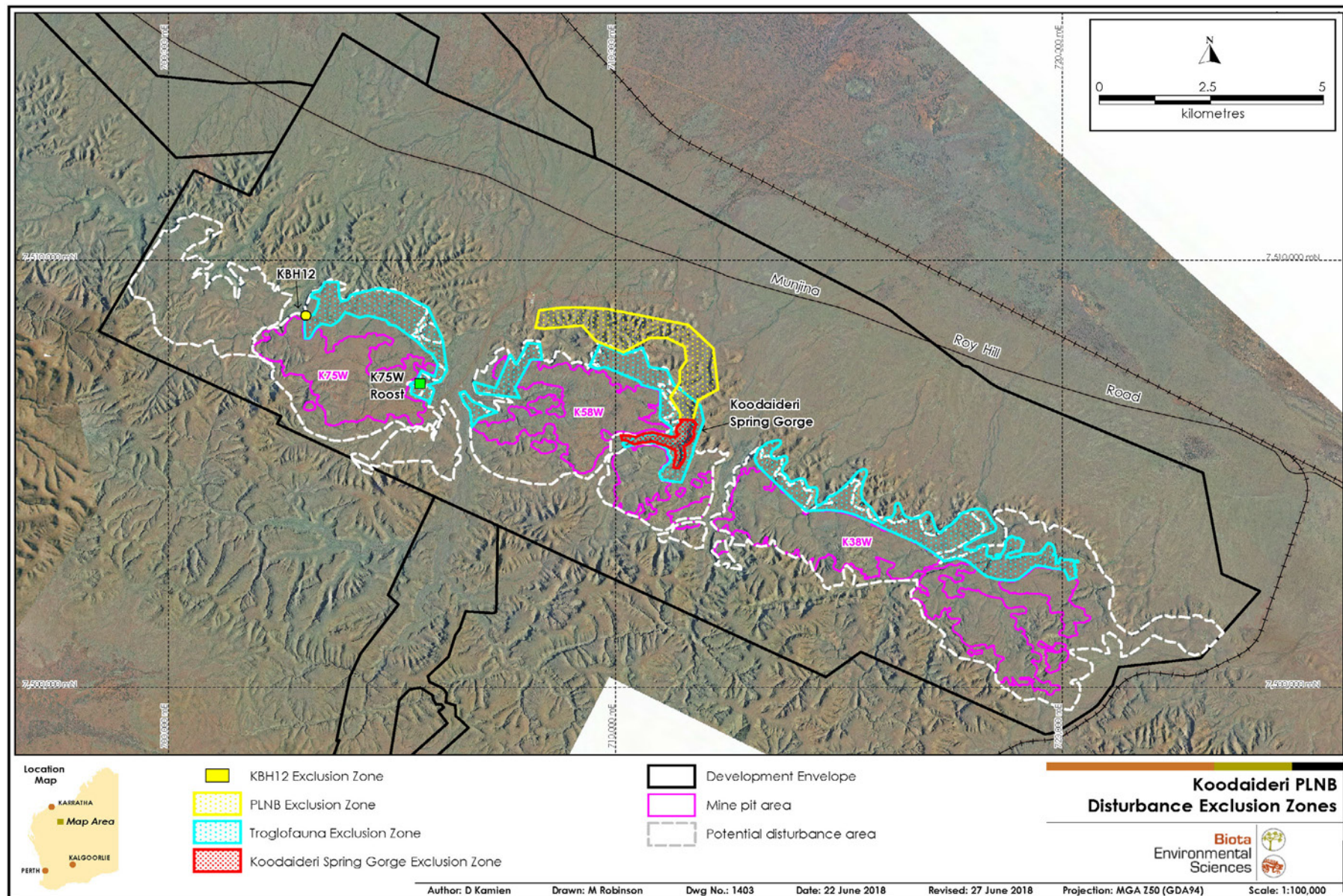


Figure 4-1: Koodaideri Exclusion zones.



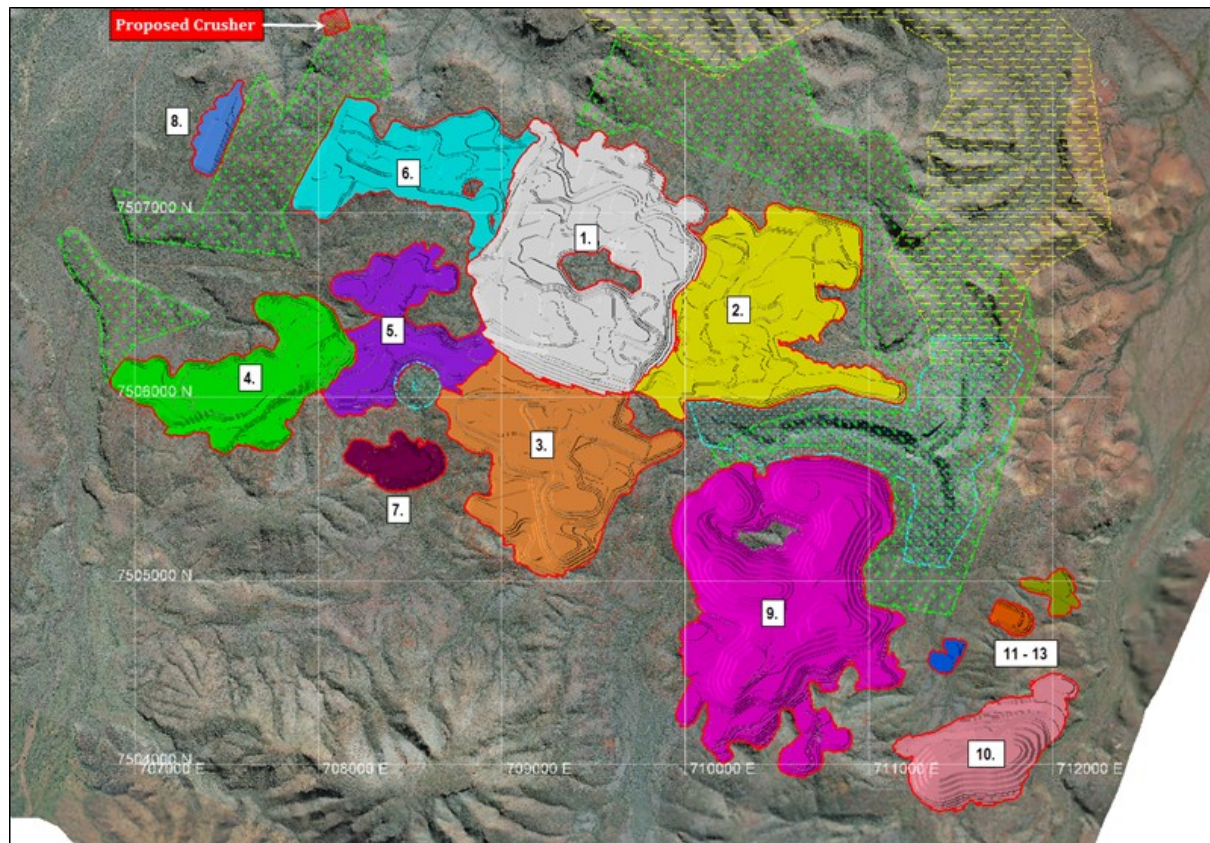


Figure 4-2: Clearing sequence for K58W.

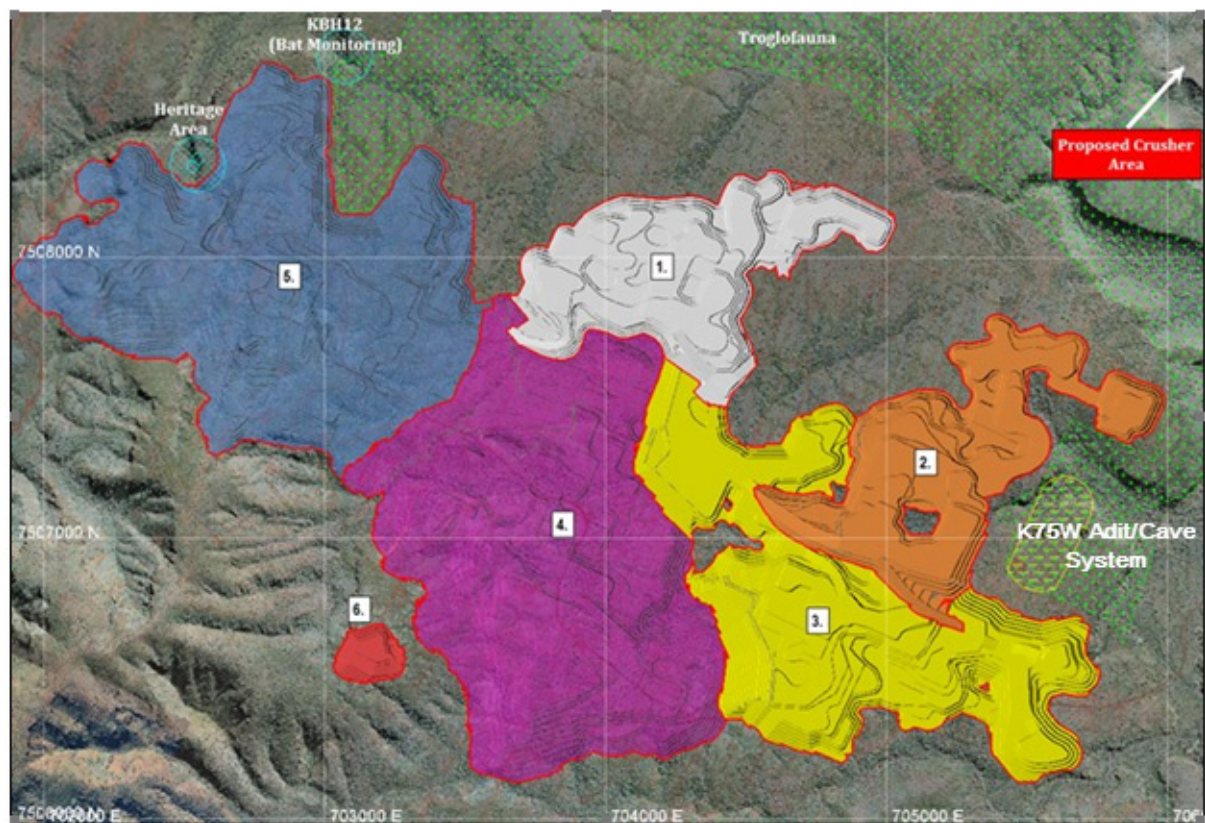


Figure 4-3: Clearing sequence for K75W.

