

R.W Corkery & Co. / Bowdens Silver

Koala Population Survey

Mid-Western Regional LGA NSW
September 2022



AREA (EHC)
Bowdens Silver Koala Survey
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Advanced Regional Environmental Assessments (AREA)

- ✓ Environmental impact assessment, auditing, and approvals
 - ✓ High level preliminary environmental assessment (PEA)
 - ✓ Review of environmental factors (REF)
 - ✓ Peer review
 - ✓ Community engagement
 - ✓ Biobanking and biodiversity offsetting assessments
 - ✓ Aboriginal heritage assessments and community walkovers
 - ✓ Landscape design
-

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Document Controls


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1 Introduction

1.1 Background

AREA Environmental & Heritage Consultants (AREA) has been engaged by R.W Corkery & Co Pty Ltd to conduct a survey for *Phascolarctos cinereus* (Koala) populations within the Bowdens Silver mine site and adjacent proposed offset areas (the study area). The study area is located near the village of Lue, approximately 30 kilometres east of Mudgee in central New South Wales (Figure 1-1).

This report will summarise methods used for and results of the population survey.

1.2 The study area

The study area for the survey comprises the Mine Site and the proposed biodiversity offset area for the Bowdens Silver Project (SSD-5765). This location has been subject to previous field survey by EnviroKey with the results of that survey described in the Biodiversity Assessment Report for the Bowdens Silver Project (EnviroKey, 2022). AREA is also aware that Niche Environment and Heritage completed a bushfire impact assessment of Matters of National Environmental Significance for the Project (Niche, 2021).

The study area was comprised of 67 survey sites established in a grid formation, with a 500-metre spacing between points. The aim of using a grid was to eliminate site selection bias, to maximise representation of the various landscapes and vegetation types within the study area, and to estimate localised levels of habitat use by Koalas more accurately across the entire study area.

Each survey site was defined by a centre point with a 100-metre radius buffer. The locations of all survey sites within the study area are shown in Figure 1-2.

