

22 May 2024

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From	Dylan Goldspink	Project No.	12637107
Project Name	Alcoa Myara Terrestrial Fauna Assessments		
Subject	Myara pre-clearance targeted fauna assessment		

1. Introduction

Alcoa of Australia Limited's (Alcoa) Western Australian (WA) mining operations comprise the Huntly and Willowdale bauxite mines, which are located in Alcoa's Mining Lease 1SA (ML1SA) within the Northern Jarrah Forest (NJF) IBRA subregion.

Alcoa has approval to mine within ML1SA subject to submitting draft five-year mine plans and associated environmental management programmes known as the Mining and Management Program (MMP). The MMP is submitted to the State's Mining and Management Program Liaison Group (MMPLG) on an annual basis. Areas which are approved for clearing via this process are included in Forest Clearance Advice (FCA) which are approved as clearance envelopes.

1.1 Purpose of this Memorandum

The Purpose of the memorandum is to summarise the methodology and the survey results of the targeted pre-clearance assessment for Myara site.

1.2 Survey Areas

The Survey Areas (labelled 1 to 5 from East to West) are located in the Huntly Mine area within the Myara Region of the Southwest of Western Australia (WA), Appendix A, Figure 1. The area is approximately 30 kilometres (km) southeast from the township of Jarrahdale in the Peel Region of WA. The Survey Areas are split into two types: a Targeted Fauna Survey (Sites 1 -5) comprising of 185.7 hectares (ha) and a targeted Black Cockatoo Assessment covering 10.3 ha (bordering site 3), as shown on Figure 1, Appendix A.

1.3 Scope and limitations

The Scope of works was as follows:

- Undertake targeted assessment to identify significant fauna constraints focusing on Significant fauna: Chuditch, Woylies and Quokka.
- Targeted Black Cockatoo Assessment, to assess the quality and extent of breeding, roosting and foraging habitat and to identify Black Cockatoo breeding trees and trees of significance.
- Prepare a standalone memorandum which summarises findings (this document)
- Prepare a Technical Report with desktop assessment.
- Prepare a data package of the survey results for the Index of Biodiversity Surveys for Assessments (IBSA) submission. Submitted to Alcoa electronically as part of the reporting package.

This technical memorandum has been prepared by GHD for Alcoa of Australia Limited. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or

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incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

Accessibility of documents

If this Technical Memorandum is required to be accessible in any other format this can be provided by GHD upon request and at an additional cost if necessary.

2. Method

2.1 Survey timing and personnel.

The Survey conducted during March – May 2024 and was led by GHD Zoologist Dylan Goldspink and accompanied by Zoologist Melissa Wood. The Hollow assessments was conducted by GHD Principal Zoologist Glen Gaikhorst and Dylan Goldspink. A breakdown of the field assessments is presented in Table 2.1.

Table 2.1 Survey Timing and Personnel

Date	Task	Personnel
Black Cockatoo habitat assessment and Remote camera deployment 08/04/2024 - 12/04/2024	Black Cockatoo Habitat Assessment identifying Black Cockatoo trees of a suitable Diameter at breast height (DBH). Deployment of remote cameras.	Dylan Goldspink Melissa Wood
Black Cockatoo Hollow Assessment 17/04/2024	Hollow assessment of potential hollows recorded.	Glen Gaikhorst Dylan Goldspink
Camera Collection 13/05/2024 - 14/05/2024	Camera collection	Dylan Goldspink Melissa Wood

2.2 Field survey

2.2.1 Targeted Remote Camera

Targeted remote cameras were deployed within the Survey Areas. A total of 25 Reconyx remote cameras were deployed within all five Survey Areas, with a minimum 400 m apart (dependent on habitat availability). The remote cameras were baited with a combination of sardines, tuna and peanut butter and were deployed to target significant fauna; Chuditch (*Dasyurus geoffroii*), Quokka (*Setonix brachyurus*), Woylies, (*Bettongia penicillate ogilbyi*). For each remote camera deployed, the time and date deployed and collected, as well as the GPS coordinates were recorded and presented in Table 2.2.

Data (images/video) was collected to SD cards and downloaded in office to database. Images were then screened for fauna species present and identified to species level. Where species level could not be achieved then species group, or best determination to highest taxonomic level was made. Species recorded was classified as an event with one event occurring every 24 hours (dusk to dawn) unless individual specimens could be identified (i.e. Chuditch with unique spot arrangement or animal sizes or injury marks). By restricting data to one event every 24 hours assumes some level of independence over each observation event.

All significant and non-significant terrestrial fauna species were identified and added to the species list presented in Appendix B.

Chuditch Camera Capture (*Dasyurus geoffroii*) Physical Assessment data

Spot patterns of Chuditch were examined in detail and used to identify individuals from camera trap photographs. To use these patterns to identify individuals, accurate and proportionate sketches were made of the top of the head, back, left and right sides of individual Chuditch from the photographs taken by the remote cameras. Each sketch aimed to provide a useful summary that strongly aided subsequent recognition of individuals (Hohnen et al 2015). The spot patterns were examined to determine whether the Chuditch in question was new or a previously viewed individual. Often two or more key spot patterns were visible in a photograph of a single side (e.g. one group on the shoulder and one on the haunch). When these key collections of spots could be matched and no area of the coat had con-complementary patterns, it was deemed to be the same individual. Therefore, a clear view of a single side was sufficient to confirm the identify of the individual, if that individual had been previously identified. Only good quality images

showing two or more clear spot patterns were used for identification and photographs with obscured or blurred patterns were not used (Hohnen et al 2015).

Table 2.2 Targeted Camera deployment.

Survey Area	Camera	Habitat type	Latitude	Longitude	Date Deployed	Date Collected	Nights deployed
Survey Area 1	CAM Yalgoo	Jarrah -Marri forest	-32.5034	116.1023	8/04/2024	13/05/2024	35
	CAM 28	Jarrah -Marri forest	-32.503	116.1051	8/04/2024	13/05/2024	35
	CAM W1	Jarrah -Marri forest	-32.5003	116.1114	8/04/2024	13/05/2024	35
	CAM 31	Jarrah -Marri forest	-32.5038	116.0985	8/04/2024	13/05/2024	35
	CAM X2	Jarrah -Marri forest	-32.5023	116.1081	8/04/2024	13/05/2024	35
Survey Area 2	CAM W9	Jarrah -Marri forest	-32.4917	116.2054	9/04/2024	13/05/2024	34
	CAM X3	Jarrah -Marri forest	-32.4939	116.2112	9/04/2024	13/05/2024	34
	CAM HF12	Jarrah -Marri forest	-32.498	116.2069	9/04/2024	13/05/2024	34
	CAM R59	Jarrah -Marri forest	-32.4947	116.2071	9/04/2024	14/05/2024	35
	CAM R41	Jarrah -Marri forest	-32.4919	116.2023	9/04/2024	13/05/2024	34
Survey Area 3	CAM X1	Jarrah -Marri forest	-32.472	116.2224	11/04/2024	13/05/2024	32
	CAM W10	Jarrah -Marri forest	-32.4674	116.2231	11/04/2024	13/05/2024	32
	CAM W12	Jarrah -Marri forest	-32.472	116.232	11/04/2024	13/05/2024	32
	Cam W5	Jarrah -Marri forest	-32.4765	116.2294	11/04/2024	13/05/2024	32
	Cam 20	Jarrah -Marri forest	-32.4732	116.2279	11/04/2024	13/05/2024	32
Survey Area 4	CAM W2	Jarrah -Marri forest	-32.4731	116.2544	9/04/2024	14/05/2024	35
	CAM W11	Jarrah -Marri forest	-32.4702	116.2554	9/04/2024	14/05/2024	35
	CAM 16	Jarrah -Marri forest	-32.4742	116.2522	9/04/2024	14/05/2024	35
	CAM W3	Jarrah -Marri forest	-32.4768	116.2564	10/04/2024	14/05/2024	34
	CAM W15	Jarrah -Marri forest	-32.4793	116.2593	10/04/2024	14/05/2024	34
Survey Area 5	CAM 53	Jarrah -Marri forest	-32.4494	116.2532	10/04/2024	14/05/2024	34
	CAM W7	Jarrah -Marri forest	-32.4529	116.2533	10/04/2024	14/05/2024	34

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Survey Area	Camera	Habitat type	Latitude	Longitude	Date Deployed	Date Collected	Nights deployed
	CAM R57	Jarrah -Marri forest	-32.4548	116.2559	10/04/2024	14/05/2024	34
	Cam 55	Jarrah -Marri forest	-32.456	116.2605	10/04/2024	14/05/2024	34
	CAM W6	Jarrah -Marri forest	-32.4602	116.2597	10/04/2024	14/05/2024	34
Total nights							849

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2.2.2 Black Cockatoo assessment

A Black Cockatoo habitat assessment for Baudin's Black Cockatoo (*Zanda baudinii*), Carnaby's Black Cockatoo (*Z. latirostris*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) was undertaken across the Survey Areas to assess the presence, quality, and extent of foraging and breeding habitat and assess roosting habitat. The assessment involved visual and aural assessment of the Survey Areas, identifying breeding habitat (presence/absence of actual and potential breeding trees), foraging habitat, roosting areas, current species activity and other signs of use by Black Cockatoos. This assessment approach was carried out based on Alcoa habitat definitions and DAWE (2022) Black Cockatoo referral guidelines and used to define breeding, foraging and night roosting habitat.

Breeding habitat

Breeding habitat: Defined by DAWE (2022) as 'habitat that contains known, suitable, or potential nesting trees' for most tree species such as Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*), Blackbutt (*E. pilularis*) and Flooded Gum (*E. grandis*), suitable DBH is 500 mm. For Wandoo suitable DBH is 300 mm. On average Carnaby Black Cockatoos are known to nest in hollows with an entrance greater than 20 cm (Johnstone & Storr 1998, Groom 2011). While the Forest Red-tailed Black Cockatoo is known to nest in hollows with an entrance greater than 12 cm (Johnstone & Storr 1998). Therefore, hollow suitability was assessed in consideration of these hollow requirements.

Breeding habitat was assessed by surveying the entirety of the Myara Survey Areas. Breeding habitat was then analysed from the data collected from the field surveys. For each potential nesting tree, details of the tree location, species, DBH, size and numbers of hollows observed, evidence of use and any other significant observations were recorded. All identified potential nesting tree were further checked visually using binoculars for suitable nest hollows. Data collected was used to score tree hollows based on DAWE (2022) and Alcoa definitions (see Table 3.5).

Where trees were recorded to have suitable large hollows that could be used or had signs of being used (potential or likely), trees were revisited by Glen Gaikhorst (Principal Zoologist) where the hollows were checked for Black Cockatoo use by using a drone, pole camera and/or telephoto lens.

Foraging habitat

Foraging habitat: Defined by DAWE (2022) as 'Plant species known to support foraging within the range of cockatoo species. Foraging habitat was assessed to determine if the vegetation within the Survey Area constitutes foraging habitat, and to qualify its value for Black Cockatoos. Foraging scores were calculated using the forage score tool outlined within the DAWE (2022) referral guidelines.

As part of the foraging assessment, the ground below known food plants and trees present was searched for any evidence of Black Cockatoo foraging residue such as chewed seed pods, cones and foliage.

The DAWE foraging quality scoring tool is based on a set of site and context attributes:

- Foraging potential
- Connectivity
- Proximity to breeding and roosting.
- Habitat health/disease presence
- Appraisal comments to explain and justify score.

Giving consideration to the above DAWE (2022) referral guidelines, the scoring approach was applied, based on the scope of works requirements, and to account for the composition of regrowth vegetation and corresponding low density of foraging plant species within habitats present. To provide an accurate assessment of Black Cockatoo foraging habitat quality, the following criteria were applied to calculate the foraging quality score of the fauna habitat present:

- Starting score of 10 (native vegetation greater than 1 hectare)

- Foraging potential (-2 where no evidence of foraging)
- Connectivity (-2 where no other foraging habitat within 12km)
- Proximity to breeding (-2 where site is greater than 12 km from breeding habitat)
- Proximity to roosting (-1 where site is greater than 20 km from roosting habitat)
- Impacts from plant disease (-1 where dieback is present in site)
- Total score calculated, adjusted and justified by appraisal statement.

The location and extent of plant species suitable for Black Cockatoo Species foraging habitat was identified and mapped for the Survey Areas, based on the vegetation assemblages and fauna habitat types, and presence/absence of known foraging species. During the field survey any Black Cockatoo foraging activity (actual or evidence) was recorded via GPS. Vegetation and foraging data were used to calculate foraging Quality score for all fauna habitat types across the Survey Area as detailed in DAWE (2022).

The foraging score tool and field data collected and associated forage score calculations are summarised in Appendix B.

Roosting habitat

Night roosting habitat: Defined by DAWE (2022) as habitat that contains one, or a group of known or potential roosting trees. Potential night roosting habitat was assessed based on the presence of suitable tall trees within proximity to water. Roosting habitat was also assessed on evidence of roosting activity i.e. feathers, twig clips and proximity of known local or regional roosting sites available from the desktop assessment.

Opportunistic observations, both visual and aural observations of Black Cockatoos within the Survey Areas were noted during the Survey.

This data was used to calculate estimates of the amount of breeding habitat, amount and quality of foraging habitat, and extent of night roosting habitat within the Survey Areas. This information is presented in Appendix B.

Alcoa Black Cockatoo tree definitions

Trees were also identified by four tree types outlined by Alcoa.

Nest Tree: A tree (live or dead) contains one or more hollows suitable as, Black Cockatoo breeding habitat (based on hollow size, shape, and entry angle), which shows evidence of use (chewing/scratching around entrance).

Possible Nest Tree: Trees with suitable nesting hollows present, that show no evidence of use.

Habitat Tree: Trees that have the potential to provide nest hollows in the future. These are primarily marri trees with DBH \geq 500mm. The tree should already be starting to develop a hollow or have a form that is conducive to hollow formation.

Significant Tree: Healthy Jarrah trees with DBH \geq 2000mm or healthy Marri trees with DBH \geq 1500mm.