## **4.4 BAT MONITORING STATIONS**

Bat monitoring stations will be maintained at the K75W Roost, the Koodaideri Spring Gorge, KBH12, KBH25, and at Kalgan Creek (refer Section 3.2). Monitoring at these stations has commenced (Section 3.2; Biota 2018) and will continue until the CEO of the EPA Services of the DWER approves in writing that monitoring at one or more stations is no longer required and can cease.

### **4.4.1 Monitoring of 400m Buffer**

Condition 7-6(4) requires the monitoring of the behaviour of the PLNBs in the K75W Roost as Koodaideri Project activities occur within 400 m of the PLNB 100 m exclusion zone (Figure 4-4).

When construction or operational activities approach or enter the 400 m buffer the following additional behavioural monitoring will commence:

- An ultrasonic microphone and audible sound microphone will be lowered into the existing drill-hole entering the roof of the main chamber (Figure 4-4). This will be connected to appropriate recorders and used to detect any unusual bat activity that may indicate disturbance behaviour. The microphones will be installed several days in advance of Koodaideri Project activity commencing within the 400 m buffer to give the bats time to habituate to the presence of the microphone.
- A humidity data logger will also be included as part of this protocol to detect any adverse reduction of humidity within the K75W Roost, potentially indicating that Koodaideri Project activity has intersected an unidentified lateral extension of the main cavern. This humidity data was installed in the K75W Adit/Cave System chamber in June 2018 to establish baseline data.

## **4.5 MAPPING THE EXTENT OF THE K75W ADIT/CAVE SYSTEM**

Condition 6-1 of MS 999 requires a 100 m Exclusion Zone around the known extent of the K75W Adit/Cave System. The adit and main cavern have been mapped but the extent of the side chambers leading off from the main cavern are not fully known and it would not be feasible (on grounds of safety and inherent difficulty) for personnel to enter and map these possible lateral extensions.

To progress the requirements of Condition 7-2 and 7-3 to prepare and submit a K75W Adit/Cave System Structural Report confirming the lateral extent of the cave system, the Proponent has conducted surveys using geophysical methods to map the main cavern and other lateral passages and side chambers of the K75W Roost.

Cavity auto-scanning conducted from the existing drill hole intersecting the cavern roof (location shown in Figure 4-4), revealed the main cavity to be located 14 m below the surface and extending to 20 m below with a lateral extent ranging from 5 to 23 m and dipping towards the east.

An investigational high-resolution microgravity survey has also been conducted with the aim of determining the extent of any side chambers off the main chamber (Rio Tinto 2015).

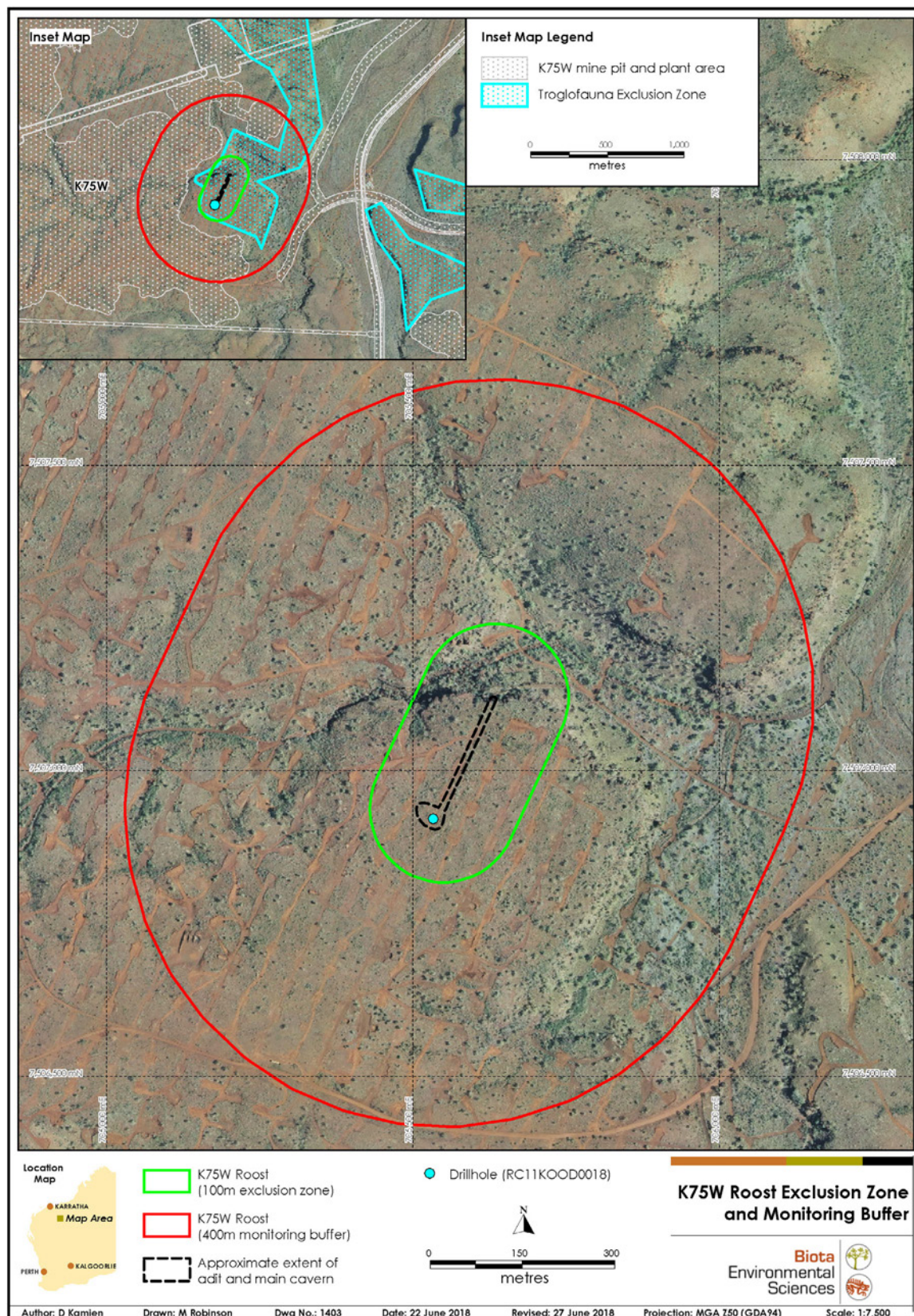
This survey revealed areas of low gravity, indicative of air pockets of a similar size to the gravitational signal of the main cavern (Rio Tinto 2015). The results of the microgravity survey do not allow a final determination of whether these additional side chambers are connected to the main cavern. However, observations made during the colony assessment (Biota 2012) of bats flying in and out of a side-chamber in the same area indicated by the microgravity study would suggest that they are likely connected to the main chamber.

The Proponent will conduct additional survey and mapping work of K75W prior to commencement of mining at K75W. In the event that the additional survey work identifies extensions to the known extent of the main cavern or side chambers, revisions to the established 100 m exclusion zone and 400 m PLNB behavioural monitoring buffer will be required.

In accordance with the intent of Condition 6-1, the 100 m buffer will be maintained around any redefined lateral extent of the K75W Adit/Cave System. Similarly, in accordance with the intent of Condition 7-6(4), the 400 m behavioural monitoring buffer will be maintained around any redefined lateral extent of the K75W Adit/Cave System.

The key outcomes from this additional mapping will be incorporated into this PLNB EMP and included in the next major review/revision when available.





**Figure 4-4: Koodaideri PLNB Colony Exclusion Zone and Monitoring Buffer**

## 5 MANAGEMENT PLAN PROVISIONS

This section of the PLNB EMP identifies the legal provisions that the Proponent proposes to implement to ensure that the Koodaideri Project does not adversely impact the PLNB population. It identifies the environmental criteria that the Proponent will use to measure performance and monitoring that will be undertaken in relation to these environmental criteria. Finally, it defines the trigger level actions and threshold contingency actions that the Proponent will undertake if the environmental criteria are exceeded.

### 5.1 ENVIRONMENTAL CRITERIA

Three levels of environmental criteria are used in this PLNB EMP:

- **Early Response** - conservative indicators that may provide early feedback on potentially increasing or expanding impacts.
  1. *Total nightly calls at the K75W Adit/Cave System remain below 500 for 52 consecutive nights.*
  2. *Noise levels exceed 50 dB (over a 30 minute period) or vibration levels exceed 10 mms-1 peak particle velocity for any single peak event at the K75W Adit/Cave System.*
  3. *Total nightly calls at the Koodaideri Spring Gorge bat monitoring stations remain below 200 for 54 consecutive nights.*
  4. *Reported incidents of Koodaideri Project related direct activity interactions (e.g. vehicle strike) resulting in PLNB mortality exceeding a rate of over 24 individuals annually, commencing January each year.*
- **Trigger** – measures set at a conservative level to ensure management actions are implemented well in advance of the environmental objective being compromised. Thus, trigger criteria are set at a level below the threshold criteria to signal the need to focus and investigate and where applicable, mitigate the impact further.
  1. *Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights.*
  2. *Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights.*
- **Threshold** - framed to measure achievement of the environmental objective. A failure to meet the Threshold criteria, if deemed attributable to the implementation of the Koodaideri Project, signals the requirement to implement threshold contingency actions to facilitate compliance with the environmental objective.
  1. *Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights following implementation of the Trigger Criteria management actions.*
  2. *Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights following implementation of the Trigger Criteria management actions.*

3. *Direct unauthorised ground disturbing activity within the exclusion zones of the K75W Adit/Cave System, the Koodaideri Spring Gorge and KBH12.*

The environmental criteria incorporated in this PLNB EMP will be reviewed at least every second year following further collection and analysis of monitoring data.

