Bower Ecology
Survey | Planning | Strategy

Cumner Road Subdivision,
White Rock, Ripley Valley, Queensland
(EPBC 2014/7388)

Compliance report
Period: 03 December 2022 to 03 December 2023

23/02/2024

Document Tracking

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Executive Summary

Key points in this reporting period:

- The EPBC Act approved action management has commenced, with approximately 60% of the total urban development footprint cleared of vegetation.
- The project is mostly compliant with the EPBC Act approval, and no incidents or non-conformances have occurred since project commencement.
- The Conservation Area Management Plan for the project is in year 4. Year 4 data has been collected and reported for the three key elements:

  - Koala (managed under the Koala Management Plan)
  - Native vegetation and weeds (managed under the Conservation Area Management Plan)
  - Pest Animals (managed under the Pest Management Plan)

- Final works and preparation for commencement in 2024 are also underway for:

  - Fire (managed under the Fire Management Plan)
  - Revegetation

- Year 4 surveys within the offset area established for the project demonstrate that:

  - The coverage of both species of lantana (*L. camara, L. montevidensis)* has declined significantly. On the other hand, the spatial distribution of *L. camara* has remained consistent with the baseline, with individuals recorded at all 20 assessment sites. Spatial distribution of *L. montevidensis* has increased, with individuals recorded at nine sites in baseline surveys, and at 13 sites in 2023 monitoring.
  - Vegetation condition at all sites remained relatively stable between 2022 and 2023 monitoring. Except, site BC3, the non-remnant vegetation site, which has improved one BioCondition score point from 4 to 3. Native forb and grass diversity, and perennial grass cover, have shown varied patterns in comparison to 2022 monitoring.
  - No evidence of koalas was recorded during any of the surveys conducted across the site in 2023. One koala scat was observed incidentally during the monitoring event, below a tree with probable koala scratch marks. Additionally, a koala was incidentally observed outside of the monitoring event, on the CAMP fence within a week of the monitoring event.
  - Some bushfire management occurred in 2023.

- Planned bushfire management for 2023 couldn't be completed due to safety concerns. The additional unsuitable weather conditions throughout the controlled burn season also resulted in constraints, which prevented the enactment of bushfire management plans.
- The legal securing of Zone 1 is overdue; however this will not prevent the continued management of the conservation area in a manner consistent with the CAMP. Plan sealing and registration of the title of the two lots associated with Zone 1 is imminent, and this will allow establishment of a Voluntary Declaration over the land (via the Qld *Vegetation Management Act 1999*).

1   Introduction

On December 3, 2019, the Cumner Road subdivision, White Rock, Ripley Valley, Queensland (EPBC 2014/7388) was approved under sections 130(1) and 133(1) of *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The approved action is the development of a mixed-use subdivision zone and associated infrastructure, and environmental protection on Cumner Road, White Rock, Queensland.

The action commenced on 03 December 2019. The following report details progress of the action for the period 03 December 2022 to 03 December 2023 (Year 4) and is provided to meet the annual compliance reporting requirement within condition 10 of the Approval Notice.

Condition 10 states:

"10. The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or as otherwise agreed to in writing by the Minister. The approval holder must:

> *a. publish each compliance report on the website within 60 business days following the relevant 12 month period;*

> *b. notify the Department by email that a compliance report has been published on the website within five business days of the date of publication;*

> *c. keep all compliance reports publicly available on the website until this approval expires;*

> *d. exclude or redact sensitive ecological data from compliance reports published on the website;*

> *and*

> *e. where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the department within 5 business days of publication. "*

This report provides a summary to meet Condition 10 above. It also provides a summary of actions and compliance pertaining to the EPBC2014/7388 approval for year 4.

2   Progress of the action (EPBC 2014/7388)

Progress is reported against the Approval Conditions and associated performance criteria within Table *1*, Table 2 and Table 3 below.

Due to the Coronavirus pandemic in 2020, delays occurred in works related to the Conservation Area Management Plan. In February 2021 a variation to the initial approval was approved. This approved variation allowed postponement of CAMP actions with an adjusted schedule provided within the approval.