Figure 1-1: Location of the study area

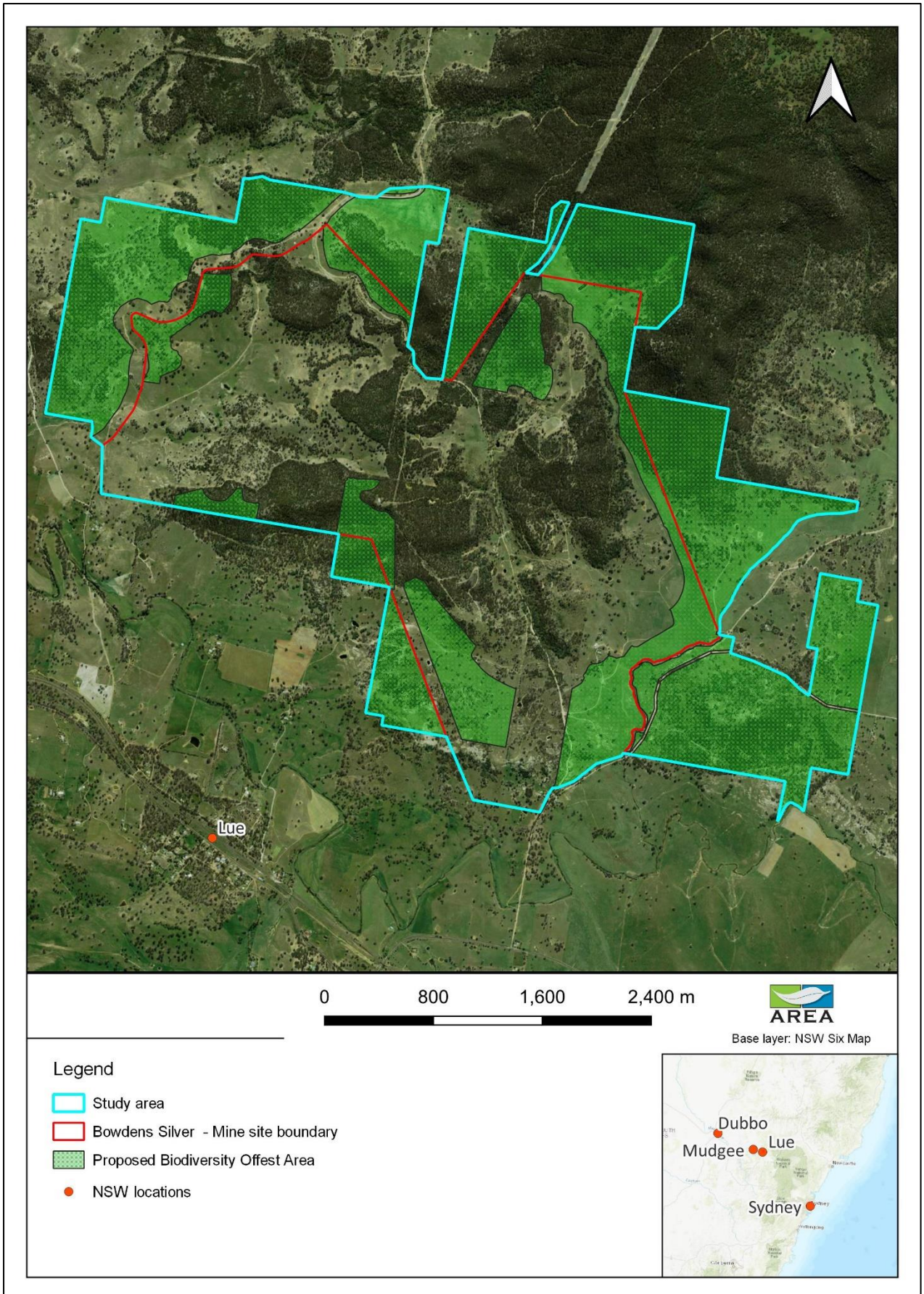
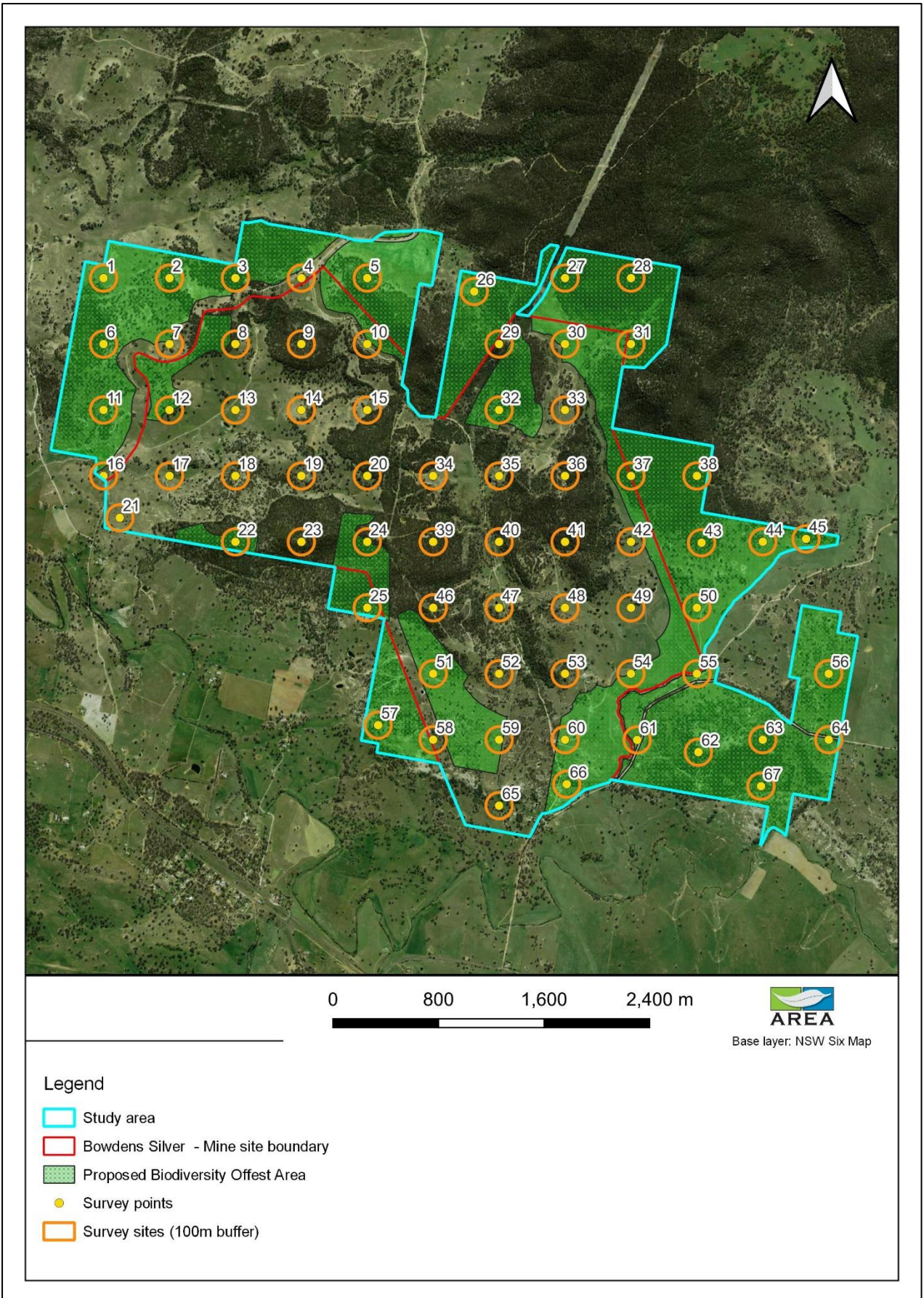