2.2.3 Basic fauna assessment

A GHD Zoologist undertook a basic fauna assessment during the Survey. The Survey Areas was traversed by vehicle and by foot over the entirety and opportunistic fauna species were recorded within the Survey Area (Appendix B). All survey methods and effort are presented in Figure 2.

3. Results

3.1 Fauna habitats

The most extensive habitat identified within all five Survey Areas was Jarrah-Marri forest. Habitat dominated by Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) forest with a mixed understory open to scattered to patchy Sheoak (*Allocasuarina fraseriana*), Bull Banksia (*Banksia grandis*) and Myrtaceous shrubs over *Persoonia*, *Xanthorrhoea*, *Macrozamia* and diverse low shrub layer. Soils are orange-brown lateritic sandy clay with pea gravel. The Survey Areas represent a large continuous tract of forest and woodland with good connectivity.

3.2 Fauna diversity

Through the Myara Pre-clearance assessment, 34 terrestrial fauna vertebrates were identified comprising nine mammals, 21 Birds and four Reptiles. Of the nine mammal species, two are introduced (for full species list refer to Appendix B).

3.3 Significant fauna

In total five significant fauna species were recorded. One of the targeted significant fauna species was recorded within the Survey Areas and an additional four significant fauna species were recorded:

Targeted fauna species recorded include:

- Chuditch (*Dasyurus geoffroii*) listed as Vulnerable under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act).

Non-targeted significant fauna recorded include:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) listed as Vulnerable under the BC Act and EPBC Act
- Western Brush Wallaby (*Notamacropus irma*) listed as Priority 4 by the DBCA
- Southwestern Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) listed as Conservation Dependent by the BC Act.
- Quenda (*Isodon fusciventer*) listed as Priority 4 by the DBCA

3.4 Significant fauna recorded

Chuditch (*Dasyurus geoffroii*)

The Western Quoll or Chuditch is listed as Vulnerable under the BC Act and EPBC Act.

The Chuditch is WA's largest extant carnivorous marsupial and is endemic to the south-west. It has mostly brown fur with distinctive white spots (4 to 7 white spots on its body but not on its tail). The head body length is up to 40cm and tail to 35 cm long. The Chuditch feeds mostly on large invertebrates. It also eats small lizards, birds and mammals. They are also known to consume the red pulp on *Zamia* seeds, small fruits and part of flowers. They utilise hollow logs or burrows for a den during the day and hunt at night. It is an excellent climber and will hunt for prey arboreally. Historically, Chuditch inhabited a wide range of habitats, but today it survives mostly in Jarrah forests and heathlands of the south-west, and woodlands of the Great Southern (DBCA 2017).

Chuditch (Plate 3.1) were recorded on 16 remote cameras, in all five Survey Areas within the Jarrah-Marri woodlands (see Appendix A, Figure 3), Chuditch had a total of 66 camera events across all 16 cameras and two observations of Chuditch scats (Plate 3.2) were recorded in Survey Area 2 and Survey Area 3. Physical assessments were conducted on the Chuditch, where camera trap images were analysed as described in section 2.2.1 to identify individuals from their spots or other identifiable characteristics. From this assessment 17 different individuals were identified in the Survey Areas. There is a likelihood that more

individuals reside in the Survey Areas as not all camera image show identifying features. The results of the spot pattern analysis can be seen in the table in Appendix B.



Plate 3.1 Chuditch recorded via remote camera.



Plate 3.2 Chuditch Scat recorded in Survey Area 3

Table 3.1 Chuditch observations

Date	Survey Area	Habitat	Observation type	Latitude	Longitude	Number of individuals
8/04/2024	Survey Area 1	Jarraah -Marri forest	Remote Camera	-32.5004	116.1114	1
9/04/2024		Jarraah -Marri forest	Remote Camera	-32.5004	116.1115	1
9/04/2024		Jarraah -Marri forest	Remote Camera	-32.5004	116.1112	1
10/04/2024		Jarraah -Marri forest	Remote Camera	-32.5023	116.1082	1
10/04/2024		Jarraah -Marri forest	Remote Camera	-32.5024	116.1082	1
11/04/2024		Jarraah -Marri forest	Remote Camera	-32.5023	116.1081	1
11/04/2024		Jarraah -Marri forest	Remote Camera	-32.5002	116.1115	1
12/04/2024		Jarraah -Marri forest	Remote Camera	-32.5024	116.1082	1
12/04/2024		Jarraah -Marri forest	Remote Camera	-32.5002	116.1112	1
13/04/2024		Jarraah -Marri forest	Remote Camera	-32.5001	116.1114	1

Date	Survey Area	Habitat	Observation type	Latitude	Longitude	Number of individuals	
14/04/2024		Jarrah -Marri forest	Remote Camera	-32.5001	116.1115	1	
15/04/2024		Jarrah -Marri forest	Remote Camera	-32.5001	116.1115	1	
16/04/2024		Jarrah -Marri forest	Remote Camera	-32.5023	116.1082	1	
16/04/2024		Jarrah -Marri forest	Remote Camera	-32.5002	116.1116	1	
17/04/2024		Jarrah -Marri forest	Remote Camera	-32.5035	116.1023	1	
18/04/2024		Jarrah -Marri forest	Remote Camera	-32.5003	116.1116	1	
20/04/2024		Jarrah -Marri forest	Remote Camera	-32.5034	116.1024	1	
22/04/2024		Jarrah -Marri forest	Remote Camera	-32.5034	116.1022	1	
5/05/2024		Jarrah -Marri forest	Remote Camera	-32.5023	116.1082	1	
9/04/2024		Survey Area 2	Jarrah -Marri forest	Fresh scats	-32.4981	116.2056	
9/04/2024	Jarrah -Marri forest		Remote Camera	-32.4942	116.2111	1	
9/04/2024	Jarrah -Marri forest		Remote Camera	-32.4941	116.2113	1	
9/04/2024	Jarrah -Marri forest		Remote Camera	-32.4919	116.2024	1	
9/04/2024	Jarrah -Marri forest		Remote Camera	-32.4920	116.2024	1	
10/04/2024	Jarrah -Marri forest		Remote Camera	-32.4939	116.2109	1	
10/04/2024	Jarrah -Marri forest		Remote Camera	-32.4918	116.2024	1	
12/04/2024	Jarrah -Marri forest		Remote Camera	-32.4948	116.2071	1	
13/04/2024	Jarrah -Marri forest		Remote Camera	-32.4940	116.2110	1	
13/04/2024	Jarrah -Marri forest		Remote Camera	-32.4947	116.2072	1	
14/04/2024	Jarrah -Marri forest		Remote Camera	-32.4918	116.2025	1	
14/04/2024	Jarrah -Marri forest		Remote Camera	-32.4916	116.2054	1	
15/04/2024	Jarrah -Marri forest		Remote Camera	-32.4981	116.2069	1	
15/04/2024	Jarrah -Marri forest		Remote Camera	-32.4939	116.2114	1	
15/04/2024	Jarrah -Marri forest		Remote Camera	-32.4919	116.2025	1	
15/04/2024	Jarrah -Marri forest		Remote Camera	-32.4948	116.2070	1	
16/04/2024	Jarrah -Marri forest		Remote Camera	-32.4980	116.2070	1	
16/04/2024	Jarrah -Marri forest		Remote Camera	-32.4946	116.2072	1	
21/04/2024	Jarrah -Marri forest		Remote Camera	-32.4981	116.2067	1	
21/04/2024	Jarrah -Marri forest		Remote Camera	-32.4937	116.2109	1	
21/04/2024	Jarrah -Marri forest		Remote Camera	-32.4916	116.2053	1	
22/04/2024	Jarrah -Marri forest		Remote Camera	-32.4979	116.2070	1	
23/04/2024	Jarrah -Marri forest		Remote Camera	-32.4980	116.2067	1	
23/04/2024	Jarrah -Marri forest		Remote Camera	-32.4917	116.2053	1	
25/04/2024	Jarrah -Marri forest		Remote Camera	-32.4941	116.2109	1	
3/05/2024	Jarrah -Marri forest		Remote Camera	-32.4979	116.2069	1	
4/05/2024	Jarrah -Marri forest		Remote Camera	-32.4917	116.2053	1	
14/04/2024	Survey Area 3		Jarrah -Marri forest	Remote Camera	-32.4675	116.2230	1
17/04/2024			Jarrah -Marri forest	Fresh scats	-32.4696	116.2271	
17/04/2024			Jarrah -Marri forest	Remote Camera	-32.4734	116.2280	1

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Date	Survey Area	Habitat	Observation type	Latitude	Longitude	Number of individuals
21/04/2024	Survey Area 4	Jarrah -Marri forest	Remote Camera	-32.4720	116.2320	1
22/04/2024		Jarrah -Marri forest	Remote Camera	-32.4719	116.2321	1
22/04/2024		Jarrah -Marri forest	Remote Camera	-32.4765	116.2294	1
30/04/2024		Jarrah -Marri forest	Remote Camera	-32.4675	116.2231	1
9/04/2024		Jarrah -Marri forest	Remote Camera	-32.4742	116.2523	1
9/04/2024		Jarrah -Marri forest	Remote Camera	-32.4741	116.2522	1
10/04/2024		Jarrah -Marri forest	Remote Camera	-32.4768	116.2564	1
11/04/2024		Jarrah -Marri forest	Remote Camera	-32.4702	116.2553	1
11/04/2024		Jarrah -Marri forest	Remote Camera	-32.4742	116.2521	1
11/04/2024		Jarrah -Marri forest	Remote Camera	-32.4768	116.2563	1
12/04/2024		Jarrah -Marri forest	Remote Camera	-32.4730	116.2545	1
12/04/2024		Jarrah -Marri forest	Remote Camera	-32.4741	116.2522	1
13/04/2024		Jarrah -Marri forest	Remote Camera	-32.4703	116.2553	1
14/04/2024		Jarrah -Marri forest	Remote Camera	-32.4730	116.2544	1
14/04/2024		Jarrah -Marri forest	Remote Camera	-32.4742	116.2523	1
16/04/2024		Jarrah -Marri forest	Remote Camera	-32.4731	116.2543	1
19/04/2024		Jarrah -Marri forest	Remote Camera	-32.4768	116.2565	1
21/04/2024		Jarrah -Marri forest	Remote Camera	-32.4731	116.2545	1
17/04/2024	Survey Area 5	Jarrah -Marri forest	Remote Camera	-32.4603	116.2597	1
Total Observations						66

** Please note that this is the number of camera events and not number of individuals.

3.5 Significant fauna likely to occur

Quokka (*Setonix brachyurus*)

The Quokka is listed as Vulnerable under the EPBC Act and BC Act

The current distribution of the mainland Quokka includes areas through the southwest forests from Jarrahdale to Walpole. The mainland Quokka lives in the Darling Range and south-west regions of WA, mostly inhabiting densely vegetated swamps and sometimes tea-tree thickets on sandy soils along creek systems and dense heath on slopes. Mainland Quokkas tend to hide in runs among vegetation during the day and forage along the swamp margins at night (Kitchener 1995)

In the southern forest Quokkas occupy a range of forest, woodland and wetland ecotypes. The most commonly occupied sites comprise of Jarrah, Marri, Red Tingle (*Eucalyptus jacksonii*) or Yellow Tingle (*E. guilfoylei*) forest and riparian habitats with a sedge dominated understory (DEC 2013). Habitat supporting a low density of near-surface fuel, a complex vegetation structure and burn patchiness are the factors favouring Quokka occupancy in the southern forest (DEC 2013). The habitat critical to survival for the south coast subpopulations includes a wider range of vegetation types (floristically and structurally) than in the northern Jarrah forest, including swamps, riparian areas, incised gullies and dense coastal heath (de Tores et al 2007).

Quokkas were recorded via remote cameras and scats in the adjacent Survey Areas of O'Neil, O'Neil East and the targeted Woylie Assessment within 10kms of the Survey Areas (GHD 2024a, GHD 204b & GHD 2024c). Within the region Quokkas have been mainly recorded in damplands and drainage lines. No

preferred habitat for Quokkas was observed within the Survey Areas, however, within some Survey Areas drainage lines were just outside the Survey Area boundaries. This species has been assessed as likely to occur as they can venture out from their preferred habitat into the greater Jarrah forest areas and into the Survey Areas, without detection during the survey period.

Woylie (*Bettongia penicillate ogilbyi*)

The Woylie is listed as Critically Endangered under the BC Act and Endangered under the EPBC Act.

The Woylie is a small Potoroidae marsupial which is restricted to small remnant populations in the Southwest of Western Australia. Inhabiting dry sclerophyll forests with thick understories in the strongholds of Dryandra National Park, Tutanning Nature Reserve and Perup forest (Menkhorst & Knight, 2011). Identifiable by their grey brown with a distinctive brush like tail (Menkhorst & Knight, 2011).

Woylies were recorded via remote cameras in the nearby Survey Area of O'Neil East and the Monadhocks Conservation Park approximately 4.5km southeast to Survey Area 4 (GHD 2024b, GHD 2024c). The Survey Areas lack areas of suitable thick understories, however suitable areas lie just outside the Survey Area boundaries, where individuals have the potential to venture within the Survey Areas. This species has been assessed as likely to occur within the Survey Areas, as it is possible for Woylies to venture into the greater Jarrah forest areas and into the Survey Areas, without detection.

3.6 Black Cockatoo assessment

The Black Cockatoo habitat assessment focused on qualifying and quantifying Black Cockatoo habitat values throughout the Survey Areas. The whole survey area was traversed by foot to sample all trees with a suitable DBH to determine breeding habitat usage and assess foraging habitat potential value for Baudin's, Carnaby's and Forest Red-tailed Black Cockatoo as described in sections 2.2.2. Table 3.4 presents a summary of Black Cockatoo habitat values and definitions as defined within the referral guidelines (DAWE 2022).

3.6.1 Black Cockatoo observations

Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)

The Forest Red-tailed Black Cockatoo is listed as Vulnerable under the EPBC Act and BC Act.