In applying this PLNB EMP, an adaptive management approach is advocated. This involves implementing mitigation measures, monitoring and evaluation relative to formulated criteria, and systematically adapting management actions and monitoring in accordance with new data and understandings, in order to better meet the environmental objective.

Accumulation of data during pre-construction, construction and operational phases, will be used to refine the environmental criteria in a process of continual revision. Project experience and resultant data from the PLNB colony (and other PLNB monitoring stations) will be used to adapt management responses as appropriate to meet the environmental objectives.

## **5.2 RATIONALE FOR CHOICE OF ENVIRONMENTAL CRITERIA**

### **5.2.1 K75W Adit/Cave System**

Baseline call data recorded at the entrance of the K75W Adit/Cave System spanning February 2013 to March 2018 (Appendix 2) was used to inform the environmental criteria within this PLNB EMP. Over this period, the total nightly calls varied significantly, ranging from 1 to 7,566 with a mean of 828 ( $\pm 18.4$  SE) and a median of 698.

The baseline data set indicates that from February 2013 to March 2018, total calls from 516 nights (32% of recorded nights) fell below 500, occurring for a maximum of 52 consecutive nights. Although yet to be statistically proven, such drops in nightly call numbers may be attributed to sustained (substantial and/or prolonged) rainfall, after which time PLNB may possibly disperse and are less reliant on the K75W Adit/Cave System for short periods (Biota 2017).

As a result, call activity falling below 500 calls per night for 52 consecutive nights is nominated as the Early Response criterion being indicative of calls consistently falling at the lower end of the range of normal activity. Additionally, no more than 11 consecutive nights were found to have less than 150 calls recorded; 15 consecutive nights with less than 150 recorded calls per night is nominated as the Trigger criterion being indicative of reduced activity below the established normal range during the baseline survey. Subsequently, an additional 15 consecutive nights with less than 150 recorded calls per night, following implementation of the Trigger Criteria management actions is nominated as the Threshold criterion being indicative of reduced activity at odds with the environmental objective.

### **5.2.2 Koodaideri Spring Gorge**

Baseline call data recorded at the Koodaideri Spring Gorge from February 2013 to January 2018 (Appendix 2) was also used to inform the environmental criteria within this PLNB

EMP. Over this period, the total nightly calls varied significantly, ranging from 0 to 5,226 with a mean of 554 ( $\pm 16.0$  SE) and a median of 408.

The baseline data set indicates that from February 2013 to January 2018, total calls from 337 nights (30% of recorded nights) fell below 200, occurring for a maximum of 54 consecutive nights. As a result, call activity falling below 200 calls per night for 54 consecutive nights is nominated as the Early Response criterion being indicative of calls consistently falling at the lower end of the range of normal activity. The Trigger criterion will be met if total nightly calls at the Koodaideri Spring Gorge monitoring station fall below 100 for 36 consecutive nights, being indicative of reduced activity below the normal range. Subsequently, an additional 36 consecutive nights with less than 100 recorded calls per night, following implementation of the Trigger Criteria management actions is nominated as the Threshold criterion being indicative of reduced activity at odds with the environmental objective.

### **5.3 MONITORING**

The purpose of the monitoring is to inform if the condition environmental outcome is being achieved and when management actions are required to be implemented.

Refer to Table 5-1, Table 5-2, Table 5-3 and Figure 5-1 for monitoring provisions, response and management actions, and how these will determine performance against the environmental criteria.

### **5.4 IMPLEMENTATION OF ACTIONS**

#### **5.4.1 Early Response Actions**

Ongoing assessment of Early Response Criteria (Table 5-1) is a critical part of the adaptive management approach and is likely to be the best means of initiating early intervention and successful prevention of adverse impacts.

#### **5.4.2 Trigger Level Actions**

The Proponent has developed trigger level actions that would be implemented if the associated Trigger criteria signal the need for increased mitigation or protection (Table 5-2). These trigger level actions will be implemented by the Proponent to mitigate and manage impacts with the aim of returning to levels below trigger criteria and avoiding exceedance of the safeguard threshold criteria.

Currently, data for KBH12 (Biota 2018) is limited and as a result the baseline range cannot yet be meaningfully determined. Reliable baseline data is being acquired and a sufficient dataset will be obtained prior to commencement of mining at K75W. Future revisions to the PLNB EMP will provide a baseline range for KBH12 and specific Trigger Criteria and associated actions.

### **5.4.3 Threshold Contingency Actions**

The Proponent has developed a number of threshold contingency actions that would be implemented if the associated threshold criteria are exceeded (Table 5-3). The threshold contingency actions will be implemented to manage aspects of the Koodaideri Project and achieve the condition environmental outcome and manage the impact to below threshold and trigger criteria again with the intent of ensuring the Proponent complies with the relevant Ministerial conditions.



**Table 5-1: Monitoring and Response Actions for PLNB Early Response Criteria**

| Parameter   | Monitoring Location                                | Frequency  | Early Response Management Actions/Contingencies  |
|---|--|--|--|
| <p><i>Echolocation recordings.</i></p> <p>Total nightly calls at the K75W Adit/Cave System remain below 500 for 52 consecutive nights.</p>  | Entrance to the K75W Monitoring Station            | Ongoing monitoring during pre-construction, construction and operations. Monitoring data reviewed quarterly. | <ol style="list-style-type: none"> <li>1. Analyse environmental data (including Koodaideri Spring Gorge water levels) and call activity from the control sites and other regional PLNB data sets to determine whether environmental conditions or regional effects explain the change in call activity.</li> <li>2. If environmental data do not explain the criterion exceedance, then analyse call activity for 90 days on a monthly basis to determine whether any further decline in PLNB call activity is detected.</li> </ol>  |
| <p><i>PLNB noise and vibration interaction.</i></p> <p>Noise levels exceed 50 dB (over a 30 minute period) or vibration levels exceed 10 mms-1 peak particle velocity for any single peak event at the K75W Adit/Cave System.</p>                             | Entrance to the K75W Monitoring Station            | As above.  | <ol style="list-style-type: none"> <li>1. Analyse call activity data from the same period for evidence of noise or vibration effect.</li> <li>2. Review Project activities to identify potential noise and vibration sources within 30 days of exceedance.</li> <li>3. If noise or vibration is attributed to operations then develop mitigation measure(s) and implement within 30 days of the source being identified</li> <li>4. Analyse call activity on a monthly basis for 90 days after implementation of mitigation measure(s) to determine if there is a decline in PLNB call activity that could be attributed to noise or vibration.</li> </ol> |
| <p><i>Echolocation recordings.</i></p> <p>Total nightly calls at the Koodaideri Spring Gorge bat monitoring stations remain below 200 for 54 consecutive nights.</p>  | Koodaideri Spring Gorge Monitoring Station         | As above.  | <ol style="list-style-type: none"> <li>1. Analyse environmental data (including Koodaideri Spring Gorge water levels) and call activity from the control sites and other regional PLNB data sets to determine whether environmental conditions or regional effects explain the change in call activity.</li> <li>2. If environmental data do not explain the criterion exceedance, then analyse call activity for 90 days on a monthly basis to determine whether there is any further decline in PLNB call activity.</li> </ol>   |
| <p><i>PLNB direct interaction.</i></p> <p>Reported incidents of Koodaideri Project related direct activity interactions (e.g. vehicle strike) resulting in PLNB mortality exceeding a rate of over 24 individuals annually, commencing January each year.</p> | Within Koodaideri Project MPA Development Envelope | Construction and operations. Monitoring data reviewed annually.  | <ol style="list-style-type: none"> <li>1. Review Project activities to identify potential factors leading to the reported interactions within 30 days of exceedance.</li> <li>2. Develop and implement mitigation measure(s) within 60 days of the factors leading to increased interactions being identified.</li> <li>3. Review direct PLNB interaction records in the 12 months following implementation of the adopted mitigation measure(s) and develop and implement additional mitigation measures if annual mortality rate does not decrease.</li> </ol>   |