Figure 1-2: Survey points



2 Methods

2.1 Personnel

The survey was completed by appropriately qualified and experienced ecologists from AREA with the names, position and qualifications of each person presented in Table 2-1. Also assisting with the survey were Till Armstrong and Matt Butterworth from Bowdens Silver. The survey occurred from 21 March to 25 March 2022 and 4 April to 8 April 2022.

Table 2-1: Summary of AREA project team qualifications

Name	Position	CV Details	Role in this ecology report and experience
Greg Bible	Environmental Consultant	<ul style="list-style-type: none"> B. Env. Sc. University of New England BSc. (Hons) University of New England WHS – White Card (OL8644384) First Aid Certificate (11228944-7487059) 	Field assessment Report writing
Rohan Saunders	Cadet Environmental Consultant	<ul style="list-style-type: none"> B. Env. Sc. Charles Sturt University (in progress) WHS - White card 	Field assessment
Gabrielle Green	Cadet Environmental Consultant	<ul style="list-style-type: none"> B. Env. Sc. University of New England (in progress) WHS - White card AHCPCM201- Recognising grasses Wires training 	Field assessment
Addy Watson	Manager Biodiversity	<ul style="list-style-type: none"> Grad. Dip. Captive Vertebrate Management, Charles Sturt University Grad. Cert. Social Impact, University of NSW B. Env. Sc. University of New England. Diploma Project Management NSW Biodiversity Assessment Method Accredited Assessor (BAAS19066) Lean Six Sigma Certificate (Sydney Uni) WHS White Card Apply First Aid. Certificate number: 07328 AHCPCM201- Recognising grasses 	Project management Editing and QMS

2.2 Survey method

The survey methodology used was based on the Spot Assessment Technique (SAT) developed by Phillips & Callaghan (2011). The SAT involves a radial assessment of Koala activity within the immediate area surrounding a tree of any species known to be utilised by Koala, or otherwise considered to be of some importance for Koala conservation and/or management purposes.

For the purposes of this survey all trees with a diameter at breast height (DBH) of 20 centimetres or greater was deemed to be potentially utilised by Koala and were included in the survey.

2.2.1 Survey site allocation

The location survey sites were determined at desktop prior to field survey. A randomly generated grid comprised of points with a 500-metre separation was overlaid over the study area to determine the centre points of survey sites. A 100-metre radius buffer was placed around each centre point to define each survey site boundaries.

Note that, prior to survey, some survey sites were moved marginally where they encroached onto properties that were not accessible for survey. Also, the location of two sites were adjusted during survey, for safety reasons, to avoid steep rocky inclines which posed insurmountable risks of trips and falls. No survey site was moved more than 100 metres, so the grid-based site selection was not notably affected.

2.2.2 Method summary

At each survey site:

- The centre point was located using mobile GPS and the closest tree was marked with paint.
- A search for Koala scat was undertaken within 100 centimetres of the base of the marked tree, dedicating at least two person minutes. This process was repeated for each of the next closest 29 trees to the centre point. Where fewer than 30 trees occurred within a survey site, all trees suitable within the 100 metre site buffer only were assessed.
- GPS points were recorded to mark the location of each tree searched, the tree species, and whether Koala scat was found
- Geotagged photographs were taken of any found Koala scat.

2.3 NSW Koala Likelihood Map

The Koala Likelihood Map (KLM) administered by the NSW Department of Planning and Environment (formerly the Department of Planning, Infrastructure and Environment) was accessed to determine the probability of finding Koalas within the survey area.

The KLM was developed by the New South Wales government to aid with the conservation and management of koalas and predicts the likelihood of finding a koala relative to other arboreal mammals across a 10-kilometre grid covering New South Wales. It is built using existing arboreal mammal records from the past 20 years (currently 1999 to 2019) and represents the likelihood of koalas as the proportion of all records within a grid cell that are koalas.

Each grid cell is assigned a value for the likelihood of koalas (p) based on a binomial distribution with each record being a koala (K) or another arboreal mammal. The proportion of all records within a cell (N) (all subject species including koalas) that are koalas represents the likelihood: $p = K/N$

This provides the relative likelihood of koalas being recorded, with a value between 0 (no koalas) and 1; i.e., a higher value represents a higher relative likelihood.