The Forest Red-tailed Black Cockatoo is endemic to the south-west humid and sub-humid zones of WA (Mawson and Johnstone 1997). It inhabits the dense Jarrah (*Eucalyptus marginata*), Karri (*E. diversicolor*) and Marri (*Corymbia calophylla*) forests receiving more than 600 mm of annual average rainfall. The current distribution is north of Perth and east to Mount Helena, Christmas Tree Well, North Banister, Mt Saddleback, Rocky Gully and the upper King River (Johnstone 1997). More recently the species has been utilising and persisting on the northern portions of the Swan Coastal Plain and is now considered a regular sighting (Johnstone *et al* 2017). Habitats in which Forest Red-tailed Black Cockatoos occur are throughout the Northern Jarrah Forest and within Marri, Jarrah, Wandoo, Blackbutt, Bullich and Flooded Gum present. This region has a general understorey of Bull Banksia (*Banksia grandis*), Snottygobble (*Persoonia longifolia*), Sheoak (*Allocasuarina fraseriana*) and other *Banksia* species with scattered ephemeral areas of relevant species (Johnstone & Kirkby 1999). Forest Red-tailed Black Cockatoos roost in emergent Jarrah-Marri-Blackbutt habitat on roadsides, paddocks or forest blocks. While the Forest Red-tailed Black Cockatoo feeds on the seeds of other species, around 90 per cent of its diet is made up of the seeds from Marri and Jarrah fruits.

Forest Red-tailed Black Cockatoos were observed flying and calling at five locations, with 13 individual birds sighted visually and aurally within the Black Cockatoo Survey Area, Within Survey Area 3, (Table 3.2). All bird locations are located in Appendix A, Figure 4.

Table 3.2 Forest Red-tailed Black Cockatoo observations within Black Cockatoo Survey Area

Date	Observation	Latitude	Longitude	Number of individuals
11/04/2024	Flying	-32.4691	116.2273	4
11/04/2024	Calling	-32.4706	116.2304	1
12/04/2024	Flying	-32.4719	116.2264	1
12/04/2024	Flying	-32.4717	116.2310	4
17/04/2024	Flying	-32.4692	116.2263	3
Total observations				13

3.6.2 Breeding habitat

From this survey three trees were identified as potentially suitable nest hollows breeding trees and were assessed by Glen Gaikhorst during a follow up assessment post field survey. Two of the trees were assessed, one tree defined as a Known nesting tree and the other tree defined as a suitable nest hollow (Table 3.4 and Table 3.5). One other tree was assessed as a potential nesting tree, and subsequently checked by Tony Kirkby using drone and the potential hollow was found to be blocked. Several other trees were identified as potential nesting trees/habitat tree but when assessed by Glen Gaikhorst they were found to be blocked.

3.6.3 Foraging habitat

The Jarrah – Marri forest provides extensive foraging habitat for all three Black Cockatoo species. With confirmed observations of foraging evidence from Forest Red-tailed Black Cockatoo across the Black Cockatoo Survey Area. A total of 39 foraging observations were made with a total of 19 being Marri nuts (Plate 3.3) and 20 Jarrah nuts (Table 3.3). However, the amount of foraging evidence is not an indication to the size of the population. All foraging locations are located in Figure 4, Appendix A.

Table 3.3 Forest Red-tailed Black Cockatoo foraging observations with Black Cockatoo Survey Area

Date	Latitude	Longitude	Foraging residue
12/04/2024	-32.4692	116.2263	Jarrah Foraging residue
12/04/2024	-32.4699	116.2261	Jarrah Foraging residue
12/04/2024	-32.4692	116.2254	Jarrah Foraging residue
12/04/2024	-32.4707	116.2274	Marri foraging residue
12/04/2024	-32.4705	116.2271	Marri foraging residue
12/04/2024	-32.4704	116.2269	Marri foraging residue
12/04/2024	-32.4700	116.2265	Marri foraging residue
12/04/2024	-32.4689	116.2265	Jarrah Foraging residue
12/04/2024	-32.4691	116.2265	Marri foraging residue
12/04/2024	-32.4693	116.2274	Marri foraging residue
12/04/2024	-32.4695	116.2269	Marri foraging residue
12/04/2024	-32.4695	116.2266	Marri foraging residue
12/04/2024	-32.4697	116.2269	Marri foraging residue
12/04/2024	-32.4702	116.2282	Marri foraging residue
12/04/2024	-32.4710	116.2295	Marri foraging residue
12/04/2024	-32.4712	116.2294	Jarrah Foraging residue

Date	Latitude	Longitude	Foraging residue
12/04/2024	-32.4723	116.2307	Marri foraging residue
12/04/2024	-32.4720	116.2310	Jarrah Foraging residue
12/04/2024	-32.4720	116.2310	Marri foraging residue
12/04/2024	-32.4718	116.2308	Marri foraging residue
12/04/2024	-32.4714	116.2300	Marri foraging residue
12/04/2024	-32.4710	116.2296	Jarrah Foraging residue
12/04/2024	-32.4719	116.2304	Marri foraging residue
12/04/2024	-32.4699	116.2231	Jarrah Foraging residue
12/04/2024	-32.4696	116.2224	Jarrah Foraging residue
12/04/2024	-32.4694	116.2226	Jarrah Foraging residue
12/04/2024	-32.4694	116.2227	Jarrah Foraging residue
12/04/2024	-32.4696	116.2223	Jarrah Foraging residue
12/04/2024	-32.4693	116.2219	Jarrah Foraging residue
12/04/2024	-32.4704	116.2257	Marri foraging residue
12/04/2024	-32.4696	116.2232	Jarrah Foraging residue
12/04/2024	-32.4696	116.2224	Jarrah Foraging residue
12/04/2024	-32.4694	116.2227	Jarrah Foraging residue
12/04/2024	-32.4692	116.2221	Jarrah Foraging residue
12/04/2024	-32.4692	116.2221	Jarrah Foraging residue
12/04/2024	-32.4691	116.2218	Jarrah Foraging residue
12/04/2024	-32.4686	116.2219	Jarrah Foraging residue
12/04/2024	-32.4683	116.2216	Marri foraging residue
12/04/2024	-32.4678	116.2214	Marri foraging residue



Plate 3.3 Forest Red-tailed Black Cockatoo Marri nut foraging residue

3.6.4 Roosting habitat

No roosting trees were recorded within the Survey Area. However, with the number of Forest Red-tailed Black Cockatoos recorded from within the area, it is likely there are roost trees in the vicinity.

3.6.5 Black Cockatoo assessment summary

A summary of the Black Cockatoo breeding, foraging and roosting assessment as defined by DAWE (2022), and Alcoa definitions is shown in Table 3.4 and Table 3.5.

Table 3.4 Black Cockatoo habitat usage

Habitat usage (DAWE 2022)	Tree type (Alcoa) / additional category	Presence within the Survey Area	Evidence
Foraging habitat	-	Present. Marri, Jarrah Chewed Marri and Jarrah pods	Extensive foraging found throughout the Survey Area for Forest Red-tailed Black Cockatoos.
Known roosting tree	-	No	None recorded
Potential roost tree	-	No	No areas or potential roost trees identified, but likely to occur within Black Cockatoo Survey Area
Suitable nesting tree	-	Yes	Recorded

Habitat usage (DAWE 2022)	Tree type (Alcoa) / additional category	Presence within the Survey Area	Evidence
Known nesting tree	Nest tree	Yes	One previously recorded nesting tree was recorded within the Survey Area. With ID tag number 1761. Table 3.5.
Known nesting tree	Nest tree	Yes	One trees with define chew marks. Table 3.5. Assigned Tree No. 2126 by Tony Kirkby.
Suitable nesting hollow	Possible nest tree	Yes	None
Potential nest tree	Habitat Tree	Yes	Recorded
-	Significant Trees	No	None recorded

Legend (DAWE 2022)

Foraging habitat: a plant species known to support foraging within the species range.

Known roosting tree: a tree (usually tallest) or any species in close proximity to fresh water that is confirmed to be used for night roosting either via Cockatoo presence or strong evidence of roosting.

Potential roost tree: tall tree of any species, usually in close proximity to a freshwater source.

Suitable nesting tree: trees with suitable nesting hollows present, but no evidence of breeding use.

Known nesting tree: tree that has a hollow in which black cockatoo breeding has been recorded (past or present)

Potential nesting tree: trees that have a suitable DBH to develop a nest hollow, but do not currently have hollows. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH.

Suitable nest hollows: any hollow with dimensions suitable for use for nesting by black cockatoos. Characteristics of hollows used by each species is available in the SPRAT database. Suitable nest hollows are only found in live trees with a DBH of at least 500 mm.

Alcoa Black Cockatoo Tree usage terminology



Nest Tree: A tree (live or dead) containing one or more hollows suitable as Black Cockatoo breeding habitat (based on hollow size, shape, and entry angle), which shows evidence of use (chewing/scratching around entrance).

Possible Nest Tree: Trees with suitable nesting hollows present, that show no evidence.


Habitat Tree: Trees on a haul road alignment that have the potential to provide nest hollows in the future. These are primarily marri trees with DBH ≥ 500 mm. The tree should already be starting to develop a hollow or have a form that is conducive to hollow formation.

Significant Tree: Healthy Jarrah trees with DBH ≥ 2000 mm or healthy Marri trees with DBH ≥ 1500 mm



Table 3.5 Glen Gaikhorst Black Cockatoo assessment

Tree Species/Tree Definition	Latitude	Longitude	Glen Gaikhorst comments	Photo
<p>dead tree</p> <p>Tree Definitions: Known nesting tree</p>	-32.4713	116.2302	<p>Hollow Assessed with drone. Lower hollow is blocked. Another hollow higher up on tree with potentially old chew marks by Black Cockatoos. Also, tree marked with tag 1761 with "H" and dot. Known breeding tree.</p> <p>Breeding hollow</p>	
<p>Marri</p> <p><i>Corymbia calophylla</i></p> <p>Tree Definitions: Known nesting tree</p>	-32.4703	116.2289	<p>Hollow assessed with drone. Definite fresh chew marks at hollow mouth. Too high for pole camera likely a breeding hollow. Assigned Tree No. 2126 by Tony Kirkby.</p> <p>Breeding hollow</p>	



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Tree Species/Tree Definition	Latitude	Longitude	Glen Gaikhorst comments	Photo
Marri <i>Corymbia calophylla</i> Tree Definitions: Potential nest tree / Habitat tree	-32.4704	116.2282	Hollow assessed with drone and from the ground. Too high for pole camera and foliage in way of hollow making it difficult to assess with drone. Images too poor to make assessment. Rechecked by Tony Kirkby using drone and found to be blocked. No hollow	No Photo
Marri <i>Corymbia calophylla</i> Tree Definitions: Potential nest tree / Habitat tree	-32.4693	116.2260	Hollow assessed with pole cam. Hollow is Blocked. No hollow	
Marri <i>Corymbia calophylla</i> Tree Definitions: Potential nest tree / Habitat tree	-32.4691	116.2270	Hollow assessed from ground level appears blocked. No hollow	No photo


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Tree Species/Tree Definition	Latitude	Longitude	Glen Gaikhorst comments	Photo
<p>Marri <i>Corymbia calophylla</i> Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4695	116.2270	<p>Hollow assessed with drone. Hollow entrance very small approx. 5 cm and no visible signs of use by Black Cockatoos No hollow</p>	
<p>dead tree Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4706	116.2280	<p>Hollow assessed from ground level appears blocked. No hollow</p>	No photo
<p>Jarra <i>Eucalyptus marginata</i> Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4724	116.2304	<p>Hollow ground assessment, Hollow blocked No hollow</p>	


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Tree Species/Tree Definition	Latitude	Longitude	Glen Gaikhorst comments	Photo
<p>Jarrah <i>Eucalyptus marginata</i> Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4714	116.2306	<p>Hollow ground assessment. Hollow blocked. Sticks and other debris observed. No hollow</p>	
<p>Marri <i>Corymbia calophylla</i> Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4701	116.2285	<p>Hollow assessed with drone. Hollow is blocked. Small hollow on side of blocked hollow but too small for Black Cockatoo. No hollow</p>	

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Tree Species/Tree Definition	Latitude	Longitude	Glen Gaikhorst comments	Photo
<p>Marri <i>Corymbia calophylla</i> Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4698	116.2286	<p>Hollow assessed with drone. Hollow is blocked. Cavity had potential use for bird of prey. No hollow</p>	

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Tree Species/Tree Definition	Latitude	Longitude	Glen Gaikhorst comments	Photo
<p>Jarrah <i>Eucalyptus marginata</i> Tree Definitions: Potential nest tree / Habitat tree</p>	-32.4699	116.2234	<p>Hollow assessed with pole camera. Hollow too small for Black Cockatoo use. No hollow</p>	

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4. Conclusion

The Survey Areas consist of the main habitat type of Jarrah-Marri forest, mature aged. The conservation value of the Jarrah-Marri forest is specific to locally occurring significant fauna species and the type of usage by those species. For example, Jarrah-Marri forest provides extensive foraging habitat for Chuditch and all three Black Cockatoo species.

Within the Black Cockatoo Survey Area, observed use was recorded of Forest Red-tailed Black Cockatoo, with sightings of individuals and of foraging residue. The Black Cockatoo Survey Area contained habitat that supports Breeding and Foraging of Black Cockatoo species; however, no signs of roosting were observed within the Survey area, however due to the presence of Forest Red-tailed Black Cockatoo observed, roosting trees are likely to be nearby. From this survey three trees were identified as potentially suitable nest hollows breeding trees and were assessed by Glen Gaikhorst during a follow up assessment post field survey. Two of these trees were subsequently checked, and both were assessed as known breeding trees, one of which was previously recorded by Tony Kirkby. A third tree was assessed by Tony Kirkby using drone and the potential hollow was found to be blocked. Several other trees were identified as potential nesting trees/habitat tree but when assessed by Glen Gaikhorst they were found to be blocked.