**Table 5-2: Monitoring and Management Actions for Trigger Criteria**

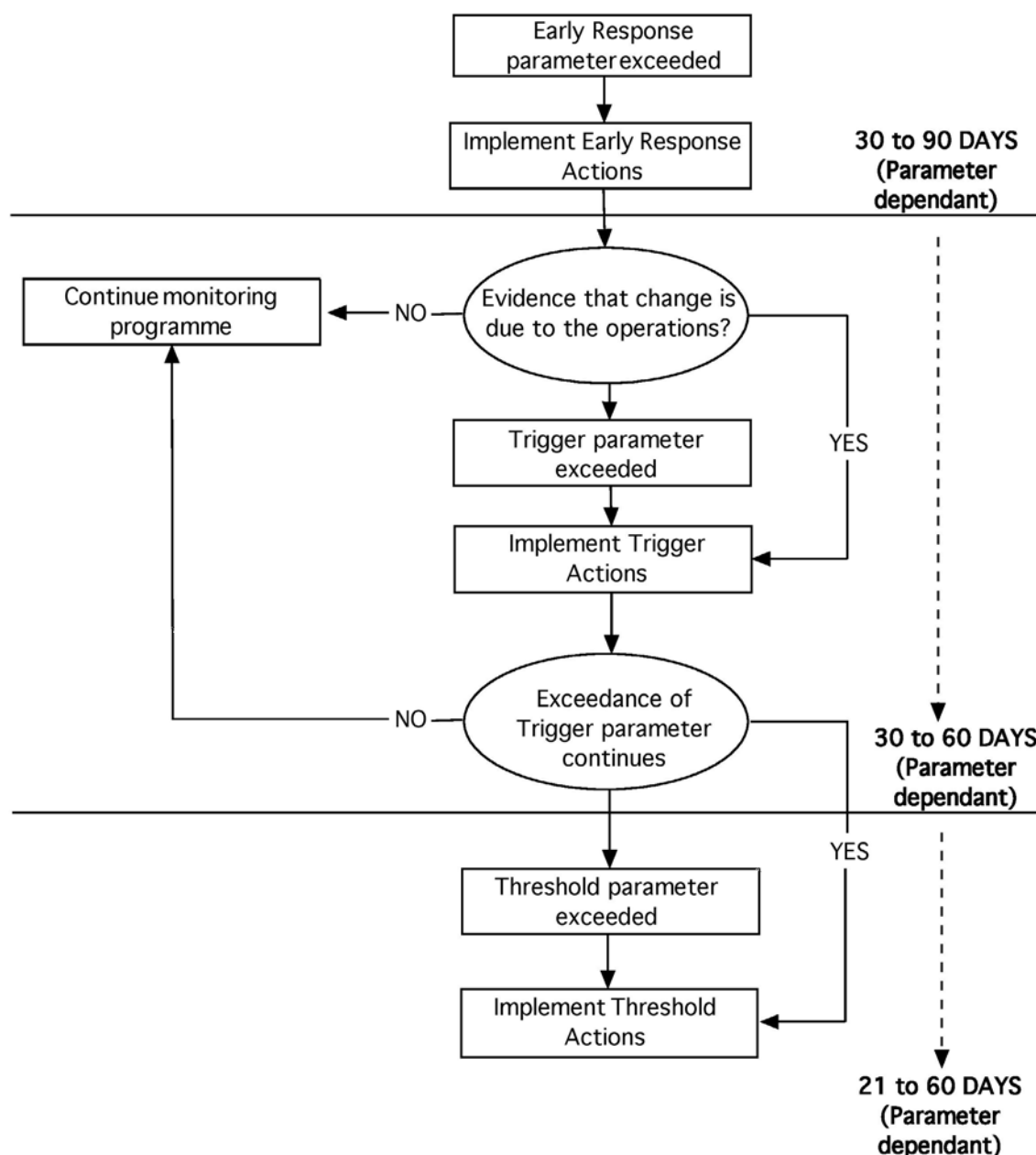
| Parameter  | Monitoring Location                        | Frequency   | Trigger Criteria Management Actions/Contingencies  |
|--|--|---|--|
| <i>Echolocation recordings.</i><br>Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights.                      | Entrance to the K75W Monitoring Station    | Ongoing monitoring during pre-construction, construction, and operations. Monitoring data reviewed quarterly. | <ol style="list-style-type: none"> <li>1. Analyse environmental data (including Koodaideri Spring Gorge water levels) and call activity from the control sites and other regional PLNB data sets to determine whether environmental conditions or regional effects explain the change in call activity.</li> <li>2. If environmental data do not explain the criterion exceedance, then analyse noise, vibration and remote camera data from the K75W Adit/Cave System for the period of the exceedance.</li> <li>3. Conduct a census of the PLNB colony within 60 days of parameter exceedance and compare against baseline colony censuses to place the change in call activity into context.</li> <li>4. Report to DWER within 21 days of becoming aware of the exceedance.</li> <li>5. If 1, 2 and 3 above indicate a project-induced change in the colony or its activity, then review Project activities to identify potential factors resulting in parameter exceedance.</li> <li>6. Develop appropriate mitigation measure(s) and implement within 30 days of the source factor(s) being identified.</li> <li>7. Analyse call activity on a fortnightly basis for 60 days after implementation of the mitigation measure(s) to determine if call activity re-establishes to levels above the criterion trigger.</li> </ol> |
| <i>Echolocation recordings.</i><br>Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights. | Koodaideri Spring Gorge Monitoring Station | As above.   | <ol style="list-style-type: none"> <li>1. Analyse environmental data (including Koodaideri Spring Gorge water levels) and call activity from the control sites and other regional PLNB data sets to determine whether environmental conditions or regional effects explain the change in call activity.</li> <li>2. If environmental data do not explain the criterion exceedance, then review Project activities to identify potential factors resulting in parameter exceedance.</li> <li>3. Develop appropriate mitigation measure(s) and implement within 30 days of the source factor(s) being identified. Where implementation within 30 days is not practical/feasible, advise DWER of alternative achievable timeframe for implementation.</li> <li>4. Report to DWER within 21 days of becoming aware of the exceedance.</li> <li>5. Analyse call activity on a fortnightly basis for 60 days after implementation of the mitigation measure(s) to determine if call activity re-establishes to levels above the criterion trigger.</li> </ol>  |

**Table 5-3: Monitoring and Contingency Actions for Threshold Criteria**

| Parameter   | Monitoring Location                     | Frequency  | Threshold Criteria Management Actions/Contingencies   |
|---|---|--|---|
| <i>Echolocation recordings.</i><br>Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights following implementation of the Trigger Criteria management actions. | Entrance to the K75W Monitoring Station | Ongoing monitoring during pre-construction and operations. Monitoring data reviewed quarterly. | <ol style="list-style-type: none"> <li>1. Analyse environmental data and call activity from the control sites and other regional PLNB data sets to determine whether environmental conditions or regional effects explain the change in call activity.</li> <li>2. If environmental data do not explain the criterion exceedance, then analyse noise, vibration and remote camera data from the K75W Adit/Cave System for the period of the exceedance.</li> <li>3. Conduct a census of the PLNB colony within 30 days of parameter exceedance and compare against baseline colony censuses to place the change in call activity into context.</li> <li>4. If 2 and 3 above indicate a project-induced change in the colony or its activity, then review Project activities to identify potential factors resulting in parameter exceedance.</li> <li>5. If Project activity cannot be ruled out as the cause of the exceedance then Project activity within at least 200 m of the K75W Roost will cease, or be modified, until further advice is obtained from DWER.</li> <li>6. Report to DWER within 21 days of becoming aware of the exceedance.</li> <li>7. Develop appropriate mitigation measure(s) and implement within 30 days of the source factor(s) being identified.</li> <li>8. Analyse call activity on a fortnightly basis for 60 days after implementation of the mitigation measure(s) to determine if call activity re-establishes to levels above the criterion threshold.</li> </ol> |

Table 5-3 continued

| Parameter  | Monitoring Location  | Frequency  | Threshold Criteria Management Actions/Contingencies   |
|--|--|--|---|
| <i>Echolocation recordings.</i><br>Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights following implementation of the Trigger Criteria management actions. | Koodaideri Spring Gorge Monitoring Station                               | As above.  | <ol style="list-style-type: none"> <li>1. Examine environmental data (including Koodaideri Spring Gorge water levels) and call activity from the control sites and other regional PLNB data sets to determine whether environmental conditions or regional effects explain the change in call activity.</li> <li>2. Report to DWER within 21 days of becoming aware of the exceedance.</li> <li>3. Review Project activities to identify potential factors resulting in parameter exceedance.</li> <li>4. Identify mitigation measure(s) considering action 2 above.</li> <li>5. Implement identified mitigation measure(s) within 30 days of the exceedance being identified. Where implementation within 30 days is not practical/feasible, advise DWER of alternative achievable timeframe for implementation.</li> <li>6. Analyse call activity on a fortnightly basis for 60 days after implementation of the mitigation measure(s) to determine if call activity re-establishes to levels above the criterion threshold.</li> </ol> |
| <i>PLNB Interaction</i><br>Direct unauthorised ground disturbing activity within the exclusion zones of the K75W Adit/Cave System, the Koodaideri Spring Gorge and KBH12.  | K75W Adit/Cave System, Koodaideri Spring Gorge and KBH12 Exclusion Zones | Ongoing monitoring during pre-construction and operations. Confirmation through annual reconciliation. | <ol style="list-style-type: none"> <li>1. Immediately cease ground disturbance activity within the exclusion zone.</li> <li>2. Report to DWER within 21 days of becoming aware of the exceedance.</li> <li>3. Develop appropriate mitigation measure(s) and implement prior to ground disturbance activities recommencing in the vicinity of the exclusion zone.</li> <li>4. Analyse call activity on a fortnightly basis for 60 days after implementation of the mitigation measure(s) to determine if call activity is within the baseline range.</li> </ol>  |



**Figure 5-1: Flowchart outlining parameter exceedance and management responses for Koodaideri PLNB Monitoring.**

## 5.5 REPORTING PROVISIONS

### 5.5.1 Reporting of Injury or Death of PLNB

It is a Commonwealth requirement that injury to or death of a listed threatened species is reported within seven days to the Department of the Environment and Energy (DotEE). Any recorded PLNB death attributable to Koodaideri Project will be reported to the DotEE and to Department of Biodiversity, Conservation and Attractions (via email address [fauna@dbca.wa.gov.au](mailto:fauna@dbca.wa.gov.au)).

Injured fauna may also be reported to Department of Biodiversity, Conservation and Attractions via the Pilbara Regional Office (Ph: 9182 2000).

### **5.5.2 Annual Reporting**

The environmental outcome will be reported against Trigger and Threshold criteria (Table 5-4) for each calendar year in the Annual Compliance Assessment Report (**ACAR**) for MS 999.

In the event of exceedance of the Trigger and Threshold criteria during the reporting period, the annual report will include a description of the effectiveness of any management contingency actions that have been implemented to manage the impact.

### **5.5.3 Reporting On Exceedance of Trigger and Threshold Criteria**

In the event of a demonstrated exceedance of the Trigger criteria, the Proponent will implement control measures as per this PLNB EMP and will submit details of the exceedance and measures to be implemented to the EPA Services of DWER within 21 days of becoming aware of the exceedance.

In the event of a demonstrated exceedance of the Threshold criteria, the Proponent will implement control measures as per this PLNB EMP and will submit details of the exceedance and measures to be implemented to the EPA Services of DWER within 21 days of becoming aware of the exceedance. The Proponent will continue to implement the measures as per this PLNB EMP until such time as the EPA Services of DWER agrees implementation may cease.