2.4 Limitations

- Poor condition of ground surface at the base of some surveyed trees reduced the likelihood of finding Koala scat if present. For example, some ground surfaces were considerably altered from feral pig rooting. Similarly, some survey sites were overgrown with dense weed cover, particularly *Cineraria lyrata*.
- Large amounts of recently shed decorating bark occurred at the base of some surveyed trees, which made it difficult to determine if Koala scats were present within the allocated survey time.

- The distance between grid points used for the survey was 500 metres. The Biodiversity Assessment Method Survey Guide for Koala (DPE, 2022), released after the survey occurred, recommends a grid point distance of no more than 250 metres, where more than 50 hectares of suitable Koala habitat is being assessed.

3 Results

3.1 Study area summary

A total of 67 sites were surveyed in the study area. No Koala were observed during the survey.

Of 67 sites, 17 (or approximately 25 percent of sites) indicated Koala activity based on the presence of Koala scat. Figure 3-2, on the following page, shows the locations of sites where Koala activity was confirmed.

Six sites indicating Koala activity were within the proposed biodiversity offset areas and 11 were within the proposed operational areas of the mine site.

The locations of trees searched within survey sites showing Koala activity are provided in Appendix A.

3.2 Tree species with Koala activity recorded

Results of the survey indicate the use of a variety of tree species by Koala in the study area. In total, 33 individual trees were recorded with Koala scat presence, across ten tree species (Figure 3-1).

The most recorded species with found Koala scat was *Eucalyptus rossii* (Inland Scribbly Gum) with eight records. A strong association with stringybark species was found with six records of *Eucalyptus macrorhyncha* (Red Stringybark) and three records of *Eucalyptus agglomerate* (Blue Stringybark). *Callitris endlicheri* (Black Cypress Pine), which is not a Koala food tree, was recorded four times with Koala scat.