Table 1: Response to condition in Attachment A of the EPBC Act approval for EPBC 2014/7388

Part A - Conditions specific to the action	
Condition	**Comments**
1. For the protection of the Koala and the Grey-headed Flying-fox, the approval holder must not clear Koala habitat and Grey-headed Flying-fox foraging habitat outside the area marked as the Development Footprint, enclosed by the red lines, as shown on the map at Attachment A.	Compliant.
2. To compensate for the clearing of 146.02 hectares of Koala habitat and Grey-headed Flying-fox foraging habitat, the approval holder must: a. Legally secure the Conservation Management Area. b. Provide the Department with evidence of the registration of legal security of the Zone 1 of the Conservation Management Area, within 3 years of the date of this approval. c. Provide the Department with evidence of the registration of legal security of Zone 2 of the Conservation Management Area within 5 years of the date of this approval. d. Commence implementation of the Conservation Area Management Plan, within 30 days of the date of this approval. e. The performance and completion criteria set out in Tables 1 and 2, at Attachment B (of the approval) must be achieved.	a) Legal security process in progress, although plan sealing of the reconfiguration of the lot has not yet occurred (a pre-requisite). Dependency b, c held until legal security obtained. Zone 1 to be secured this coming year. (due 3 years from the date of the varied approval – i.e. 16/2/2024) d) As per last compliance report (for year 3), this has been met e) In progress
3. The approval holder must not commence the action until the approval holder has commenced implementation of the Conservation Area Management Plan.	The CAMP was commenced in September of 2019 with the undertaking of baseline Koala surveys per the KMP. The approval holder commenced the action on 4/12/2019 with the initial works related to the road corridor for the Cumner Road extension. The department was notified of the commencement of the action on 11/12/2019 via email.
4. The approval holder must implement the Koala management plan.	Plan implemented and results included in this report
Part B - Standard administrative conditions	
Notification of date of commencement of the action 5. The approval holder must notify the Department in writing of the date of commencement of the action and the date of commencement of construction within 10 business days after the date of commencement of the action or commencement of construction respectively.	Achieved. The approval holder commenced the action on 4/12/2019 with the clearing of the road corridor for the Cumner Road extension. The department was notified of the commencement of the action on 11/12/2019 via email.
6. If the commencement of the action does not occur within 5 years from the date of this approval, then the approval holder must not commence the action without the prior written agreement of the Minister.	N/A. The action has commenced.

Compliance records 7. The approval holder must maintain accurate and complete compliance records.	Accurate and complete compliance records have been maintained.
8. If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request. Note: Compliance records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, and or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the Department's website or through the general media.	No request has been received.

Preparation and publication of plans 9. The approval holder must:
    a.   submit plans electronically to the Department for approval by the Minister;
    b.   publish each plan on the website within 20 business days of the date of this approval or the date that the plan is approved by the Minister or of the date a revised action management plan is submitted to the Minister or the Department, unless otherwise agreed to in writing by the Minister;
    c.   exclude or redact sensitive ecological data from plans published on the website or provided to a member of the public; and
    d.   keep plans published on the website until the end date of this approval
	All approved plans can be found at:
	https://intrapac.com.au/ripley/
	
	No sensitive ecological data is contained within the plans.

Annual compliance reporting
10. The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or as otherwise agreed to in writing by the Minister. The approval holder must:
    a.   publish each compliance report on the website within 60 business days following the relevant 12 month period;
    b.   notify the Department by email that a compliance report has been published on the website within five business days of the date of publication;
    c.   keep all compliance reports publicly available on the website until this approval expires;
    d.   exclude or redact sensitive ecological data from compliance reports published on the website; and
    e.   where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within 5 business days of publication. Note: Compliance reports may be published on the Department's website.
	See above
	This document is the compliance report for the third 12-month period (Year 4) period following the commencement of the action.

Reporting non-compliance
11.The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:
    a.   the condition which is or may be in breach; and
    b.   a short description of the incident and/or non-compliance
	There was no incident or occurrence of non-compliance in the reporting year.