**Table 5-4: Koodaideri PLNB Environmental Management Plan Reporting Table**

| Condition environmental outcome, trigger and threshold criteria  | Reporting on the environmental outcome for 1 January to 31 December as per condition 4-6 of MS 999  | Status                  |
|--|---|-------------------------|
| <p><u>Trigger criteria</u></p> <ol style="list-style-type: none"> <li>1. Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights.</li> <li>2. Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights.</li> </ol> <p><u>Threshold criteria</u></p> <ol style="list-style-type: none"> <li>1. Total nightly calls at the K75W Adit/Cave System remain below 150 for 15 consecutive nights following implementation of the Trigger Criteria management actions.</li> <li>2. Total nightly calls at the Koodaideri Spring Gorge monitoring station remain below 100 for 36 consecutive nights following implementation of the Trigger Criteria management actions.</li> <li>3. Direct unauthorised ground disturbing activity within the exclusion zones of the K75W Adit/Cave System, the Koodaideri Spring Gorge and KBH12.</li> </ol> | <p>The Koodaideri Project has been managed so as to ensure that the Pilbara leaf-nosed bat colony continues to use the important foraging locations of Koodaideri Spring Gorge and the gorge containing KBH12 site and to ensure that the PLNB colony remains in the K75W Adit/Cave System.</p> <p>Trigger criteria</p> <p>-----</p> <p>Threshold criteria</p> <p>-----</p> <p>Notes:</p> <p>The status of achievement of environmental objectives is indicated by the following symbols:</p> <p>■ Environmental outcome achieved</p> <p>● Environmental outcome not achieved</p> | <p>■ or</p> <p>● or</p> |

## **6 ADAPTIVE MANAGEMENT AND REVIEW OF THE PLNB EMP**

The Proponent will implement adaptive management to learn from Early Response reviews, implementation of mitigation measures, monitoring and evaluation against Trigger and Threshold criteria, to more effectively meet the condition environmental outcome. The following approach will be ensured:

- Monitoring data will be systemically reviewed and analysed to determine and understand any trends in the health of the PLNB colony.
- Based on the analysis of this monitoring data, the Proponent will review and adjust the management measures in consultation with the EPA Services of DWER and the Department of Biodiversity, Conservation and Attractions.

Once approved, the Proponent will implement this PLNB EMP in accordance with Condition 7-8 of MS 999. Any future revisions of the PLNB EMP will be submitted for approval and, once approved, will be implemented in accordance with Condition 7-9 and 7-10 of MS 999. The Department of Biodiversity, Conservation and Attractions will be consulted in any future review and update of the PLNB EMP.

## **7 STAKEHOLDER CONSULTATION**

Consistent with expectations for this PLNB EMP to align with the principles of EIA, the Proponent consulted with the Department of Parks and Wildlife (now the Department of Biodiversity, Conservation and Attractions) during the initial development of this PLNB EMP through the provision of the initial draft in August 2015; comments were received in October 2015. This consultation is captured in Appendix 3, which presents the Department of Biodiversity, Conservation and Attractions comments and the Proponent responses outlining how changes were made to the PLNB EMP.

The EPA Services of DWER consolidated additional comments from the Department of Biodiversity, Conservation and Attractions and its own comments (dated April 2017, Issued 11 June 2017) in relation to the October 2016 PLNB EMP. These EPA Services consolidated comments and the Proponent responses to each are also presented in Appendix 3. This PLNB EMP reflects changes made to the document to address issues raised in those consolidated response comments and to incorporate more recent and extended baseline monitoring data.



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## 9 APPENDIX

### Appendix 1: Condition 6-1, 6-2 and 7 of MS 999 and Condition 2 of EPBC 2012/6422

#### MS 999 – Condition 7 Terrestrial Fauna – Pilbara leaf-nosed bat

| Condition | Condition Requirement  |
|-----------|--|
| <b>6</b>  | <b>Terrestrial Fauna (Pilbara leaf-nosed bat)</b>  |
| 6-1       | <p>There shall be no ground disturbing activity within the following exclusions areas:</p> <ol style="list-style-type: none"> <li>1) K75W Adit/Cave System Exclusion Zone, defined by a 100 metres buffer around the predicted lateral extent of the K75W Adit/Cave System. The current K75W Adit/Cave System Exclusion Zone is delineated in Figure 2 of Schedule 1 and defined by the geographic coordinates in Schedule 2.</li> <li>2) Koodaideri Spring Gorge Exclusion Zone, as delineated in Figure 2 of Schedule 1 and defined by the geographic coordinates in Schedule 2.</li> <li>3) KBH12 Exclusion Zone, as delineated in Figure 2 of Schedule 1 and defined by the geographic coordinates in Schedule 2.</li> </ol> |
| 6-2       | Ground disturbing activity shall be limited to linear infrastructure, to a maximum of 5% of the area of the K58W Pilbara leaf-nosed bat Exclusion Zone as delineated in Figure 2 of Schedule 1 and defined by the geographic coordinates in Schedule 2, to the satisfaction of the CEO.  |
| <b>7</b>  | <b>Terrestrial Fauna – Pilbara leaf-nosed bat</b>  |
| 7-1       | The proponent shall ensure that the proposal is implemented in a manner that maintains the K75W Adit/Cave System colony of the Pilbara leaf-nosed bat ( <i>Rhinonictis aurantia</i> .)   |
| 7-2       | Prior to the commencement of mining of the K75W pit the proponent shall prepare and submit a K75W Adit/Cave Structural Report confirming the lateral extent of the K75W Adit/Cave System, to the requirements of the CEO, on advice from the of Parks and Wildlife.  |
| 7-3       | <p>The K75W Adit/Cave System Structural Report required by condition 7-2, shall include:</p> <ol style="list-style-type: none"> <li>1) Geophysical data, or other evidence acceptable to the CEO, of the lateral extent of the main chamber and other lateral passages and side chambers of the K75W Adit/Cave System.</li> <li>2) Advice from an appropriate technical specialist (or specialists) on the most likely lateral extent of the K75W Adit/Cave System.</li> </ol>   |
| 7-4       | Prior to ground-disturbing activities within the Mine/Plant Development Envelope, the proponent shall prepare and submit a Pilbara leaf-nosed bat Management Plan to the requirements of the CEO, on advice from the Department of Parks and Wildlife.   |
| 7-5       | <p>The objectives of the Pilbara leaf-nosed bat Management Plan required by condition 7-4 are to:</p> <ol style="list-style-type: none"> <li>1) Ensure that the bat colony continues to use the important foraging locations of Koodaideri Spring Gorge and the gorge containing the KBH12 site, as delineated in Figure 2 of Schedule 1 and defined by the geographic coordinates in Schedule 2.</li> <li>2) Ensure that the population of the Pilbara leaf-nosed bat colony as defined in condition 7-6(1) remains in the K75W Adit/Cave System as defined by condition 7-2.</li> </ol>  |
| 7-6       | The Pilbara leaf-nosed bat Management Plan shall include:  |

| Condition | Condition Requirement   |
|-----------|---|
|           | <ol style="list-style-type: none"> <li>1) A baseline survey utilising ultrasonic bat call detection methods to determine the population size of the Pilbara leaf-nosed bat colony which roosts within the K75W Adit/Cave System and delineate the baseline distribution of bat movement and foraging activity between the K75W Adit/Cave System and the Koodaideri Spring Gorge and the gorge containing the KBH12 site.</li> <li>2) Protocols and procedures to monitor activity levels of Pilbara leaf-nosed bats foraging at the Koodaideri Spring Gorge and the gorge containing the KBH12 site.</li> <li>3) Protocols and procedures to monitor the Pilbara leaf-nosed bat movement and foraging activity between K75W Adit/Cave System and the Koodaideri Spring Gorge during the development of Pit K58W.</li> <li>4) Protocols and procedures to monitor Pilbara leaf-nosed bat behaviour as the proposal's activities move to within 400 metres of the K75W Adit/Cave System Exclusion Zone required by condition 6-1 during the development of Pit K75W.</li> <li>5) Specific management protocols to enable the Pilbara leaf-nosed bat to adapt to impacts of construction and operation including a schedule of clearing of bat foraging habitat within the K58W mine pit and K75W mine pit taking into account the requirements of conditions 7-6(1), 7-6(2), 7-6(3), and 7-6(4).</li> <li>6) Criteria to trigger implementation of management or contingency measures to prevent disturbance to the Pilbara leaf-nosed bat colony within the K75W Adit/Cave System during drilling and blasting required for the development of Pit K75W.</li> <li>7) Criteria to trigger implementation of management or contingency measures to respond to a reduction of Pilbara leaf-nosed bat foraging calls at the gorge containing the KBH12 site and the Koodaideri Spring Gorge to levels below baseline during mining of Pits K75W and K58W.</li> <li>8) Management and or contingency measures to be implemented in the event that the trigger criteria required by condition 7-6(6) and/or condition 7-6(7) have been reached.</li> </ol> |
| 7-7       | <p>In the event that monitoring carried out under the Pilbara leaf-nosed bat Management Plan required by conditions 7-6(1), 7-6(2), 7-6(3) and 7-6(4) indicates trigger criteria required by condition 7-6(6) and 7-6(7) have been reached the proponent shall:</p> <ol style="list-style-type: none"> <li>1) Investigate to determine the likely cause (s) of the criteria required by condition 7-6(6) and/or 7-6(7) being exceeded.</li> <li>2) If the exceedance is likely to be the result of activities undertaken in implementing the proposal, implement management and/or contingency measures required by condition 7-6(8) and continue implementation until criteria required by condition 7-6(6) and/or 7-6(7) are being met, or until otherwise agreed by the CEO.</li> <li>3) Provide a report that describes the investigation required by condition 7-7(1) and measures required by condition 7-7(2) to the CEO within 21 days of identification that criteria required by condition 7-6(6) and/or 7-6(7) has been exceeded.</li> </ol>   |
| 7-8       | After receipt of written advice from the CEO that the Pilbara leaf-nosed bat Management Plan satisfies conditions 7-5 and 7-6, the proponent shall implement the Pilbara leaf-nosed bat Management Plan.  |
| 7-9       | Revisions to the Pilbara leaf-nosed bat Management Plan may be approved by the CEO.   |
| 7-10      | The proponent shall implement approved revisions of the Pilbara leaf-nosed bat Management Plan required by condition 7-4.   |
| 7-11      | The proponent shall report to the CEO on the outcomes of the implementation of the  |