Figure 3-1: Number of Koala scat records per tree species

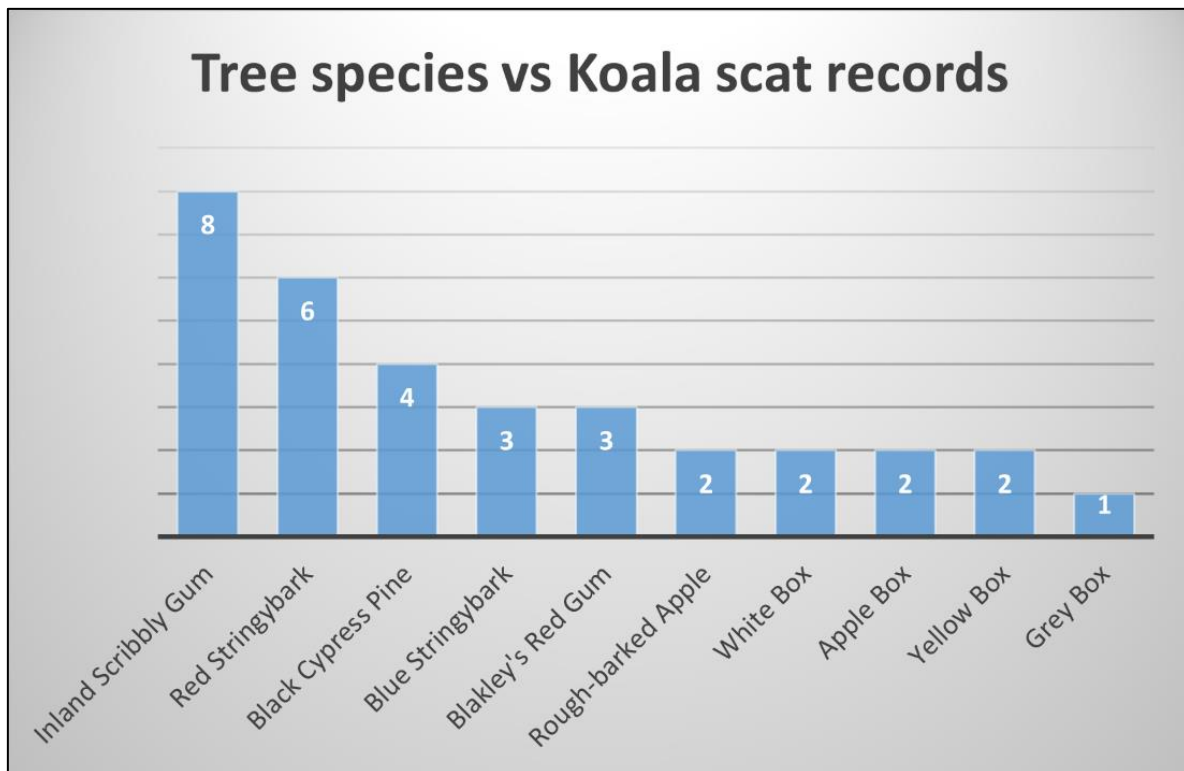
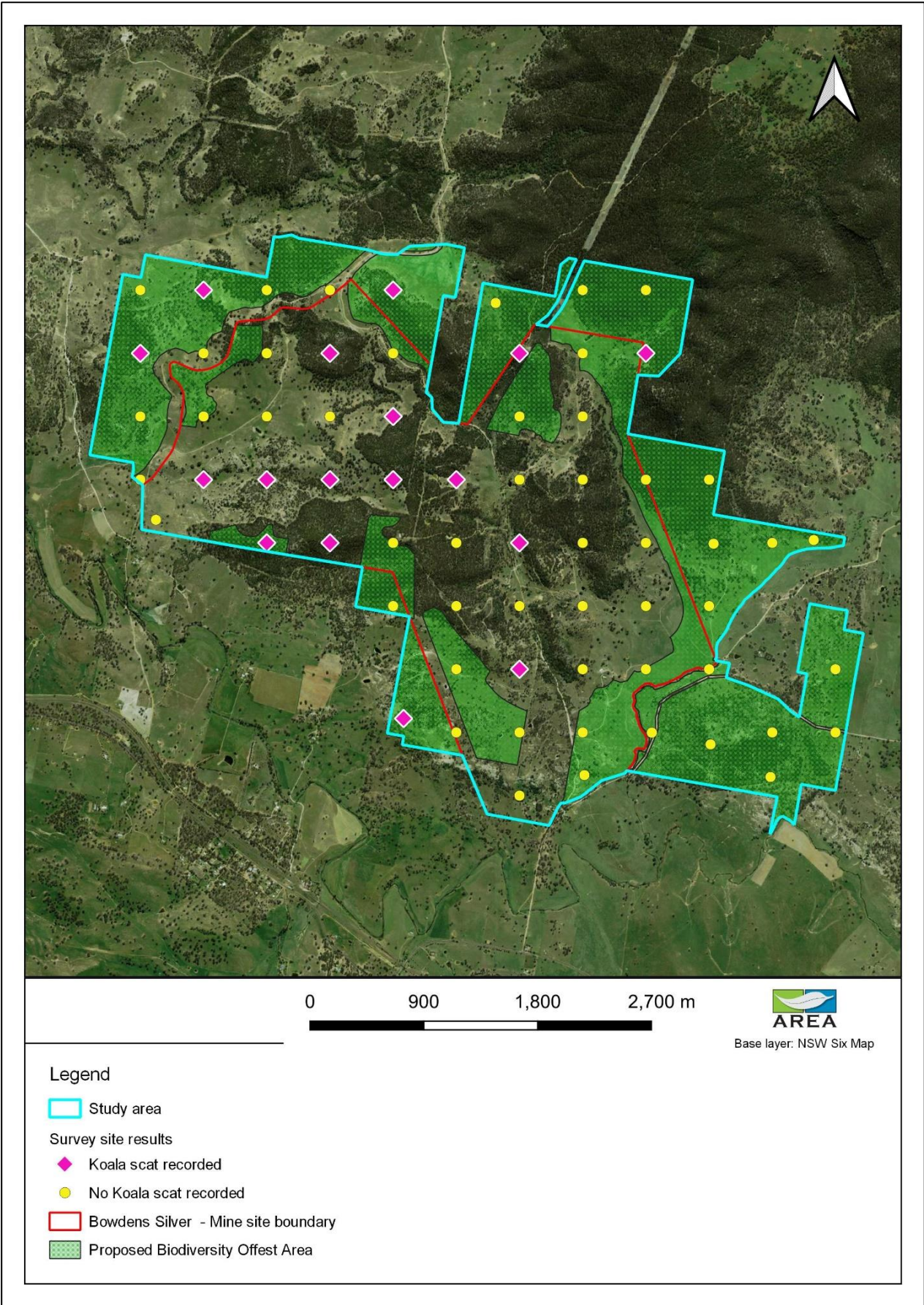


Figure 3-2: Survey results within the study area



3.3 Activity level results (SAT)

The 'activity level' for an area is simply expressed as the percentage equivalent of the proportion of surveyed trees within **any site that had a Koala scat recorded** within the prescribed search area (in this case the study area). Activity level results for the 17 sites where activity was identified, including the mean (for the total study area), are shown below in Table 3-1.

The highest activity level at an individual survey site was 13.3 percent, at Site 18, while the lowest was 3.3 percent at six different survey sites. The mean activity level across the study area was 6.5 percent.