In total five significant species were recorded. The targeted significant species, Chuditch was readily recorded via remote camera within all five Survey Areas, with a total of 66 camera events with Chuditch present and two observations of Chuditch scats. Through physical analysis of the Chuditch recorded via remote camera, 17 were identified through spot pattern analysis. Four other significant (but not target) species were recorded within the Survey Areas including Forest Red-tailed Black Cockatoo, Southwestern Brush-tailed Phascogale, Western Brush Wallaby and Quenda.

Regards

Dylan Goldspink
Zoologist

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Appendices

Appendix A

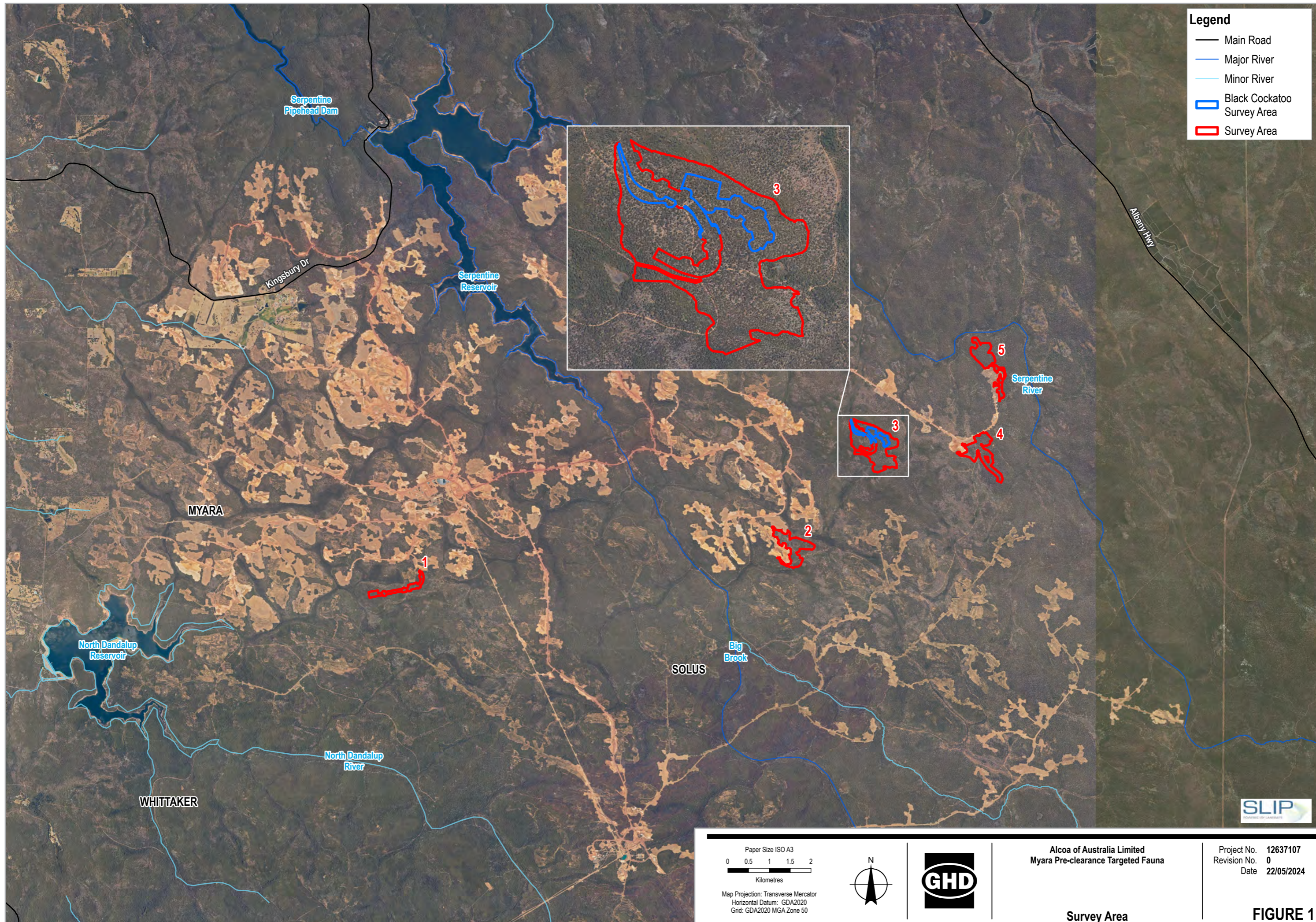
Figures

Figure 1 Survey Areas

Figure 2. Survey method – sites 1-5

Figure 3. Significant fauna – sites 1-5

Figure 4 Black Cockatoo survey results



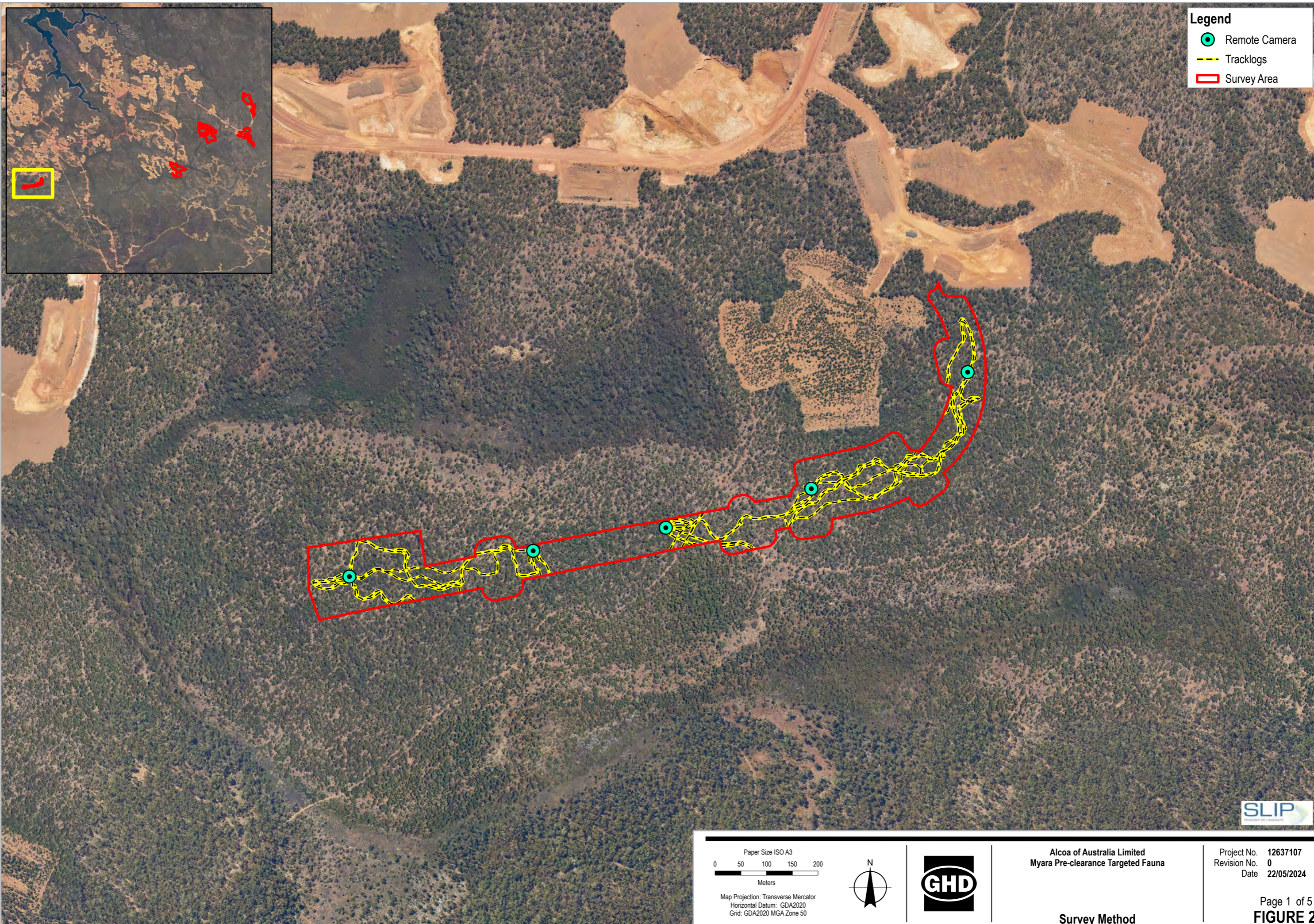
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- Minor River
- ▭ Black Cockatoo Survey Area
- ▭ Survey Area

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<p>Survey Area</p>			<p>FIGURE 1</p>	

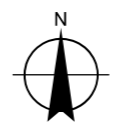
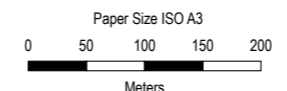
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Legend

- Remote Camera
- Tracklogs
- Survey Area



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Myara Pre-clearance Targeted Fauna

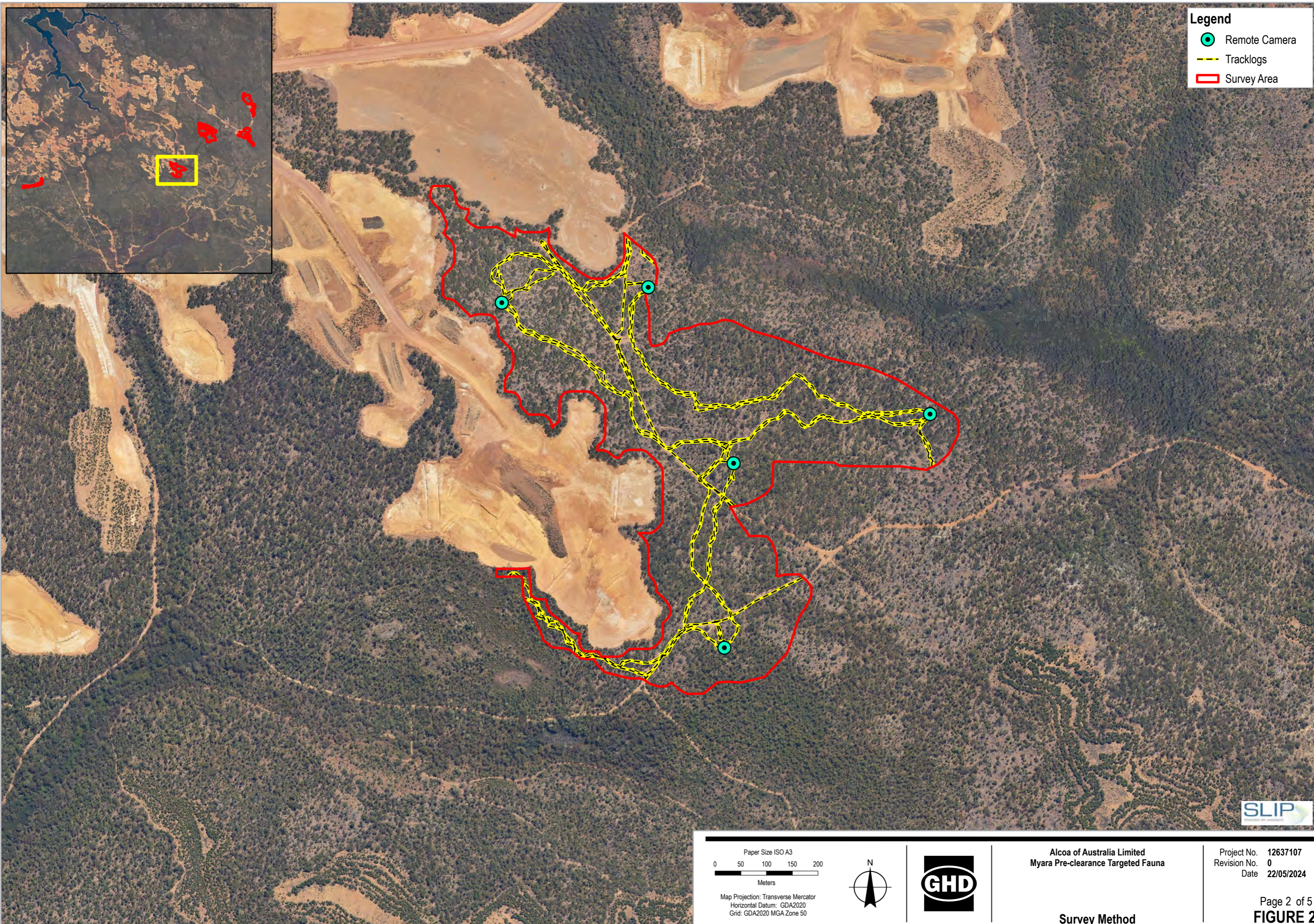
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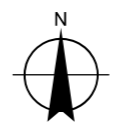
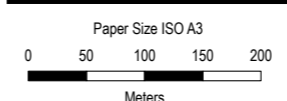
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FIGURE 2