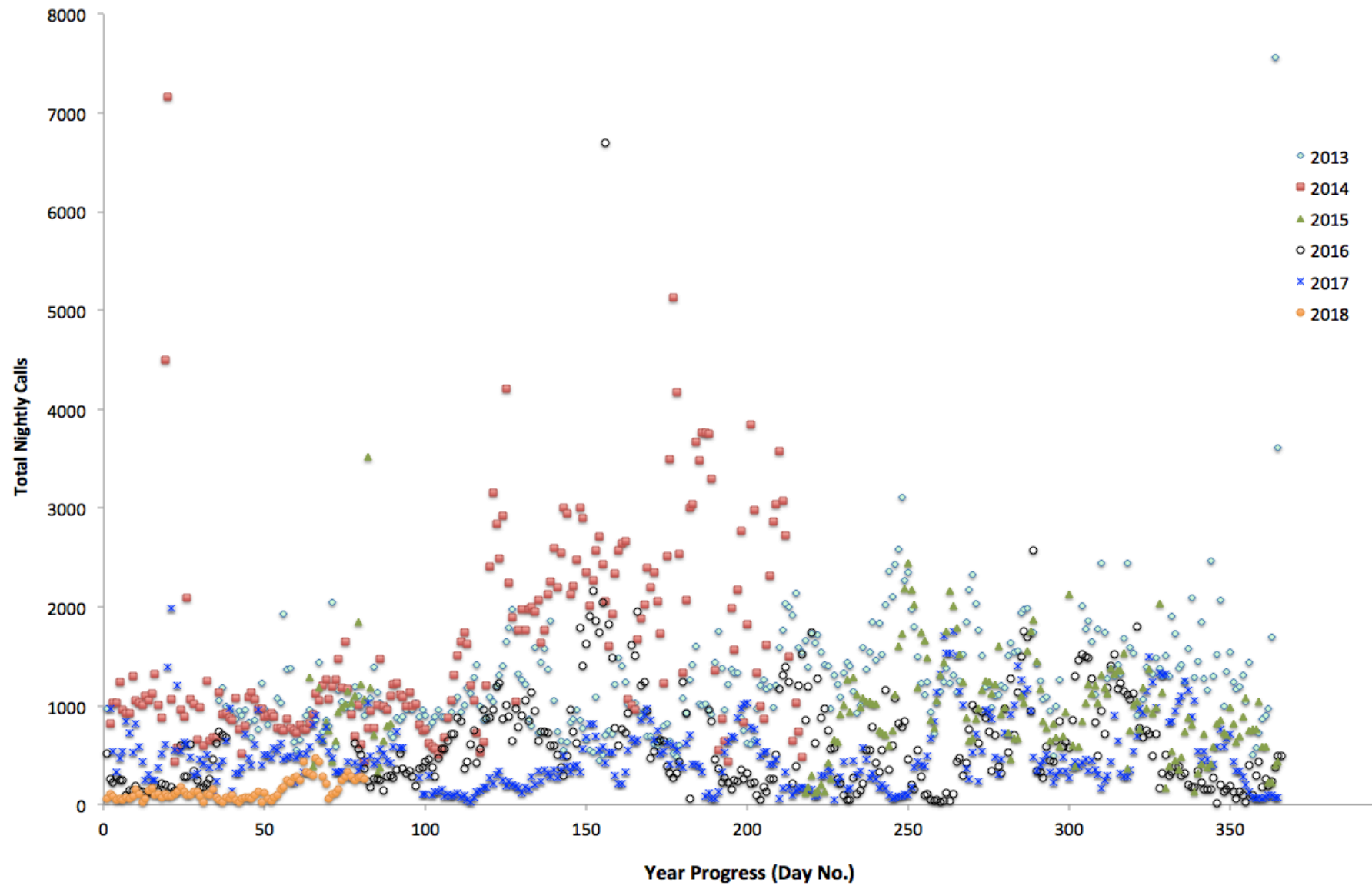
| Condition | Condition Requirement   |
|-----------|---|
|           | <p>Pilbara leaf-nosed bat Management Plan. The report to the CEO shall include:</p> <ol style="list-style-type: none"> <li>1) The activity levels of the Pilbara leaf-nosed bats using the Koodaideri Spring Gorge and the gorge containing the KBH12 site.</li> <li>2) An assessment of the stability of the K75W Adit/Cave System.</li> <li>3) An assessment of the baseline and current population size of the K75W Adit/Cave System Pilbara leaf-nosed bat colony.</li> <li>4) Evidence that the population size of the K75W Adit/Cave System colony of Pilbara leaf-nosed bat has been maintained within natural variation.</li> <li>5) Outcomes of the monitoring undertaken in accordance with the Pilbara leaf-nosed bat Management Plan to assess behaviour and movement of the Pilbara leaf-nosed bat as the proposal's activities move within 400 metres of the K75W Adit/Cave System Exclusion Zone.</li> </ol> |

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| Condition | Condition Requirement   |
|-----------|---|
| 2         | <p>For the better protection of the Pilbara leaf-nosed bat, northern quoll, olive python (Pilbara subspecies) and Hamersley Lepidium, the approval holder must comply with:</p> <ol style="list-style-type: none"> <li>a) Conditions 6-1, 6-2 (Terrestrial Fauna – Pilbara leaf-nosed bat) of the Western Australian Approval.</li> <li>b) Conditions 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 7-9, 7-10, 7-11 (Terrestrial Fauna – Pilbara leaf-nosed bat) of the Western Australian Approval.</li> <li>c) Conditions 8-1, 8-2, 8-3, 8-4, 8-5, 8-6 (Terrestrial Fauna – Northern Quoll Management Plan) of the Western Australian Approval.</li> <li>d) Condition 9-1 (Flora – Hamersley Lepidium (<i>Lepidium catapycnon</i>)) of the Western Australian Approval.</li> <li>e) Condition 11-1, 11-2, 11-3, 11-4, 11-5 (Flora and Hydrological Processes – Koodaideri Spring Adaptive Management Plan) of the Western Australian Approval.</li> </ol> |



Appendix 2: Total nightly PLNB calls recorded at the K75W Adit/Cave System from February 2013 to March 2018



**Appendix 3: Responses to EPA Services of DWER comments – letter dated 13 June 2017****Attachment 1: OEPA assessment of Pilbara Leaf-nosed Bat Management Plan**

| <b>Parks and Wildlife comments<br/>30 Oct 2015</b>  | <b>Mount Bruce Mining response<br/>14 Dec 2015</b>   | <b>Parks and Wildlife comments<br/>23 Feb 2016 (Draft EMP Nov 2015)</b>  | <b>OEPA comments, April 2017<br/>(Draft EMP Oct 2016)</b>   | <b>Mount Bruce Mining response<br/>July 2018 (PLNB EMP July 2018)</b>   |
|---|--|--|---|---|
| <p><i>Conditions:</i></p> <p>7-2 Prior to the commencement of mining of the K75W pit the proponent shall prepare and submit a K75W Adit/cave System Structural Report confirming the lateral extent of the K75W Adit/cave System, to the requirements of the CEO, on advice from the Department of Parks and Wildlife.</p> <p>7-5 The objectives of the Pilbara Leaf-nosed Bat Management Plan required by condition 7-4 are to:</p> <p>7-5(2) ensure that the population of the Pilbara Leaf-nosed Bat colony as defined by condition 7-6(1) remains in the K75W Adit/cave System as defined in by condition 7-2.</p>  |  |  |   |   |
| <p>Section 4.3, p. 16 states that “<i>the work and report to better map the main cavern and other lateral passages and side chambers of the K75W Roost...is not required until the commencement of mining at k75W, approximately 4-5 years after mining commences at k58W</i>”. While this is a reasonable statement this section of the plan does not offer any explanation of potential outcomes from this work. For example, it is unclear if the current 100m exclusion zone and 400m monitoring buffer will be modified if the cave survey work identifies new passages and chambers. Section A1.1 of Appendix 2 indicates that “<i>Given these indications that the cave system may be expanded to the west of the known main cavern, the exclusion zone will be amended...This will minimise the potential for impact to the Adit/cave System.</i>” It is recommended that reference to the potential changes to exclusion/buffer zones is included in the plan rather than in the appendix.</p> | <p>Text on the work conducted to date moved from Appendix 2 to Section 4.3. The potential changes to exclusion/buffer zones now included</p> <p>Text added to Section 4-3 amending the Exclusion Zone in response to any extension to the main cavern and laterals resulting from the additional survey work</p> | <p>Parks and Wildlife’s previous comment has been addressed.</p>   | <p>No further work is required.</p>   | <p>Text on the work conducted to date is provided in Section 4.5.</p> <p>Text added to Section 4.5 confirming that the Exclusion Zone would be amended in response to any determined extension to the main cavern and laterals resulting from additional survey work.</p>   |
| <p><i>Condition:</i></p> <p>7-6(1) A baseline survey utilizing ultrasonic bat call detection methods to determine the populations size of the Pilbara Leaf-nosed Bat Colony which roosts within the K75W Adit/cave System and delineate the baseline distribution of bat movement and foraging activity between the k75W Adit/cave System and the Koodaideri Spring Gorge and the gorge containing the KBH 12 site;</p>   |  |  |   |   |
| <p>Section 4.3, p. 16 states that “<i>further survey work will be undertaken to confirm the extent of the main cavern and other lateral passages</i>” this and other important baseline survey information (e.g. bat population size, bat behavior, distribution of bat movements, foraging activity, etc.) should be included in the plan once available;</p>  | <p>This information will be added to the PLNB MP once it becomes available</p>   | <p>Parks and Wildlife’s previous comment does not appear to have been fully addressed.</p> <p>The plan does not appear to meet the requirement of Condition 7-6(1) under MS 999.</p> <p>The condition requires the plan to include baseline survey information on bat population size and foraging activity at the site.</p> | <p>It would appear that in accordance with 7-6(1) baseline surveys have been conducted to determine the population size of the Pilbara Leaf-nosed Bat colony and map the movement and foraging activity (Section 3.2). Section 3.1 defines the size of the population as over 400 individuals. Section 5.2 provides mean and median nightly call levels at the K75W Adit/Cave System.</p> <p>Baseline information on foraging routes and activity are provided in sections 3.3 and 3.4.</p> <p>Include the survey reports as attachments.</p> | <p>Baseline surveys have been conducted between February 2013 and March 2018 (and is ongoing) to determine the population size of the Pilbara Leaf-nosed Bat (PLNB) colony as measured by call activity (Section 3.2 and Section 5.2.1).</p> <p>Baseline information of movement and foraging activity using SM4 units has been mapped and discussed in Section 3.3 and Section 3.4. An additional alternative method (to individually track movements of a subset of the Koodaideri PLNB population via coded VHF transmitters) is also scheduled to be trialled in late 2018 with data available from early 2019 which can be reported on in later revisions to the PLNB EMP. Section 3.1 defines the size of the colony as over 400 individuals.</p> |