A categorisation of activity levels has been determined by Philips & Callaghan (2011) based on application of the SAT in different regions of NSW, while considering Koala population densities taken from previous studies in those regions. These studies categorise the Western Slopes and Plains as a medium to high population density area, and activity levels within this area have been categorised as the following:

- High use > 46.72 percent
- Medium use ≥ 35.84 percent but ≤ 46.72 percent
- Low use < 35.84 percent

Table 3-1: Activity levels per site and across study area

Site #	Trees surveyed	Trees with scat	Activity level (percent)
2	30	3	10.0
5	30	1	3.3
6	30	1	3.3
9	30	3	10.0
15	30	2	6.7
17	30	2	6.7
18	30	4	13.3
19	30	2	6.7
20	30	1	3.3
22	30	2	6.7
23	30	2	6.7
29	30	1	3.3
31	30	1	3.3
34	30	2	6.7
40	30	1	3.3
52	30	2	6.7
57	30	3	10.0
Total (study area)	510	33	6.5

The activity level for the study area has been estimated as the mean activity level of the 17 sites showing Koala activity, which was determined to be 6.5 percent. This figure indicates the study area is a 'low use' area for Koala based on population densities for the Western Slopes and Plains region.

3.4 Koala Likelihood Mapping

The study area corresponds with two grid cells on the Koala Likelihood Map (KLM), with the larger proportion (approximately 83 percent) of the study area occurring in one cell and the remaining 17 percent occurring in another (Figure 3-3).

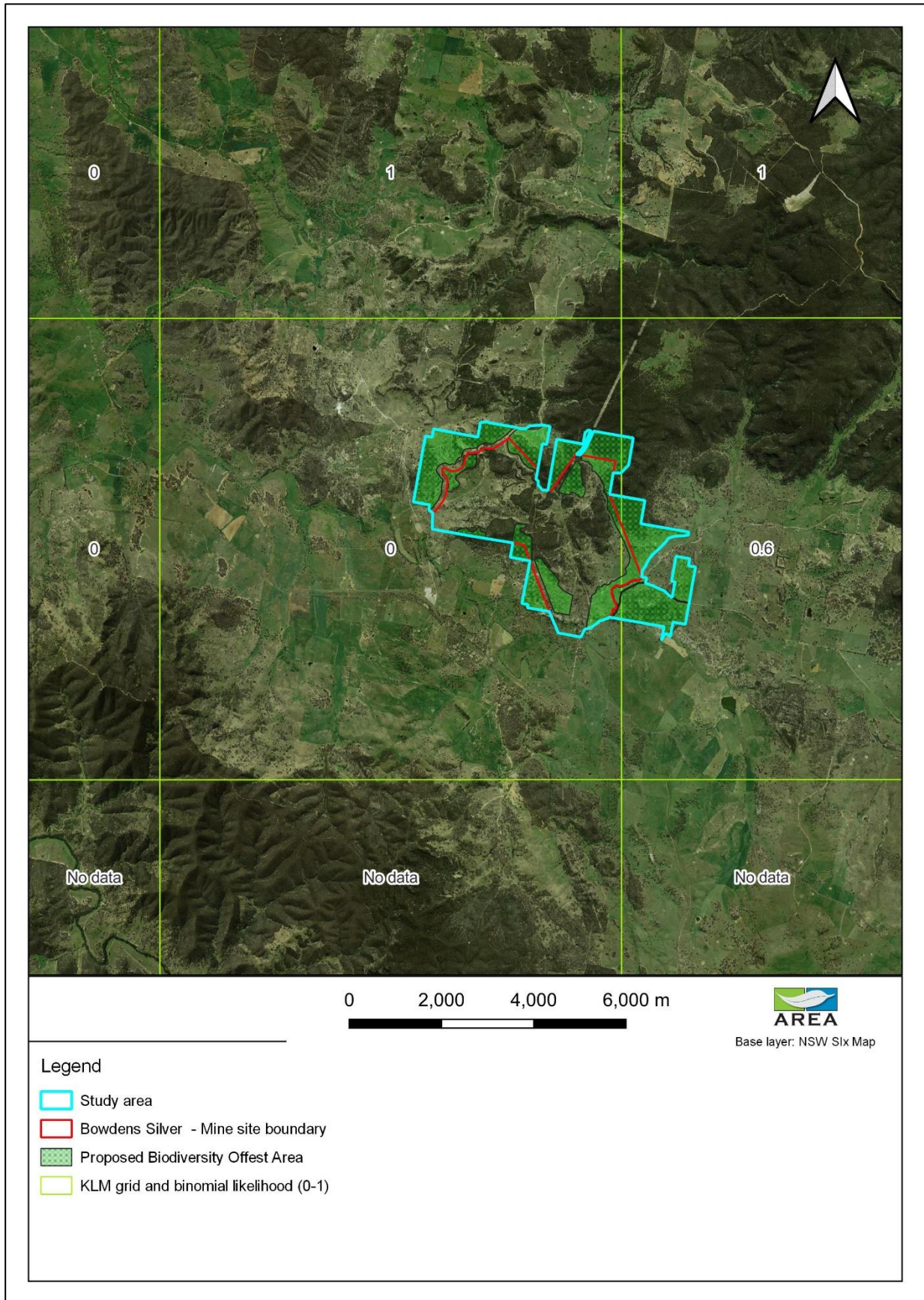
The KLM map shows a p value of zero for the grid corresponding with the larger proportion of the study area. Based on mammal records from the past 20 years, this p value indicates a zero percent probability of finding Koala in that mapped grid cell.