12. The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:	As above

a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the incident or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the approval holder.	
Independent audit and independent Scientific Outcomes 13. The approval holder must ensure that independent audits of compliance with the conditions and/or Independent Scientific Verification of Outcomes are conducted as requested in writing by the Minister.	N/A. No independent audits were requested by the Minister within the reporting year.
14. For each independent audit, the approval holder must: a. provide the name and qualifications of the independent auditor and the draft audit criteria to the Department; b. b. only commence the independent audit once the audit criteria have been approved in writing by the Department; and c. c. submit an audit report to the Department within the timeframe specified in the approved audit criteria.	N/A. No independent audits were conducted within the reporting year.
15. For each Independent Scientific Verification of Outcomes the approval holder must: a. provide the name and qualifications of the independent suitably qualified field ecologist and the draft brief to the Department; b. only commence the independent Scientific Verification of Outcomes once the independent suitably qualified field ecologist and the brief have been approved in writing by the Department; and c. submit an independent suitably qualified field ecologist's report to the Department within the timeframe specified in the approved brief.	N/A. No independent scientific verification of outcomes occurred within the reporting year.
16. The approval holder must publish the audit report on the website within 10 business days of receiving the Department's approval of the audit report and keep the audit report published on the website until the end date of this approval.	N/A. No independent audits were conducted within the reporting year.
Completion of the action 17. Within 30 days after the completion of the action, the approval holder must notify the Department in writing and provide completion data	N/A. The action has not been completed.

Table 2: Compliance criteria (Attachment B Table 1 of the EPBC approval)

Task	Establishment			Maintenance	Progress within Year 3 (03/12/2022 to 03/12/2023)
	Preliminary	Management			* only progress toward preliminary management actions (highlighted green) are addressed within this compliance report as the reporting period (Year 3) is relevant to these only.
	By end of year 3	Between end of year 3 and end of year 10	Year 11	Years 12-21	
Construction-related management actions					
Fencing / signage / (and maintenance) relating to Koala and GHFF management	Infrastructure installed.	No more than 5% of fencing compromised at any time			Fencing / signage / (and maintenance) relating to Koala and GHFF management has not yet commenced along the eastern edge of the mixed-use development area. Nonetheless, all Koala fencing has been completed along Sandstone Boulevard (the new road constructed as part of the action).
Sediment and erosion control (and maintenance)	Sediment / erosion works installed	Sediment and erosion control devices checked and repaired annually in Quarter 1			Sediment and erosion work required regarding the clearing of the Cumner Rd extension have been installed and maintained as part of the Construction Environmental Management Plan. Construction Contractor reporting on this is available upon request.
Bushland management actions					
Fire Management	Bush fire management plan (BFMP) completed. Fire management works undertaken as specified in the BFMP.	Fire management works undertaken as specified in the BFMP			Some, albeit limited, bushfire management works were undertaken in this monitoring period. Planned bushfire management for 2023 couldn't be completed due to safety concerns. The additional unsuitable weather conditions throughout the controlled burn season also resulted in constraints, which prevented the enactment of bushfire management plans.

Pest fauna management	Two survey events completed to determine the baseline of dogs / cats / foxes within the Conservation Management Area and reference sites within the adjacent White Rock Conservation Estate Area. Development of a pest management plan that specifies how feral dogs, cats and foxes will be reduced in the conservation Management Area Development of a survey methodology that is sufficient to demonstrate any reduction of feral dogs, cats and foxes in the Conservation Management Area, relative to the baseline and reference sites within the adjacent White Rock conservation Estate Area.	Between end of year 3 and end of year 6, no increase in pests against baseline, or, in the event of evidence of an increase of pests in the general area as measured at reference sites within the White Rock Conservation Estate Area, then demonstrated reduction in pests relative to these reference sites, measured annually.	From beginning of year 7 to end of approval, maintain a reduction in pests relative to baseline, measured annually, or in the event of evidence of an increase of pests in the general area, as measured at reference sites within the White Rock Conservation Estate Area, then demonstrated reduction relative to these reference sites, measured annually.	Two survey events (Autumn and Spring 2023) were undertaken to track pest management progress against baseline reports.
Bushfire/recreation trails (and maintenance)	Fire access tracks established	At a minimum, bushfire management trails drivable at least one month prior to fire season as determined in BFMP. No more than 10% of designated multipurpose trails unwalkable at any time.		Existing fire access trails have been maintained as part of access requirements for the ongoing revegetation works.
Revegetation requirements assessed	Revegetation requirements assessed every year prior to planting season until Year 8		n/a	The revegetation contractor has been engaged and is looking to do some planting in the coming months to take advantage of the la Nina.