Legend

-  Remote Camera
-  Tracklogs
-  Survey Area



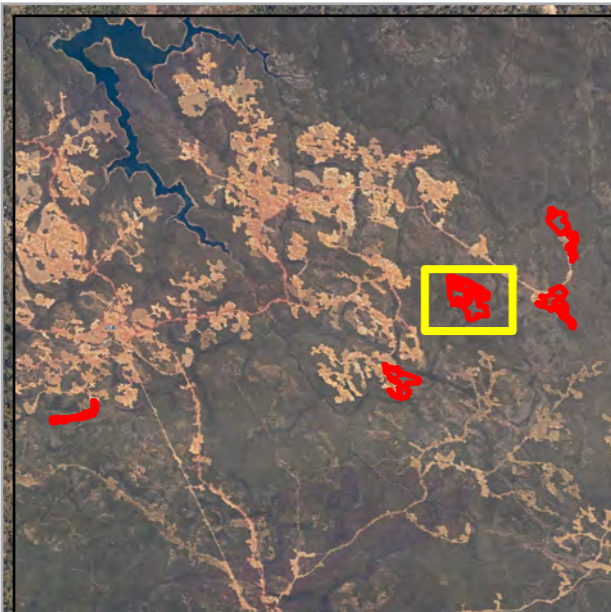
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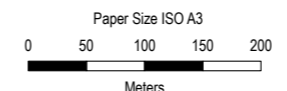
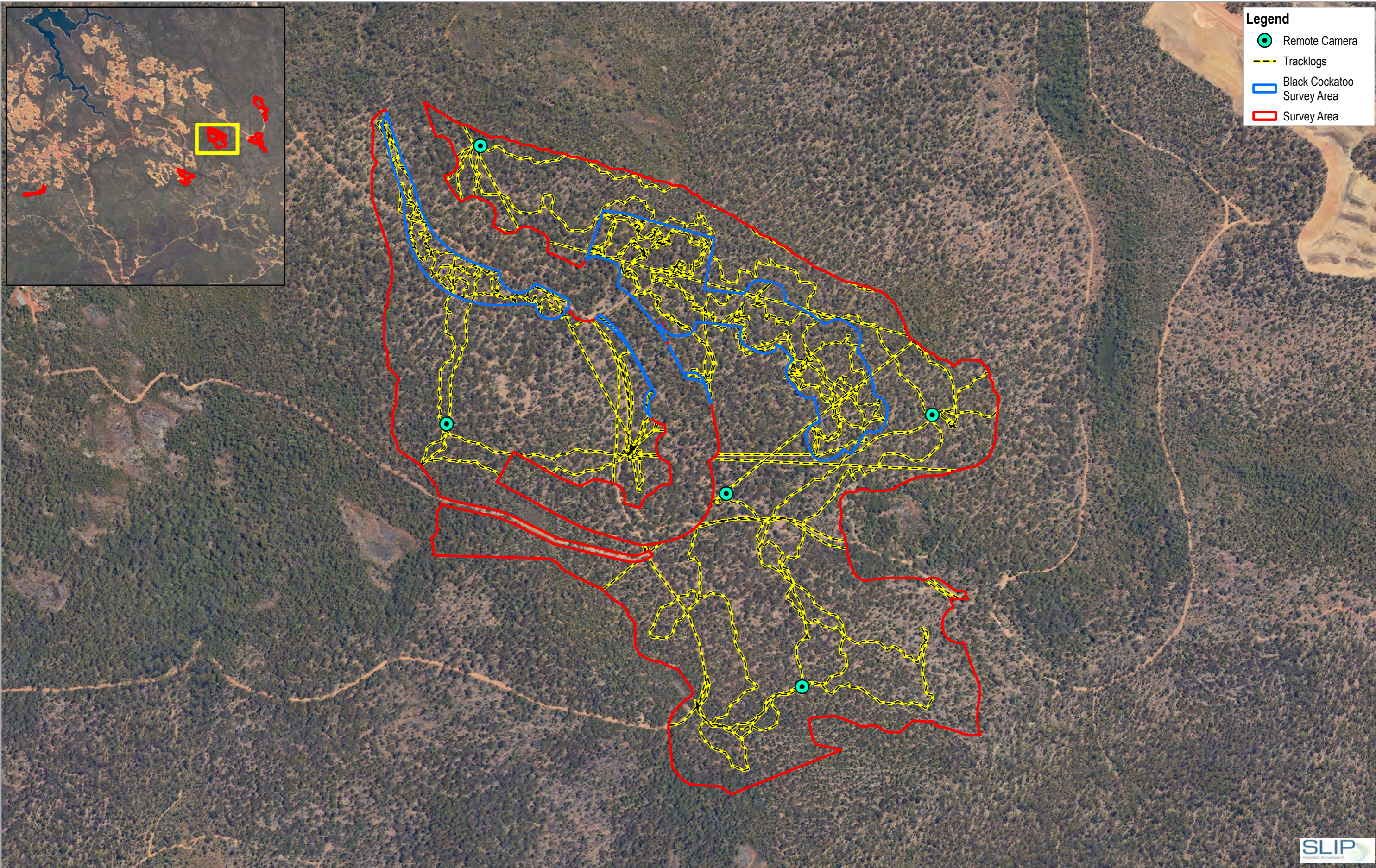
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FIGURE 2

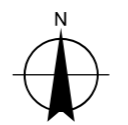


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- Black Cockatoo Survey Area
- Survey Area



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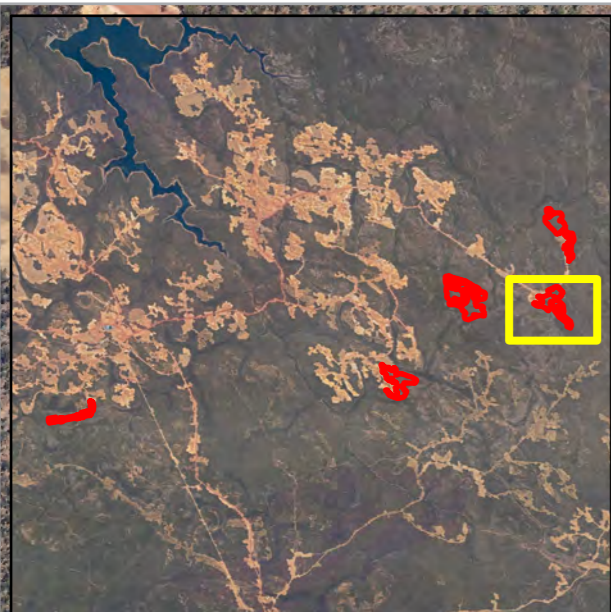


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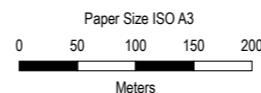
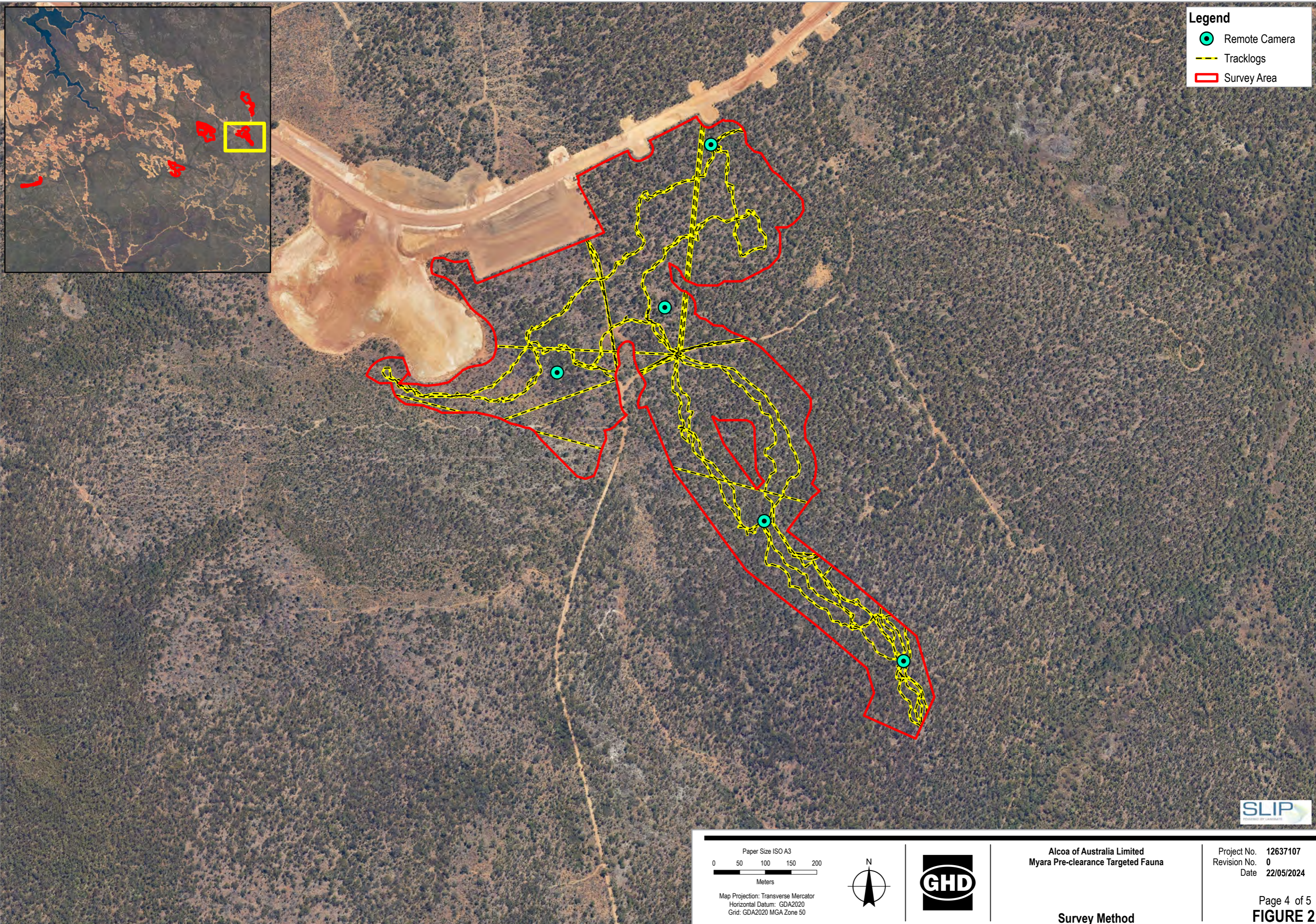
Survey Method

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FIGURE 2

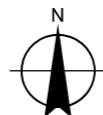


Legend

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- Tracklogs
- Survey Area



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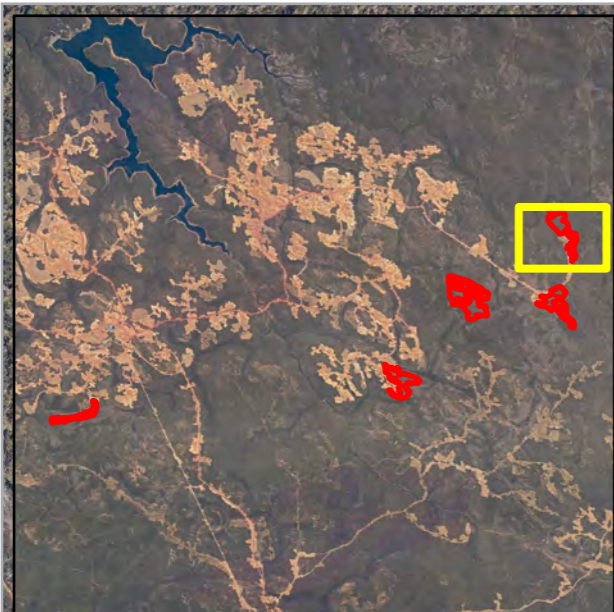


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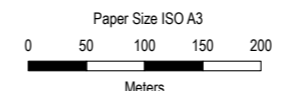
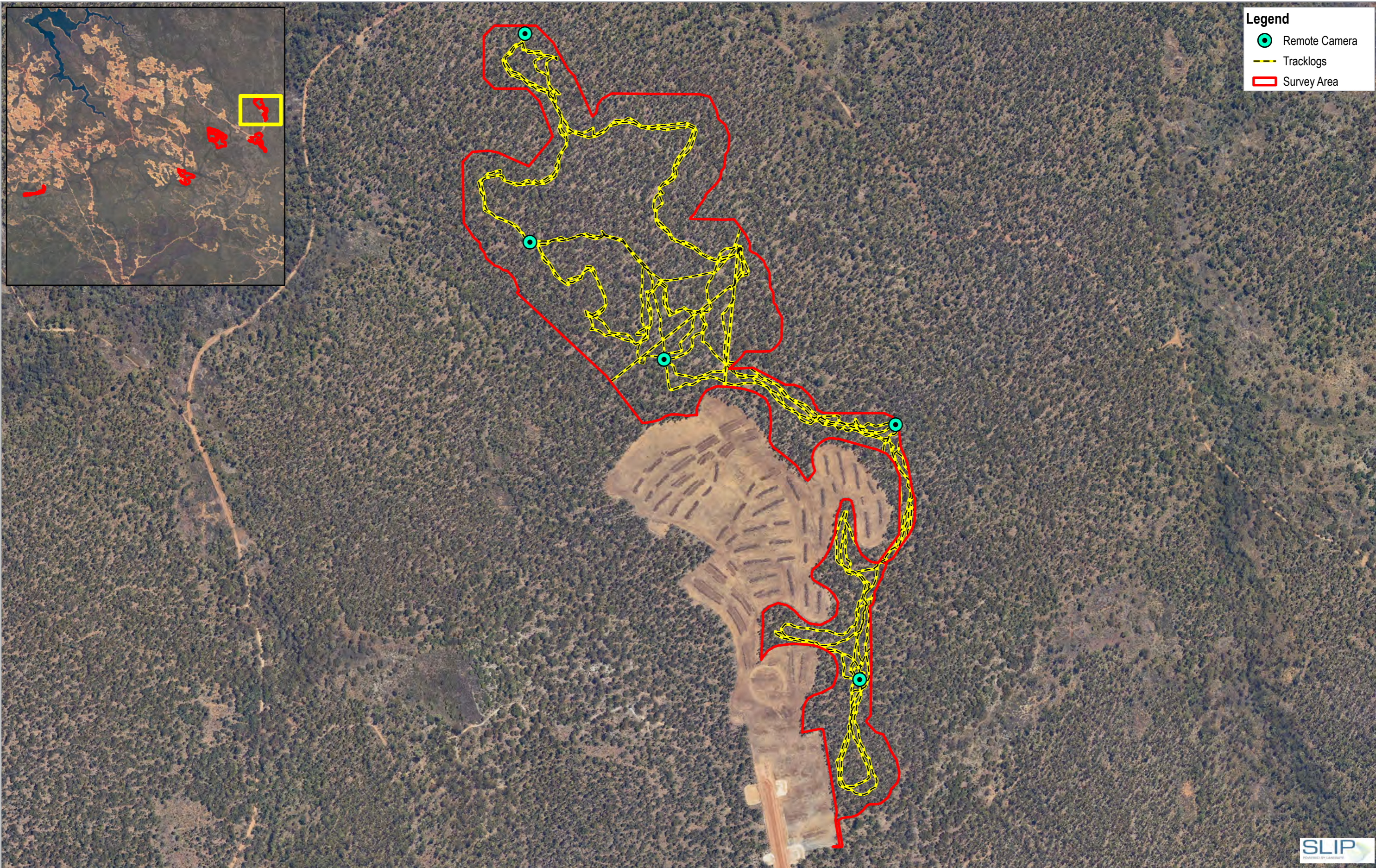
Survey Method