The KLM map shows a p value of 0.6 for the grid corresponding with the smaller proportion of the study area (95 percent of which is proposed offset areas). This p value indicates a 60 percent probability of finding Koala in that mapped grid cell.

Both KLM grid cells to the north of the study area have a p value of one, indicating a 100 percent probability of finding Koala in those areas.

No data is recorded in any of the grids to the south of the study area.

Figure 3-3: Koala Likelihood Map (KLM) (DPIE, 2019)



4 Discussion

The survey has shown that the study area is a **low-use** area for Koala. This result is consistent with previous studies in the area (i.e. EnviroKey 2022), including the Koala likelihood Map, administered by the NSW Department of Planning and Environment (formerly the Department of Planning, Infrastructure and Environment).

Phillips & Callaghan (2011) state that a cautionary approach should be taken when interpreting results where a SAT site returns an activity level in the 'low use' range. Results should only be interpreted in location-specific habitat utilisation. For example, some areas may return a low use result despite being in an area that is otherwise known to be Koala habitat with a medium to high population. Historical disturbance has been named as a consideration when interpreting low use range SAT results.

Regardless, low activity levels are correlated with low-density Koala populations. Low density koala populations are not necessarily unimportant in ecological terms and have been shown to exist as stable populations, naturally occurring in some areas (Phillips & Callaghan, 2011). More likely however, given the very low activity level results returned, a *transitory* Koala population occurs within the broader landscape. An alternate survey method may provide more representative data on localised Koala movement patterns but would be very unlikely to change the overall activity level categorisation. The mean activity level recorded across sites was only 6.5 percent, so Koala evidence at those sites would need to be a factor of six higher to place the population in the 'medium-use' category.

The relatively high number of Koala scat records for non-food trees (four records in Black Cypress Pine) is also evidence of a transient Koala population, where Koala are present but seeking refuge or shelter in non-food trees as they move through the landscape within the study area. This is supported by the Koala Likelihood Mapping which shows a zero probability of Koala occurring in 83 percent of the study area and 60 percent probability of Koala occurring in the remaining 17 percent of the study area. Of this 17 percent, 95 percent is within the proposed biodiversity offset area. Further, this map identifies a high probability of Koala occurring in areas outside of the study area and supports the possibility of a Koala movement corridor through the study area.

It should be noted SAT activity level categories were determined based on Koala population numbers prior to 2011. Current Koala numbers are shown to be substantially lower across most of NSW, likely due to multiple impacts including drought, bushfire, vegetation clearing, predation, vehicle strike, Chlamydia infection, and retroviruses (McCallum et al., 2018) (Charalambous & Narayan, 2020). Given this, activity level benchmarks may now be lower than they were in 2011, if Western Slopes and Plains populations have also significantly declined.

Regardless, the results of this survey indicate a very low use of the study area by Koala.

5 Addendum – Koala sighting surveys

Additional rapid surveys were undertaken at two locations where Koala sightings were reported or recorded outside of the survey sites at the time of survey.

A member of the public reported seeing a Koala in a tree on Pyangle Road, on the boundary of Bowdens Silver mine site, nearby to Survey Site 66, on the 22 March 2022. Tom Purcell of Bowdens Silver inspected the tree that afternoon and found a handful of Koala scat, but the Koala had since relocated.