| Parks and Wildlife comments<br>30 Oct 2015  | Mount Bruce Mining response<br>14 Dec 2015  | Parks and Wildlife comments<br>23 Feb 2016 (Draft EMP Nov 2015)  | OEPA comments, April 2017<br>(Draft EMP Oct 2016)   | Mount Bruce Mining response<br>July 2018 (PLNB EMP July 2018)   |
|---|---|--|---|---|
|   |   |  |   | <p>Section 5.2 provides mean and median nightly call levels at the K75W Adit/Cave System. Appendix 2 shows total nightly call data recorded between February 2013 and March 2018 at the K75W Adit/Cave System.</p> <p>The reports on the PLNB baseline long-term monitoring and the PLNB movement/foraging activity are provided with the PLNB EMP as attachments for supplementary information.</p>  |
| 7-6(2) protocols and procedures to monitor activity levels of Pilbara Leaf-nosed Bats foraging at the Koodaideri Spring gorge and the gorge containing the KBH12 site;  |   |  |   |   |
|   |   |  | <p>This is mentioned in Tables 5-2 and 5-3 (echolocation recordings and habitat changes). However this would benefit from a section similar to 4.4.1 (Monitoring of 400m buffer), which addresses the management protocols and procedures to monitor Pilbara Leaf-nosed Bat behaviour within the K75W cave.</p> | <p>Section 4.4.1 outlines additional monitoring of the 400m buffer at the K74W roost during operational activities. Specifically, this entails acoustic recordings and humidity monitoring inside the roost main chamber. The spring gorge and site KBH12 are not conducive to such additional monitoring beyond the currently installed acoustic monitoring stations.</p> <p>Protocols and procedures of the current monitoring stations are presented in Section 3.2 and Section 4.4 indicates that current bat monitoring stations will be maintained.</p> |
| 7-6(3) protocols and procedures to monitor the Pilbara Leaf-nosed Bat movement and foraging activity between K75W Adit/cave System and the Koodaideri Spring Gorge during development of Pit K58W;  |   |  |   |   |
|   |   |  | <p>This does not appear to have been addressed in the management plan.</p>  | <p>This has now been more fully addressed in Section 3.3.</p>   |
| <p><i>Condition:</i></p> <p>7-6(4) protocols and procedures to monitor Pilbara Leaf-nosed Bat behavior as the proposal's activities move to within 400 meters of the K75W Adit/cave System Exclusion Zone required by condition 6-1 during the development of the Pit K75W;</p>   |   |  |   |   |
| <p>Table 5.2, p. 25 indicates that monitoring will be undertaken when project activities occur within the "...400m of K75W Adit/cave System Exclusion Zone..." at a frequency of "As required". It is currently unclear how frequent the monitoring of the colony will be if activities occur within 400m of K75W Adit/cave System Exclusion Zone. The frequency of "As required" should be defined or further explained.</p> | <p>Text in Table 5.2 amended to clarify that monitoring will be continuous once Project activity approaches inside the 400 m live monitoring buffer</p> | <p>Parks and Wildlife's previous comment has been addressed.</p> | <p>There has been a slight change in wording of Table 5.2 (see below). This does not appear to change the intent of the condition.</p> <p>No further information is required.</p> <p>Table 5.2 EMP Nov 2015</p> <p>Monitoring location - <u>&lt;500 m from K75W adit/cave</u></p>                               | <p>No further amendments made. This is addressed in Section 4.4.1 and Section 4.5.</p>  |

| Parks and Wildlife comments<br>30 Oct 2015  | Mount Bruce Mining response<br>14 Dec 2015 | Parks and Wildlife comments<br>23 Feb 2016 (Draft EMP Nov 2015) | OEPA comments, April 2017<br>(Draft EMP Oct 2016)  | Mount Bruce Mining response<br>July 2018 (PLNB EMP July 2018)  |
|---|--|---|--|--|
|   |  |   | <p>Trigger/management – continuous monitoring <u>once project activity approaches within 400 m of the K75W adit/cave.</u></p> <p>Table 5.2 EMP Oct 2016</p> <p>Monitoring location - <u>within 400 m monitoring buffer.</u></p> <p>Trigger/management - continuous monitoring of noise, vibration and call data <u>once Koodaideri Project activity occurs within the 400m buffer.</u></p> |  |
|   |  |   | The requirement of condition 7-6(4) appears to have been addressed on section 4.4.1.   |  |
| 7-6(5) Specific management protocols to enable the Pilbara Leaf-nosed Bat to adapt to impacts of construction and operation including a schedule of clearing of bat foraging habitat within the K58W mine pit and K75W mine pit taking into account the requirements of conditions 7-6(1), 7-6(2), 7-6(3) and 7-6(4); |  |   |  |  |
|   |  |   | <p>Staged clearing is mentioned in Section 4.3 and Table 4-1 mentions some management actions for impacts from artificial light, dust, water management.</p> <p>Clarify what “specific Management protocols to enable the Pilbara Leaf-nosed Bat to adapt to impacts of construction and operation” have been developed.</p>   | <p>A revised Section 4.3 states that clearing for the main development infrastructure will commence upon start of construction and will occur in parallel with the initial mine pit development; all infrastructure will be established in a single construction timeframe, except those facilities associated with future wet processing.</p> <p>Clearing for mine pit development will be staged to firstly commence at K58W, then K75W and then K38W. Mine pit development scheduling and hence clearing sequencing has been prepared for K58W and K75W, with preliminary planning completed for K38W.</p> <p>Preliminary sequential staged development of K58W and K75W mine pit developments are depicted in the PLNB EMP. The mining/clearing timeframe for K38W, K58W and K75W are also provided.</p> <p>Also, a list of specific management protocols/actions to enable the PLNB to adapt to potential impacts of construction and operation to be adopted is provided in Section 4.</p> |

| Parks and Wildlife comments<br>30 Oct 2015  | Mount Bruce Mining response<br>14 Dec 2015  | Parks and Wildlife comments<br>23 Feb 2016 (Draft EMP Nov 2015)   | OEPA comments, April 2017<br>(Draft EMP Oct 2016)  | Mount Bruce Mining response<br>July 2018 (PLNB EMP July 2018)   |
|---|---|---|--|---|
| <p><i>Conditions:</i><br/>7-6(6) criteria to trigger implementation of management or contingency measures to prevent disturbance to the Pilbara Leaf-nosed Bat colony within the K75W Adit/cave System during drilling and blasting required for the development of Pit K75W.</p> <p>7-6(7) criteria to trigger implementation of management or contingency measures to respond to a reduction of Pilbara Leaf-nosed Bat foraging calls at the gorge containing the KBH12 site and the Koodaideri Spring gorge to levels below baseline during mining of Pits K75W and K58 W; and</p> |   |   |  |   |
| <p>Section 5.3, p. 26 indicates that “<i>formal statistical criteria for the triggering of management actions will be established following the collection and analysis of all baseline monitoring data and will be documented in a future review of this PLNB MP</i>”. This information is a key aspect of the plan and should be included for review as a part of the plan.</p>   | <p>Formal triggers added. A proviso added for future refinement of the triggers, when more baseline data becomes available.</p> | <p>Parks and Wildlife’s previous comment does not appear to have been fully addressed.</p> <p>The trigger criteria included in the plan are not all measurable and require further information / clarification. Information from further baseline survey/s on population and foraging behaviour is required to inform the development of specific and measurable trigger criteria, management responses and contingency actions.</p> <p>The plan therefore does not appear to meet the requirements of Conditions 7-6 (6), (7), (8) and 7-7 under MS 999.</p> | <p>Some trigger criterial in the Summary Table, and Tables 5-1, 5-2, 5-3 and 5-4 continue to be unmeasurable, for example:</p> <ul style="list-style-type: none"> <li>• <b>Early response criteria in Table 5-1</b><br/>“increase in the number of Koodaideri project and PLNB interactions”<br/><i>Define interaction. It is noted that a baseline would be needed for an increased number of interactions. When would a measureable number of increased activity be included in the management plan?</i></li> <li>• <b>Trigger and Threshold criteria in Tables 5-2 and 5-3</b><br/>“increased diurnal activity at the K75W Adit/cave System”.<br/><i>How is “increased diurnal activity” defined?</i></li> <li>• <b>Trigger and Threshold criteria in Table 5-2 and 5-3</b><br/>“call numbers at the Koodaideri Spring Gorge and/or KBH12 are consistently below the normal baseline range (between 117 and 125 kHz).”<br/><i>What is the measurement for “consistently”?</i></li> <li>• <b>Threshold criteria in Summary Table and Table 5-4</b><br/>“substantial diurnal activity indicative of large scale disturbance”<br/><i>How is this measured/defined?</i></li> </ul> <p>It is also noted that trigger and threshold criteria are not consistent between the Summary Table and Table 5-4 (Reporting), and Tables 5-2 (Trigger criteria monitoring and management actions) and 5-3 (Threshold criteria monitoring and contingency actions).</p> | <ul style="list-style-type: none"> <li>• <b>Early response criteria in Table 5-1</b><br/>The definition of “interaction” is now clarified in Section 4.</li> <li>The number of PLNB interactions forming an Early Response criterion is defined in Table 5-1.</li> <li>• <b>Trigger and Threshold criteria in Tables 5-2 and 5-3</b><br/>“Diurnal activity” has been removed due to perceived limitations on adequately and continuously monitoring or detecting daylight departures of PLNB.</li> <li>• <b>Trigger and Threshold criteria in Table 5-2 and 5-3</b><br/>Added early trigger criterion for the Koodaideri Spring (discussed in Section 5.2.2). Quantitative trigger criteria for Koodaideri Spring included in Table 5-2 and Table 5-3.</li> <li>Data for KBH12 is limited and as a result a meaningful baseline range cannot yet be determined. Monitoring is continuing at KBH12 and it is only now that reliable baseline data is being obtained for that monitoring station. Appropriate baseline data will be obtained well in advance of any project activity at the K75W pit. Future revisions to the PLNB EMP will provide a baseline range for KBH12.</li> <li>• <b>Threshold criteria in Summary Table and Table 5-4</b><br/>“Diurnal activity” has been removed due to perceived limitations on adequately and continuously monitoring or detecting daylight departures of PLNB.</li> <li>Any inconsistencies in trigger and threshold criteria between tables (Table 5-1 to Table 5-3) have been rectified.</li> </ul> |