Page 4 of 5
FIGURE 2



Legend

- Remote Camera
- Tracklogs
- Survey Area



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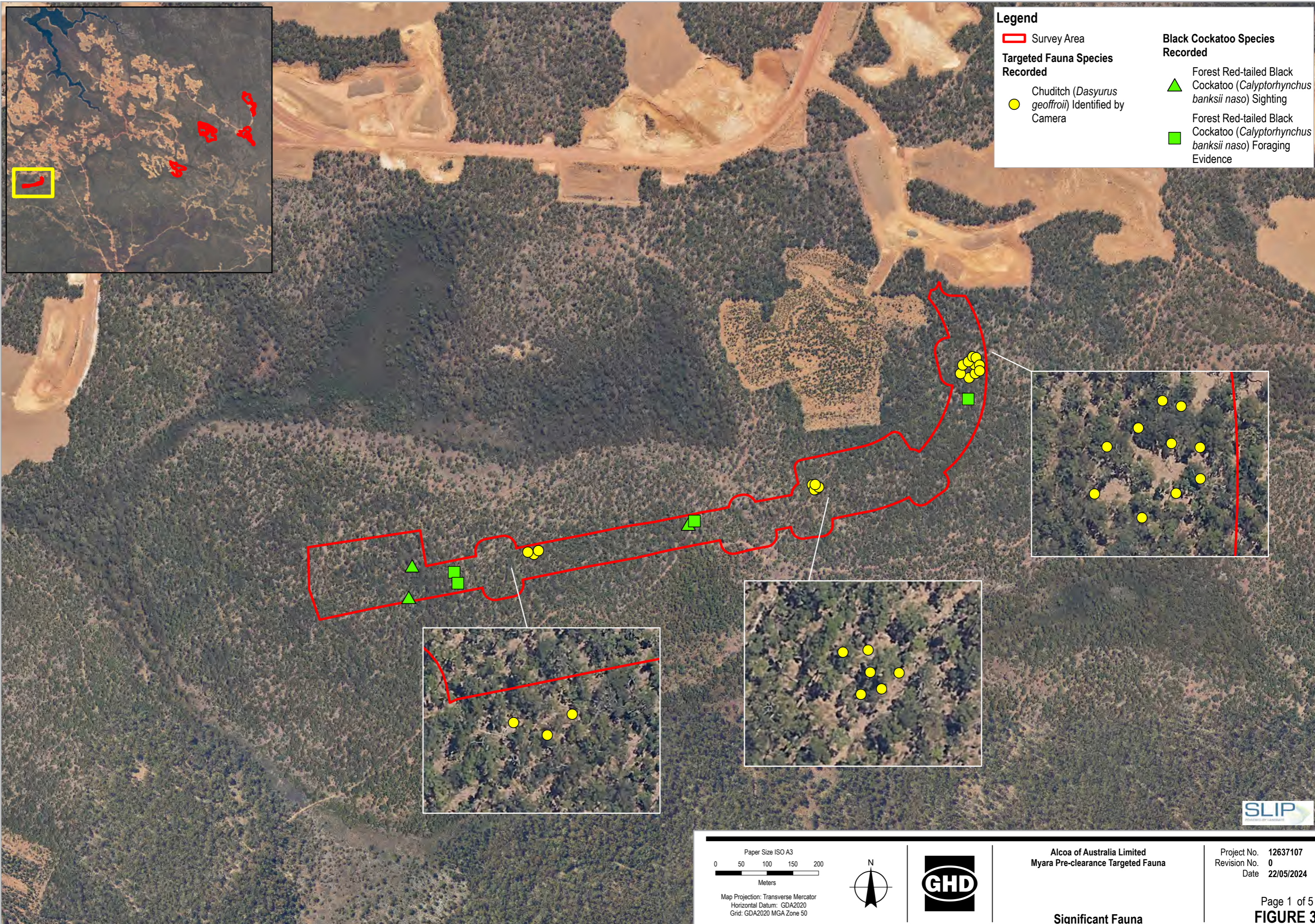


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Revision No. 0
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Survey Method

Page 5 of 5
FIGURE 2



Legend

Survey Area

Targeted Fauna Species Recorded

● Chuditch (*Dasyurus geoffroi*) Identified by Camera

Black Cockatoo Species Recorded

▲ Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Sighting

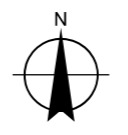
■ Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Foraging Evidence

Paper Size ISO A3

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

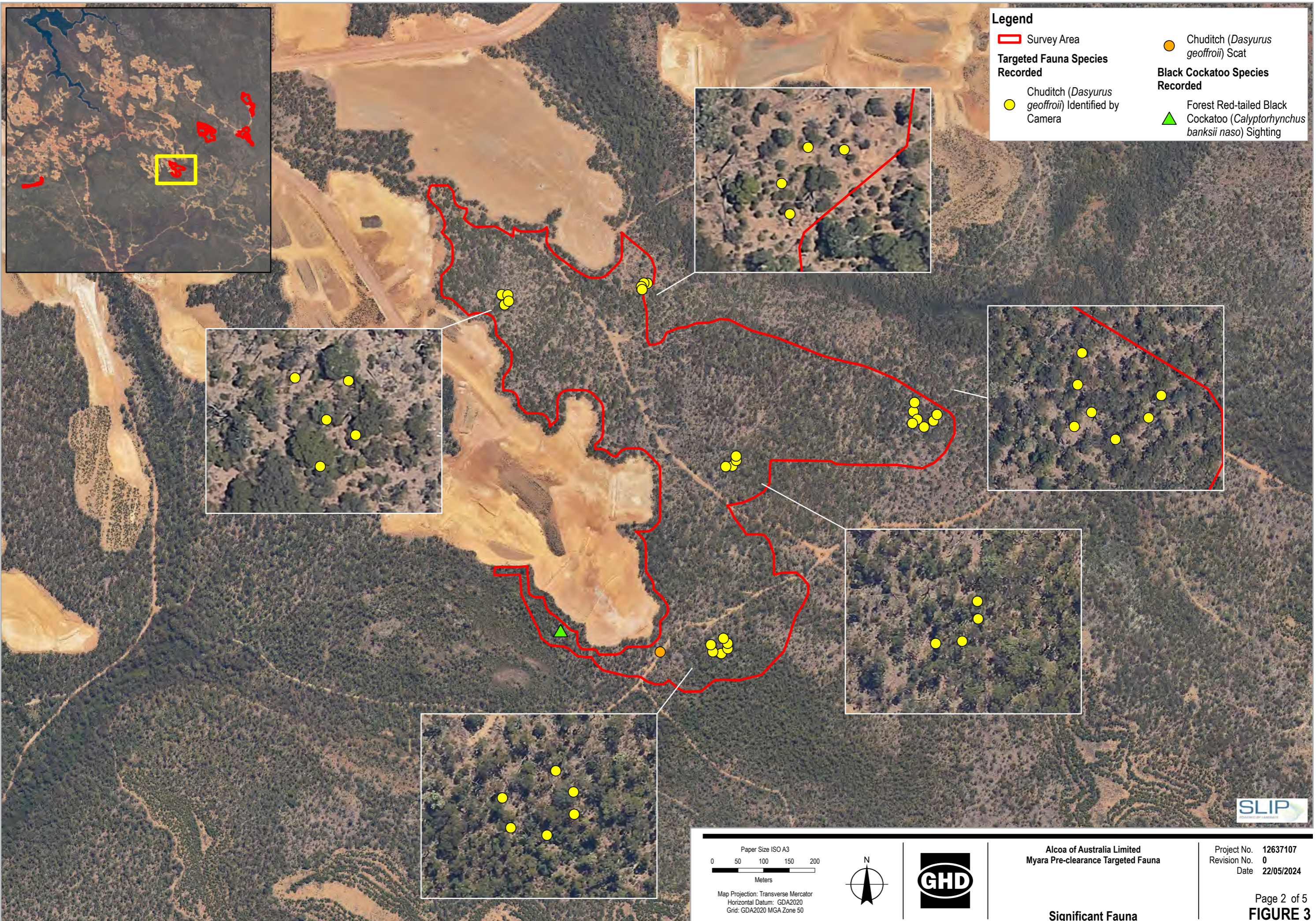


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Myara Pre-clearance Targeted Fauna

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Revision No. 0
Date 22/05/2024

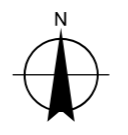
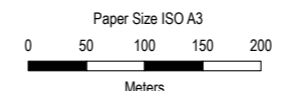
Significant Fauna

Page 1 of 5
FIGURE 3



Legend

▭ Survey Area
● Chuditch (*Dasyurus geoffroi*) Identified by Camera
● Chuditch (*Dasyurus geoffroi*) Scat
▲ Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Sighting



Map Projection: Transverse Mercator
 Horizontal Datum: GDA2020
 Grid: GDA2020 MGA Zone 50

Alcoa of Australia Limited
 Myara Pre-clearance Targeted Fauna

Project No. 12637107
 Revision No. 0
 Date 22/05/2024

Significant Fauna

Page 2 of 5
FIGURE 3

G:\6112637107\GIS\Map\Working\12637107_Figures\12637107_Figures.aprx\12637107_03_SignificantFauna_Rev0
 Print date: 22 May 2024 - 15:48

Data source: Landgate_Subscription_Imagery\WAnow... Created by: r.brown3



Legend

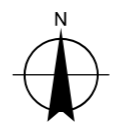
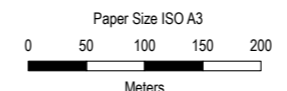
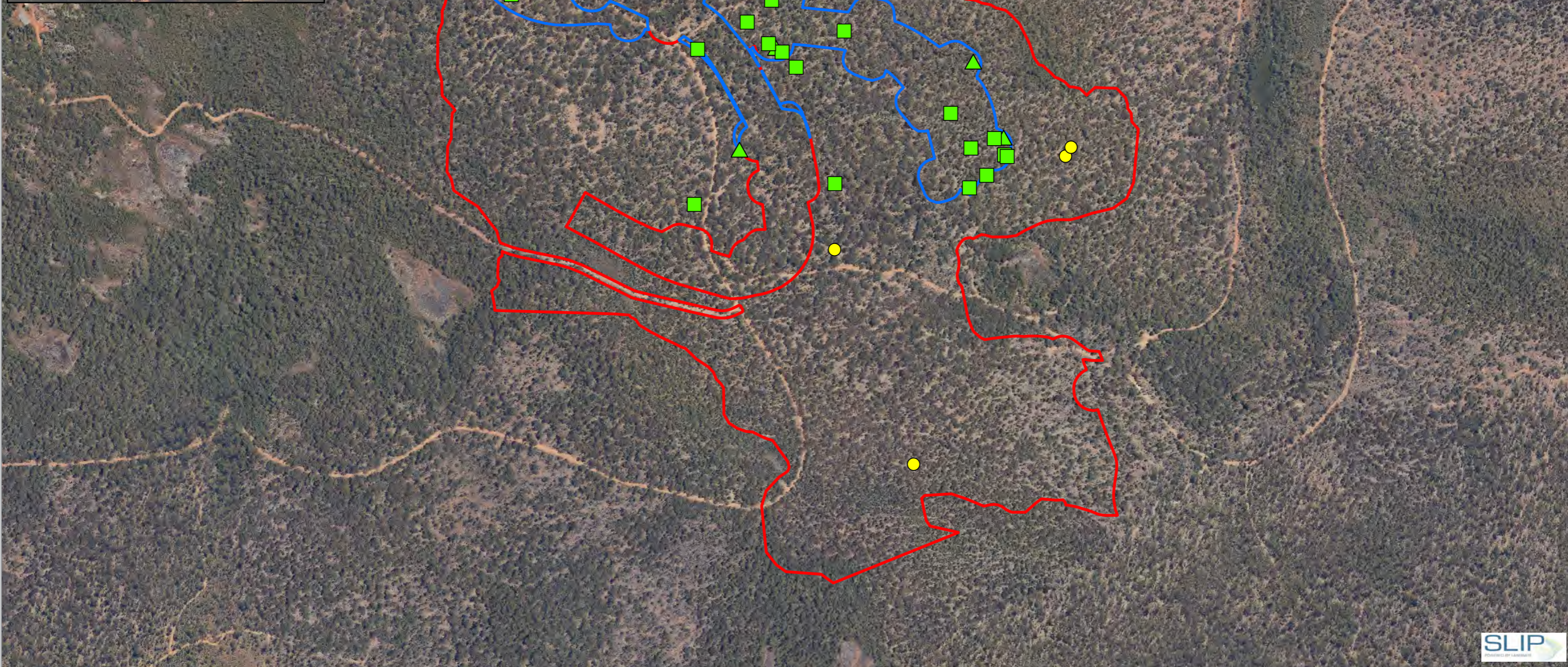
- ▭ Black Cockatoo Survey Area
- ▭ Survey Area

Targeted Fauna Species Recorded

- Chuditch (*Dasyurus geoffroi*) Identified by Camera
- Chuditch (*Dasyurus geoffroi*) Scat

Black Cockatoo Species Recorded

- ▲ Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Sighting
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Foraging Evidence