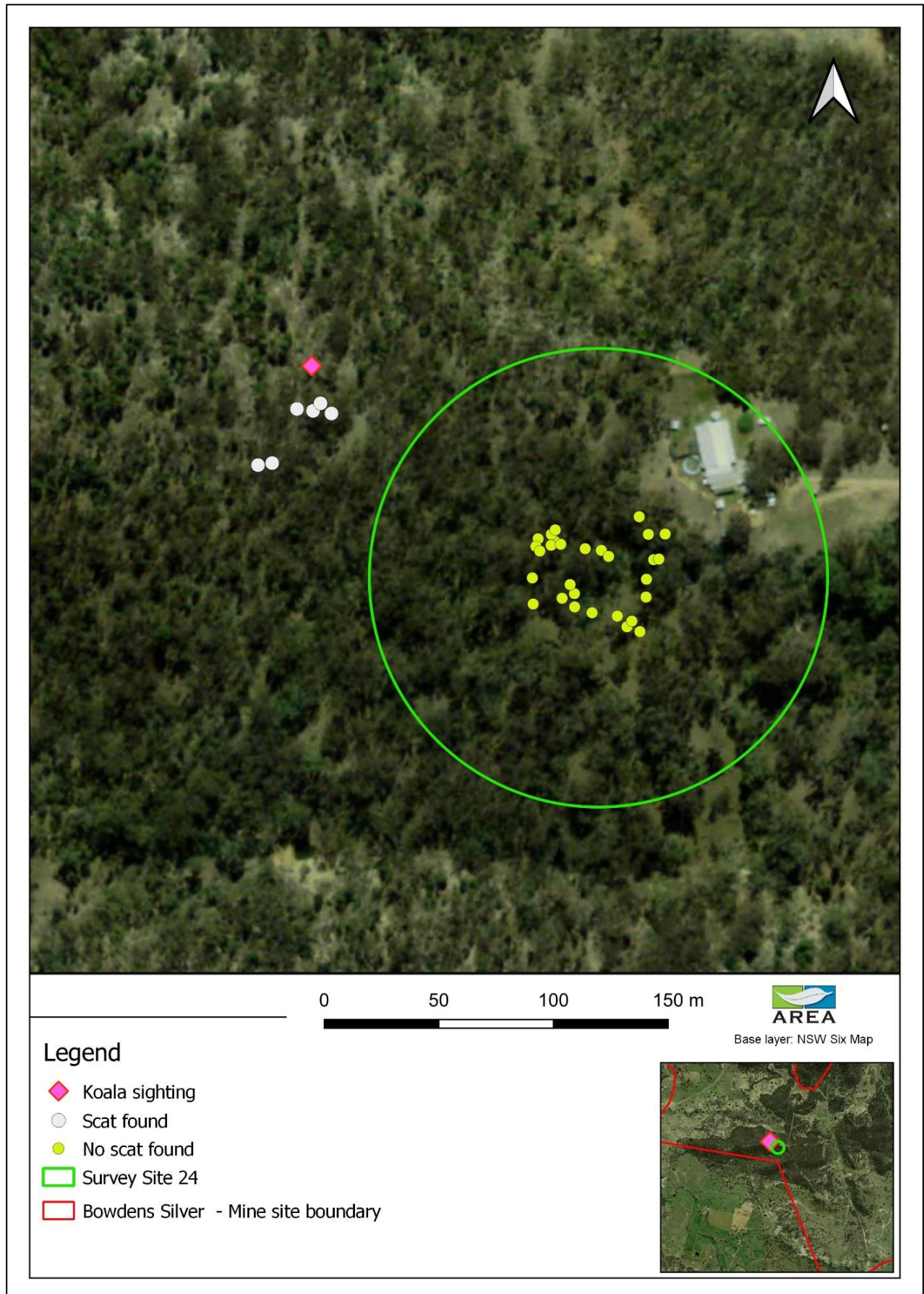
AREA and Bowdens Silver staff conducted a rapid survey of the site the following day (23 March 2022), which included a survey of 30 nearby trees and a meandering search in nearby woodlands. No Koala were found, and none of the sampled trees were found to have Koala scats. This was consistent with findings of the larger survey of the study area, where a nearby survey site, Site 66, also returned no Koala activity. The location of the sighting in proximity to Survey Site 66, as well as results from the rapid survey, are shown below in Figure 5-1.

Till Armstrong of Bowdens Silver recorded a Koala nearby to Survey Site 24 in part of the proposed biodiversity offset area on 31 March 2022. A rapid meandering search for evidence of Koala was conducted in an approximately 50-metre radius of the sighting location on 4 April 2022. No Koala were observed at this time, but a relatively high number of Koala scats were found in proximity to the sighting location (six trees with scat). No evidence of Koala activity was recorded at nearby Survey Site 24, however; the site is on a relatively steep slope with thick shrubby understory, unlikely to be frequently utilised by Koalas.

Figure 5-1: Koala sighting location near Survey Site 66



Figure 5-2: Koala sighting location and recorded scat near Survey Site 24



6 References

- Charalambous, R., & Narayan, E. (2020). A 29-year retrospective analysis of koala rescues in New South Wales, Australia. *Plos one*, 15(10), e0239182.
- DPE. (2022). Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide. Accessed from:
<https://www.environment.nsw.gov.au/research-and-publications/publications-search/koala-phascolarctos-cinereus-biodiversity-assessment-method-survey-guide>
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Appendix A: Survey site maps (Koala activity)