| Parks and Wildlife comments<br>30 Oct 2015  | Mount Bruce Mining response<br>14 Dec 2015  | Parks and Wildlife comments<br>23 Feb 2016 (Draft EMP Nov 2015)   | OEPA comments, April 2017<br>(Draft EMP Oct 2016) | Mount Bruce Mining response<br>July 2018 (PLNB EMP July 2018)  |
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| Section 5.3.3, p.27 provides “three examples of compliance criteria that would trigger substantial additional management or contingency actions...” The reason for providing only three examples in the plan should be further explained. The plan should include all proposed compliance criteria for review as a part of the plan.  | Wording amended to be more prescriptive regarding trigger criteria  | <p>Parks and Wildlife’s previous comment does not appear to have been addressed.</p> <p>The compliance criteria proposed in section 5.3.3 and Table 5.3 are not measurable (e.g. “increased diurnal activity at the roost indicative of large-scale disturbance”). The management responses are also unclear and non-prescriptive (e.g. “modify procedures to mitigate impacting factor”) and the timing of implementation is not included in the plan.</p> <p>Section 5.3.3.2 also suggests artificial habitat construction will be used as a management response for bats abandoning the K75 roost. There is little information provided to demonstrate how this will be implemented and its likely level of success. The use of artificial habitat is not included in Table 5.3 as a management response.</p> <p>Given current uncertainties, the plan does not appear to meet the requirements of Conditions 7-6 (6), (7), (8), and 7-7 under MS 999.</p> | See comments above.                               | <p>Reference to “diurnal activity” has been removed from the PLNB EMP for the reasons stated above. Reference to the creation of an artificial habitat has been removed from the PLNB EMP. The environmental offset payments to be made by the Proponent could be used to create an artificial PLNB habitat for regional learnings by all mining operations in the Pilbara should that option be considered beneficial.</p> <p>The Proponent believes the current revised PLNB EMP now meets the intent and requirements of condition 7-6(6), (7), (8) and 7-7 under MS 999.</p> |
| <p>Table 5.3 is unclear. While the table does provide some useful information, in most cases it does not provide:</p> <ul style="list-style-type: none"> <li>Enough detail (i.e. specifics) for trigger events, responses, outcomes and follow-up;</li> <li>A specific indication of when an event triggers a management response; and</li> <li>Implementation timelines for management responses and follow-up.</li> </ul> | Table 5.3 updated to include more specific triggers. Timelines for assessing and reporting on management responses added to Table 5.3 where appropriate | <p>Parks and Wildlife’s previous comment has not been fully addressed.</p> <p>As mentioned above, many of the proposed trigger criteria in Table 5.3 are unmeasurable and require further detail. The proposed management responses and contingency measures are unclear and non-prescriptive, particularly in relation to the proposed timing associated with the implementation of management responses.</p> <p>Further detail is required on the proposed trigger criteria, management responses and contingency actions in the plan to demonstrate that the plan meets the requirements of Conditions 7-6 (6), (7), (8) and 7-7 under MS 999.</p>   | See comments above.                               | Refer above responses.   |

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| <p><i>Condition:</i><br/>7-6(8) management and or contingency measures to be implemented in the event that the trigger criteria required by condition 7-6(6) and/or condition 7-6(7) have been reached.</p>  |  |   |  |   |
| <p>Section 5.3.2, p. 27 states that “<i>Management criteria and responses will be defined more fully in a future revision of this PLNB MP</i>” this information is a key aspect of the plan and should be included for review as a part of the plan. It is likely that some management responses may require a short (swift) implementation to avoid/minimise any potential impacts, therefore, it is important that these criteria and responses are fully defined.</p> | <p>Management criteria now more fully defined. It is not possible to detail the management responses to all possible disturbance scenarios; rather, the appropriate management response will be developed tailored to the specific source of disturbance when identified</p> | <p>Parks and Wildlife’s previous comment does not appear to have been fully addressed.</p> <p>Trigger criteria in section 5.3.2 and Table 5.3 are not all measurable and require further information / clarification. The commitment to and timing of implementing management responses (e.g. changes to construction or operational activities) is unclear in the plan, and the timeframe for implementing a management response is unclear.</p> <p>Given the current uncertainties, the plan does not appear to meet the requirements of Conditions 7-6 (6), (7), (8) and 7-7 under MS 999.</p> | <p>Management responses to triggers remain unclear as:</p> <ul style="list-style-type: none"> <li>The timing of early response (Table 5-1), trigger management actions (Table 5-2), and threshold contingency actions (Table 5-3) generally do not provide any timing of implementation.</li> <li>Examples of possible management measures provided in the Summary Table should also be provided in Table 5-2 and 5-3.</li> <li>The contingency actions such as “project activity closest to K75W Roost to be temporarily ceased/limited where practicable” are ambiguous in Table 5-3.</li> </ul> <p>The Summary Table states that an artificial habitat that may be constructed as part of a threshold criteria contingency action. Further discussion of this should be made in the management plan as the success of this type of endeavour is currently unproven.</p> | <p>Wherever it is applicable or possible, timing of management actions/contingencies has been provided in Table 5-1, Table 5-2 and Table 5-3.</p> |
| <p>Section 5.3.3.1, p. 28 indicates that “<i>management actions would be developed and implemented in consultation with the OEPA and the Department of Parks and Wildlife...</i>” while it is recognised that Parks and Wildlife should be consulted in the development and implementation of management actions, the management actions should be included for review as a part of the plan.</p>  | <p>The consultation referred to in this statement is currently being implemented through the review of the draft PLNB MP by the Department of Parks and Wildlife and incorporation of revisions. The management actions are included in the PLNB MP</p>                      | <p>As mentioned above, the proposed management responses in the plan are non-prescriptive, unclear, and are linked to unmeasurable trigger criteria.</p> <p>Further consultation with Parks and Wildlife may be necessary to assist the proponent in developing the management measures to be included in the plan in order to meet the requirements of MS 999.</p>   | <p>Further consultation with Parks and Wildlife may be necessary to assist the proponent in developing the management measures to be included in the plan in order to meet the requirements of MS 999.</p>   | <p>Reference to the creation of an artificial habitat has been removed (for the reason stated above).</p>   |

| Parks and Wildlife comments<br>30 Oct 2015  | Mount Bruce Mining response<br>14 Dec 2015  | Parks and Wildlife comments<br>23 Feb 2016 (Draft EMP Nov 2015) | OEPA comments, April 2017<br>(Draft EMP Oct 2016)   | Mount Bruce Mining response<br>July 2018 (PLNB EMP July 2018)  |
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| <p>7-7 in the event that monitoring carried out under the Pilbara Leaf-nosed Bat Management Plan required by conditions 7-6(1), 7-6(2), 7-6(3) and 7-6(4) indicates trigger criteria required by condition 7-6(6) or 7-6(7) have been reached the proponent shall:</p> <p>(1) investigate to determine the likely cause(s) or the criteria required by condition 7-6(6) and/or 7-6(7) being exceeded;</p> <p>(2) if the exceedance is likely to be the result of activities undertaken in implementing the proposal implement management and/or contingency measures required by condition 7-6(8) and continue implementation until criteria required by condition 7-6(6) and/or 7-6(7) are being met, or otherwise agreed by the CEO; and</p> <p>(3) provide a report that describes the investigation required by condition 7-7(1) and measures required by condition 7-7(2) to the CEO within <b>21 days</b> of identification that criteria required by condition 7-6(6) and/or 7-6(7) has been exceeded.</p> |   |   |   |  |
| Section 5.4, p. 28 refers to reporting Pilbara Leaf-nosed Bat ( <i>Rhinonictis aurantia</i> ) deaths/mortalities. This information can be reported to Parks and Wildlife via the generic fauna email address <a href="mailto:fauna@dpaw.wa.gov.au">fauna@dpaw.wa.gov.au</a> and injured fauna should be reported to Parks and Wildlife via the Pilbara Regional Office (Ph: 9182 2000).   | This additional information provided by the Department of Parks and Wildlife now added to Section 5.4 | Parks and Wildlife's previous comment has been addressed.       |   |  |
|   |   |   | Table 5-3 states that an exceedance of threshold criteria will be reported to the OEPA within seven days. This differs from the 21 day reporting requirement as stated in Summary Table and the condition 7-7(3). | Amended Table 5-3 (and throughout the PLNB EMP) to reflect the 21-day reporting requirement as stated in condition 7-7(3). |