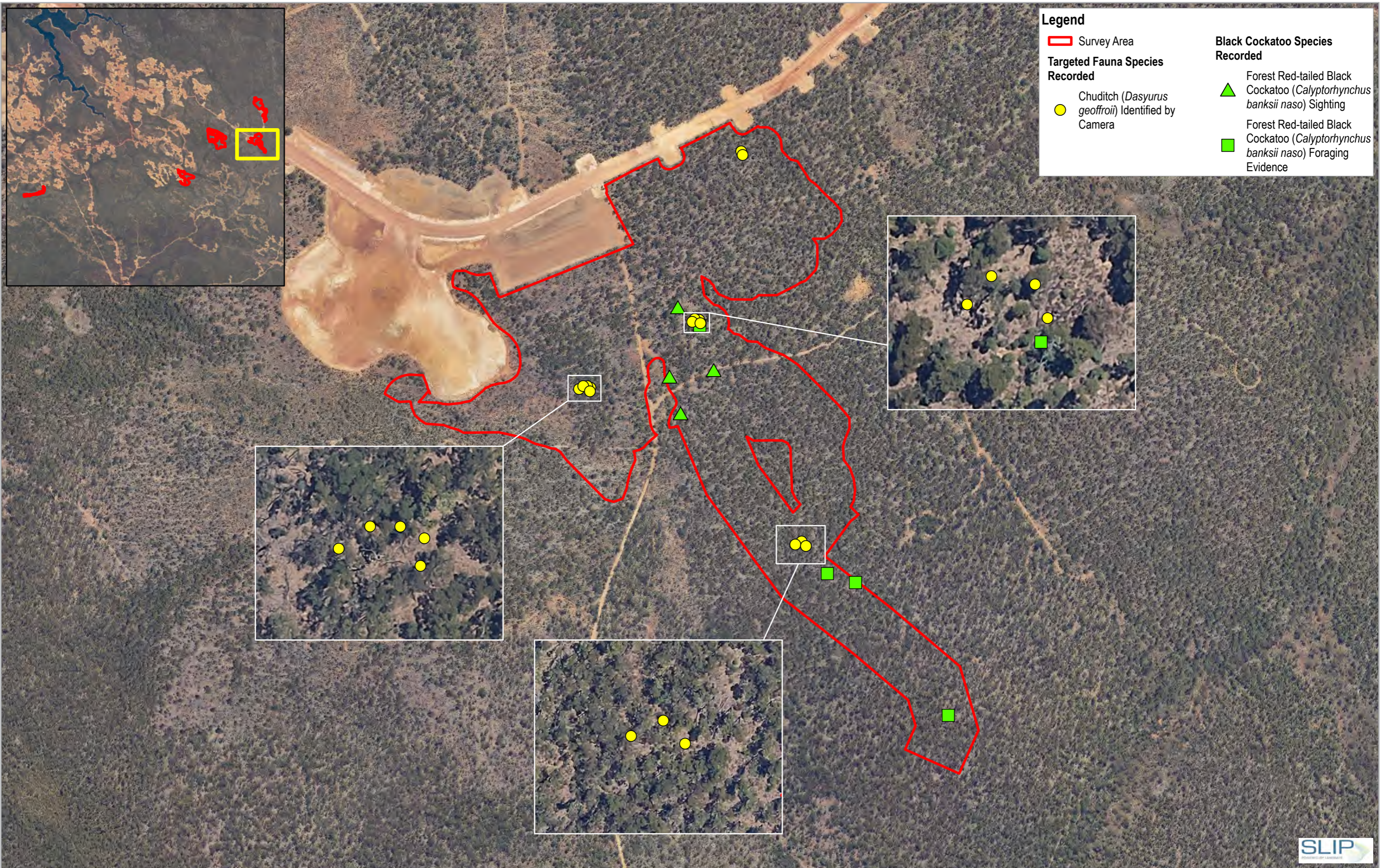
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 Horizontal Datum: GDA2020
 Grid: GDA2020 MGA Zone 50

Alcoa of Australia Limited
 Myara Pre-clearance Targeted Fauna

Project No. 12637107
 Revision No. 0
 Date 22/05/2024

Significant Fauna

Page 3 of 5
FIGURE 3



Legend

Survey Area
 Survey Area

Targeted Fauna Species Recorded

- Chuditch (*Dasyurus geoffroi*) Identified by Camera

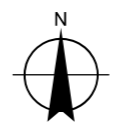
Black Cockatoo Species Recorded

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Sighting
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Foraging Evidence

Paper Size ISO A3

0 50 100 150 200
Meters

Map Projection: Transverse Mercator
 Horizontal Datum: GDA2020
 Grid: GDA2020 MGA Zone 50



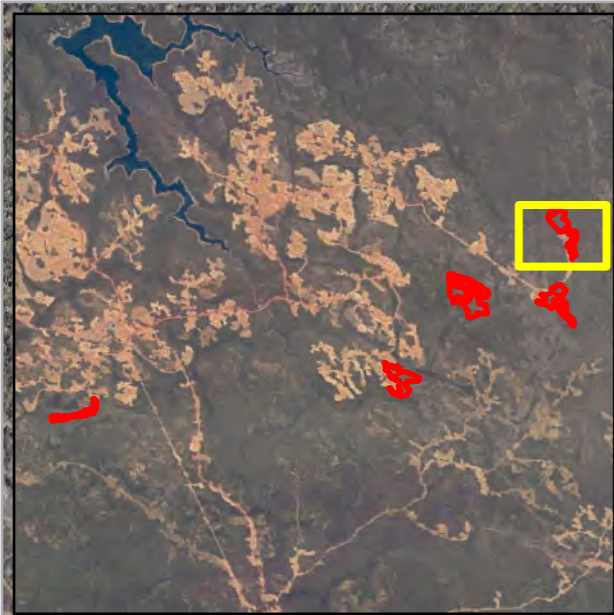
Alcoa of Australia Limited
 Myara Pre-clearance Targeted Fauna

Project No. 12637107
 Revision No. 0
 Date 22/05/2024

Significant Fauna

Page 4 of 5
FIGURE 3





Legend

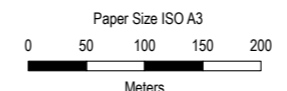
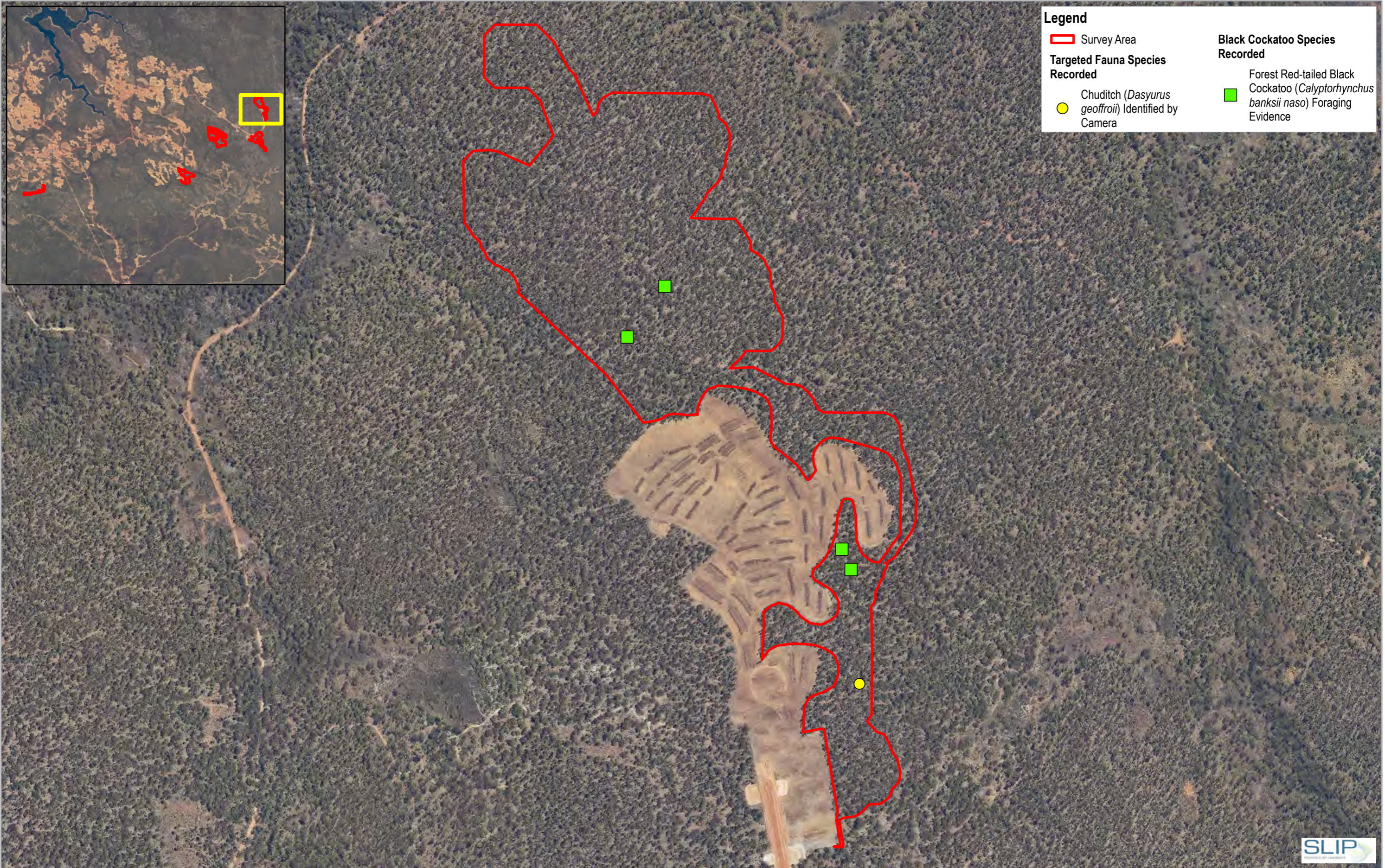
Survey Area

Targeted Fauna Species Recorded

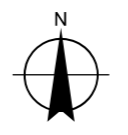
Chuditch (*Dasyurus geoffroi*) Identified by Camera

Black Cockatoo Species Recorded

Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) Foraging Evidence



Map Projection: Transverse Mercator
 Horizontal Datum: GDA2020
 Grid: GDA2020 MGA Zone 50

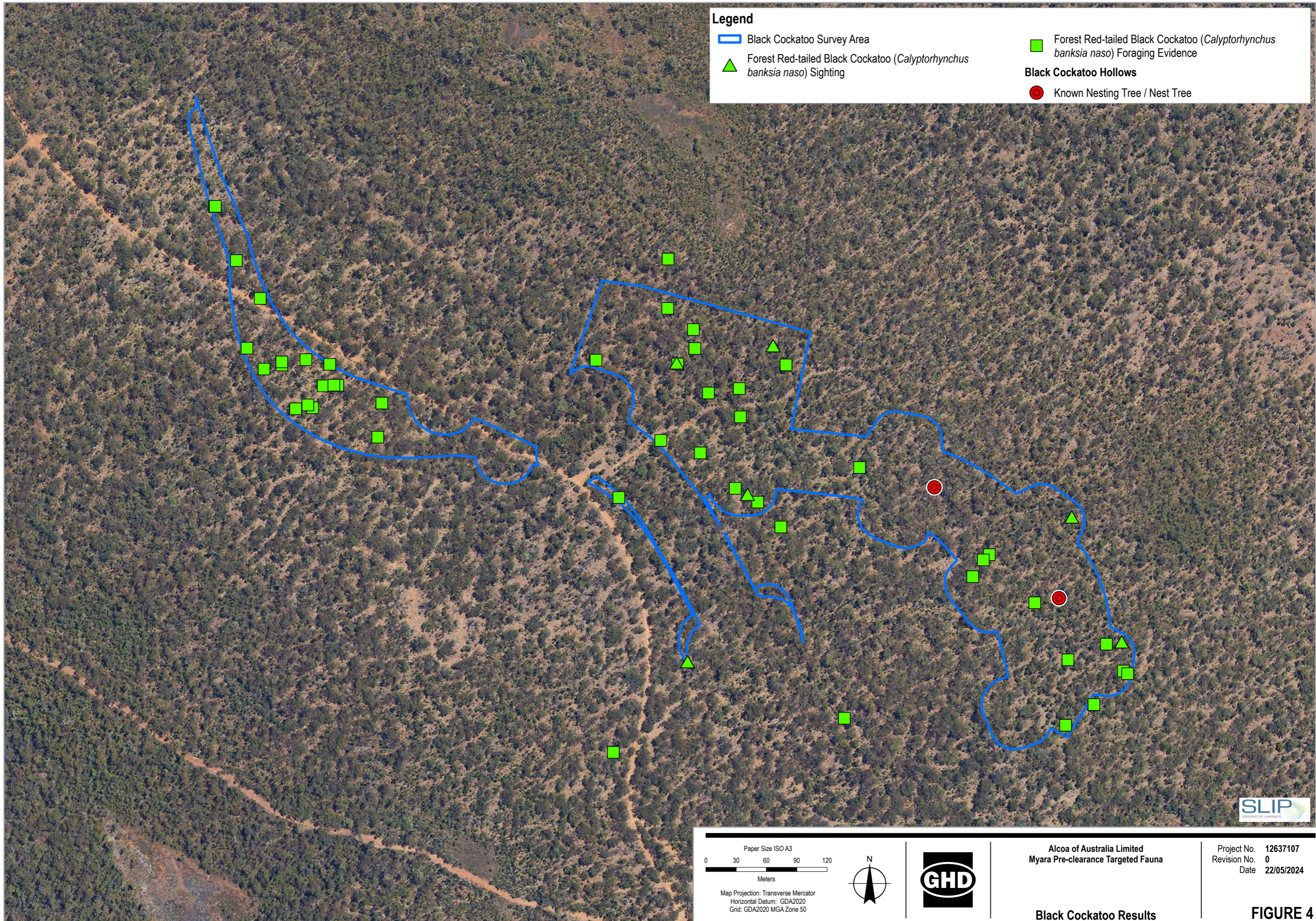


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 Date 22/05/2024

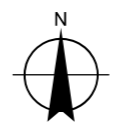
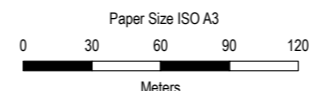
Significant Fauna

Page 5 of 5
FIGURE 3



Legend

- ▭ Black Cockatoo Survey Area
- ▴ Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) Sighting
- ▣ Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) Foraging Evidence
- Black Cockatoo Hollows
- Known Nesting Tree / Nest Tree



Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

Alcoa of Australia Limited
Myara Pre-clearance Targeted Fauna

Project No. 12637107
Revision No. 0
Date 22/05/2024

Black Cockatoo Results

FIGURE 4

Appendix B

Field Data

Species List

Family	Taxa	Species	EPBC listing	DBCA listing	
Mammals					
Dasyuridae	<i>Dasyurus geoffroii</i>	Chuditch	VU	VU	X
Dasyuridae	<i>phascogale tapoatafa wambenger</i>	Southwestern Brush-tailed Phascogale		CD	X
Felidae	<i>Felis catus</i>	Feral Cat	Int	Int	X
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo			X
Macropodidae	<i>Notamacropus irma</i>	Western Brush Wallaby		P4	X
Peramelidae	<i>Isoodon fusciventer</i>	Quenda		P4	X
Phalangeridae	<i>Trichosurus vulpecula</i>	Common Brushtail Possum			X
Suidae	<i>Sus scrofa</i>	Feral Pig	Int	Int	X
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna			X
Birds					
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill			X
Acanthizidae	<i>Sericornis frontalis</i>	White-browed Scrubwren			X
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar			X
Artamidae	<i>Strepera versicolor</i>	Grey Currawong			X
Cacatuidae	<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	VU	VU	X
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu			X
Climacteridae	<i>Climacteris rufus</i>	Rufous Tree Creeper			X
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing			X
Corvidae	<i>Corvus coronoides</i>	Australian Raven			X
Maluridae	<i>Malurus elegans</i>	Red-winged Fairywren			X
Maluridae	<i>Malurus splendens</i>	Splendid Fairywren			X
Monarchidae	<i>Colluricincla harmonica</i>	Grey Strike Thrush			X
Neosittidae	<i>Pachycephala pectoralis</i>	Golden Whistler			X
Pachycephalidae	<i>Pardalotus punctatus</i>	Spotted Pardalote			X
Pachycephalidae	<i>Pardalotus striatus</i>	Striated Pardalote			X
Petroicidae	<i>Eopsaltria griseogularis</i>	Western Yellow Robin			X
Petroicidae	<i>Petroica boodang</i>	Scarlet Robin			X
Phasianidae	<i>Coturnix pectoralis</i>	Stubble Quail			X
Psittaculidae	<i>Platycercus zonarius</i>	Australian Ringneck Parrot			X
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail			X
Turnicidae	<i>Turnix varius</i>	Painted Button Quail			X
Reptiles					
Scincidae	<i>Ctenotus labillardieri</i>	Common south-west Ctenotus			X
Scincidae	<i>Egernia napoleonis</i>	Napoleon Skink			X

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Family	Taxa	Species	EPBC listing	DBCA listing	
Scincidae	<i>Menetia greyii</i>	Common Dwarf Skink			X
Scincidae	<i>Morethia obscura</i>	Shrubland Skink			X

Camera data

Species Name	Common Name	EPBC/BC Listing	Survey Area 1					Survey Area 2					Survey Area 3				
			CAM Yalgoo	CAM 28	CAM W1	CAM 31	CAM X2	CAM W9	CAM X3	CAM HF12	CAM R59	CAM R41	CAM X1	CAM W10	CAM W12	CAM W5	CAM 20
<i>Antechinus flavipes</i>	Mardo		25	6	1	12	7	2	12	13	9	1	8	10	20	9	10
<i>Dasyurus geoffryii</i>	Chuditch	Vu/VU	3		1		6	4	7	6	4	4		2	2	1	1
<i>Phascogale tapoatafa wambenger</i>	Southwestern Brush-tailed Phascogale	CD	4		1	5	1								1	2	
<i>Felis catus</i>	Feral Cat	Int						1					1				
<i>Notamacropus irma</i>	Western Brush Wallaby	P4	1	6	6	5	1	2	1	4			4	3		2	16
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		1	3	2		1		1				5	2	2	5	1
<i>Isodon fusciventer</i>	Quenda	P4	2			3	1							6			
<i>Trichosurus vulpecula</i>	Common Brushtail Possum				3	1	1										
<i>Sus scrofa</i>	Feral Pig	Int							1								
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna			1	1			1						1			1
<i>Sericornis frontalis</i>	White-browed Scrubwren									2			1				
<i>Acanthiza apicalis</i>	Inland Thornbill								1	7			1				
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar																
<i>Strepera versicolor</i>	Grey Currawong						2	1								2	6
<i>Climacteris rufus</i>	Rufous Tree Creeper																
<i>Corvus coronoides</i>	Australian Raven											1					
<i>Malurus elegans</i>	Red-winged Fairywren								1								
<i>Colluricincla harmonica</i>	Grey Strike Thrush																

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<i>Eopsaltria griseogularis</i>	Western Yellow Robin									2						
<i>Coturnix pectoralis</i>	Stubble Quail					1						1				1
<i>Rhipidura albiscapa</i>	Grey Fantail							1	2	2				2		

Species Name	Common Name	EPBC/BC Listing	Survey Area 4					Survey Area 5					Total
			CAM W2	CAM W11	CAM 16	CAM W3	CAM W15	CAM 53	CAM W7	CAM R57	CAM 55	CAM W6	
<i>Antechinus flavipes</i>	Mardo		13	4	13	2	7	2	15	4	16	12	233
<i>Dasyurus geoffryii</i>	Chuditch	Vu/Vu	3	2	5	3						1	55
<i>Phascogale tapoatafa wambenger</i>	Southwestern Brush-tailed Phascogale	CD											14
<i>Felis catus</i>	Feral Cat	Int											2
<i>Notamacropus irma</i>	Western Brush Wallaby	P4	16	7	2	13	8		2	3	2	9	113
<i>Macropus fuliginosus</i>	Western Grey Kangaroo			1		3	1		7	1	2	4	42
<i>Isodon fusciventer</i>	Quenda	P4											12
<i>Trichosurus vulpecula</i>	Common Brushtail Possum												5
<i>Sus scrofa</i>	Feral Pig	Int											1
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna		1							1			7
<i>Sericornis frontalis</i>	White-browed Scrubwren								8		1		12
<i>Acanthiza apicalis</i>	Inland Thornbill												9
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		2										2
<i>Strepera versicolor</i>	Grey Currawong		2					1					14
<i>Climacteris rufus</i>	Rufous Tree Creeper										2		2
<i>Corvus coronoides</i>	Australian Raven												1
<i>Malurus elegans</i>	Red-winged Fairywren		6		3								10
<i>Colluricincla harmonica</i>	Grey Strike Thrush				1								1
<i>Eopsaltria griseogularis</i>	Western Yellow Robin			2					13		2		19

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<i>Coturnix pectoralis</i>	Stubble Quail													3
<i>Rhipidura albiscapa</i>	Grey Fantail						1							8

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Black Cockatoo foraging assessment (DAWE 2022)




Starting score	Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black Cockatoo
10	Start at a score of 10 if your site is native shrubland, Kwongan heathland or woodland, dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.	Start at a score of 10 if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.	Start at a score of 10 if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. This tool only applies to sites equal to or larger than 1 hectare in size.
Attribute/score subtraction	Context adjustor (attributes reducing functionality of foraging habitat)		
Foraging potential (-2)	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.	Subtract 2 from your score if there is no evidence of feeding debris on your site.
Connectivity (-2)	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding (-2)	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting (-1)	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease (-1)	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.

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	Attribute/score subtraction	Carnaby's Black Cockatoo	Baudin's Black Cockatoo	Forest Red-tailed Black Cockatoo
Jarrah-Marri forest	Starting score	10	10	10
	Foraging potential (-2)	-2	-2	0
	Connectivity (-2)	0	0	0
	Proximity to breeding (-2)	0	0	0
	Proximity to roosting (-1)	0	0	0
	Impact from significant plant disease (-1)	0	0	0
	Total score	8	8	10
	Appraisal	The Jarrah-marri forest contains suitable foraging habitat for Carnaby's Black Cockatoo however, no signs of foraging evidence from Carnaby's Black Cockatoo were recorded within the Survey Area, resulting in a subtraction in the total score. The habitat has good connectivity with foraging habitat within 12kms of the Survey Area. Previously recorded breeding trees are recorded within the region and two breeding trees and one potential breeding tree was recorded within the Survey Area. No Roosting sites were recorded with the Survey Area, however, roosting has been recorded within the region. No signs of Phytophthora or Marri canker was observed. Frequent fires have the potential to affect Carnaby's Black Cockatoo.	The Jarrah-marri forest contains suitable foraging habitat for Baudin's Black Cockatoo however, no signs of foraging evidence from Baudin's Black Cockatoo were recorded within the Survey Area, resulting in a subtraction in the total score. The habitat has good connectivity with foraging habitat within 12kms of the Survey Area. Previously recorded breeding trees are recorded within the region and two breeding trees and one potential breeding tree was recorded within the Survey Area. No Roosting sites were recorded with the Survey Area, however, roosting has been recorded within the region. No signs of Phytophthora or Marri canker was observed. Frequent fires have the potential to affect Baudin's Black Cockatoo,	The Jarrah-marri forest contains suitable foraging habitat with numerous signs of Forest Red-tailed Black Cockatoo foraging evidence on Marri and Jarrah nuts were recorded within the Survey Area. The Survey Area has good connectivity with foraging habitat within 12kms and the greater Jarrah forest. Previously recorded breeding trees are recorded within the region and two breeding trees and one potential breeding tree was recorded within the Survey Area. No Roosting sites were recorded within the Survey Area, however, from the number of Forest Red-tailed Black Cockatoos sighted it is likely they're are roosting trees near by. No signs of Phytophthora or Marri canker was observed. Frequent fires have the potential to affect Forest Red-tail Black Cockatoo

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Chuditch camera capture (*Dasyurus geoffroi*) physical assessment data

Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 1	CAM W11	11/04/2024	Row of three defined dots with two combined dots above on left side		<p><u>Chuditch Left Side:</u></p> 
	CAM W3 (Survey area 4)	11/04/2024 12/04/2024			<p><u>Chuditch Right Side:</u></p> 


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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 2	CAM W11 (Survey Area 4)	13/04/024	Circle of dots on left flank		<p><u>Chuditch Right Side:</u></p>  <p><u>Chuditch left Side:</u></p> 






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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 3	CAM W2	12/04/2024	Two rows of spots on right side. Bottom row has 6 spots top row has 4		<u>Chuditch Left Side:</u> 
	CAM16 (Survey area 4)	14/04/2024			<u>Chuditch Right Side:</u> 
		16/04/2024			



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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 4	CAM W6 (Survey Area 5)	17/04/2024			<p><u>Chuditch Left Side:</u></p> <p><u>Chuditch Right Side:</u></p>  <p><u>Left side</u></p>





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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image		
Chuditch 5	CAM 16 (Survey area 4)	10/04/2024	Notch in left ear				
		12/04/2024	Little spots on left side				
		13/04/2024					
Chuditch 6	CAM W3 (Survey area 4)	20/04/2024					



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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 6	CAM HF12 (Survey Area 2)	16/04/2024			
Chuditch 7	CAM HF12 (Survey Area 2)	22/04/2024			



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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 8	CAM HF12 (Survey Area 2)	22/04/2024			
Chuditch 9	CAM HF12 (Survey Area 2)	24/04/2024			
Chuditch 10	CAM X3 (Survey Area 2)	10/04/2024			




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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 11	CAM 20	18/04/2024	Singificantly reduced tail/more than half missing, with line of three vertical spots down back right hand side flank and two small horizontal spots close to tail		 <p>2024-04-18 12:04:16 AM N 27.3 1.9 21.9C HC500 HYPERFIRE</p>
Chuditch 12	CAM W12	22/04/2024 23/04/2024	Distinctly bare covering across front half of body. Horizontal line of four, equally-spaced dots across left flank.		 <p>2024-04-22 9:07:24 PM N 27.3 1.9 11.9C HYPERFIRE 2 COVERT</p>


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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 13	CAM Yalgoo	18/04/2024 21/04/2024	Two distinct white spots along front of snout, circular ring of five spots along middle of body on left side flank.		 A night-vision camera image showing a chuditch in a natural, brushy environment. The animal is partially obscured by the vegetation. The image includes a timestamp '2024-04-18 00:44:56' and 'M 1/3' at the top, and 'HF2 PRO COVERT' and a logo at the bottom.
Chuditch 14	CAM W5 CAM R41 CAMW9	23/04/2024 16/04/2024 15/04/2024 16/04/2024	Distinct loss of tail, approximately one-third missing, bare coverage across front half of body.		 A night-vision camera image showing a chuditch in a natural, brushy environment. The animal is partially obscured by the vegetation. The image includes a timestamp '2024-04-23 10:09:42 PM' and 'M 2/3' at the top, and 'HYPERFIRE 2 COVERT' and a logo at the bottom.




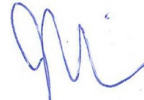
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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
					
Chuditch 15	CAM X2	11/04/2024 12/04/2024 13/04/2024 17/04/2024	Distinct circular pattern of spots across front left shoulder.		
Chuditch 16	CAM R41 CAM W9	10/04/2024 11/04/2024 22/04/2024 24/04/2024	Two vertical white spots down the front of snout, single, large white spot in the middle of left shoulder and white scarring directly behind left ear.		

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Chuditch ID	Camera ID	Date	ID marks	Spot pattern diagram	Remote camera Image
Chuditch 17	CAM W1	09/04/2024 10/04/2024 12/04/2024 13/04/2024 14/04/2024 15/04/2024 17/04/2024	Three vertical white spots in the middle of right flank with single horizontal white spot directly next to the same horizontal line. Small scar underneath left eye.		

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Project name		Alcoa Myara Terrestrial Fauna Assessments					
Document title		Myara pre-clearance targeted fauna assessment [Document subtitle]					
Project number		12637107					
File name		12637107-MEM-Myara Preclearance.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S0	Rev A	D. Goldspink, M. Wood	J Collins, R. Browne-Cooper		J Collins		22/05/24
S4	Rev 0	D. Goldspink, M. Wood	J Collins, R. Browne-Cooper		J Collins		23/05/24
[Status code]							
[Status code]							
[Status code]							

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