Table 3: Completion criteria (Attachment B, Table 2 of the EPBC Act approval)

Completion Criteria	Relevant to Year 11	Relevant to Year 21	Comments
1. Both Zones 1 and 2 of the conservation area have been legally secured, ensuring protection for conservation purposes, within 5 years of date of the approval.	✓	✓	Zone 1 is to be legally secured in 2024.
2. With exception of minor initial works, bushland management actions commenced within 3 years of the date of the approval.	✓	✓	Commenced.
3. Documented increase in Koala and GHFF habitat value, as shown in an assessment against the management objectives of table 4 of the CAMP.	✓	✓	N/A for the Year 4 period.
4. All revegetation (planting works) completed by the end of year 11, with planted tree species comprising predominantly Koala food trees (including Forest Red Gum and Grey Gum) and winter foraging species for the GHFF (Broad-leaved Paperbark, Spotted Gum, Swamp Mahogany and Forest Red Gum).	✓	N/A	N/A for the Year 4 period.
5. Minimum 90% survival rate of revegetation or equivalent stem density (i.e. due to natural regeneration) by end of year 11.	✓	N/A	N/A for the Year 4 period.
6. All management zones contain primary Koala food trees and GHFF winter foraging trees in good health by end of year 11 and for the remaining duration of the approval.	✓	✓	N/A for the Year 4 period.
7. Across the planting area, tree canopy cover % within each management zone meets regional ecosystem benchmarks by end of year 11, 16 and 21, as defined by the Queensland Government's BioCondition Benchmarks for Regional Ecosystem Condition Assessment (2019).	✓	✓	N/A for the Year 4 period.
8. By end of year 11, a density of at least 20 overstory trees (comprising Koala food trees and winter foraging resource trees for GHFF) and 250 mid or understory trees and/or shrubs per hectare will be present and maintained for the duration of the approval.	✓	✓	N/A for the Year 4 period.
9. By end of year 11 rehabilitation and management results in vegetation communities that meet the descriptions of pre-existing and/or surrounding remnant regional ecosystem types and these are maintained for the duration of the approval.	✓	✓	N/A for the Year 3 period.

3   Summary of Management Actions

The Conservation Management Area Plan (CAMP) stipulates annual reporting on five key attributes:

- a summary of management actions,
- results of any vegetation monitoring,
- results of any koala monitoring,
- report on actions to support the bushfire management plan
- actions to support the pest management plan.

Attached to this document are detailed reports from relevant contractors within each action, and a summary of actions and results (Sections 3.1.1 to 3.1.5). Relevant reports are attached in the appendix.

3.1   Management Action Report

Evolve Environmental Solutions were contracted to begin weed treatment works. Treatment areas are mapped in Figure 1. They have occurred in:

- April: Weed management and vegetation clearing began in area 7. Focused primarily on the removal of lantana. Follow up spray treatments to cleared areas 3, 5 and 7.
- May: Spray treatments to cleared areas 3, 5, 7, 8, 9 and 10.
- June: Slashing of Groundsel infested parcel in area 5. Spray treatments to cleared areas 6, 8, 9 and 10.
- July: Follow up spray treatment to Groundsel infested parcel in area 5. Prepared for burning works.
- August: Follow up maintenance to areas, 2,3, 8 and 9. Bushfire management in block 11 undertaken.
- September: Follow up maintenance to areas 7 and 10.

3.2   Vegetation Monitoring Report

The CAMP stipulates that vegetation will be improved in three unique zones, each with their own actions:

- MZ1: Riparian restoration over a total of 30ha along drainage lines,
- MZ2: Assisted regeneration of 91ha through control of *Lantana camara* and other invasive species
- MZ3: Regeneration of the remaining 128ha through minor weed works

BioCondition surveys were conducted within the CAMP Area in May 2022, with 6 plots established across the site which can be seen in detail in Figure 2. The results from the BioCondition survey can be seen in Table 4. The assessment sites have all remained relatively stable between 2022 and 2023 monitoring. The exception to this is, Site BC3, the non-remnant vegetation site, which has improved one BioCondition score point from 4 to 3. Specific attributes with short response times, for example native forb and grass diversity, and perennial grass cover, have shown varied patterns in comparison to 2022 monitoring.

Lantana cover (percent foliage cover), the key trait expected to respond in a two-year timeframe, shows a decreasing trend since baseline surveys were conducted in 2021, while spatial distribution of lantana shows a slight increasing trend. Since weed management works commenced, the coverage of both species of lantana has declined significantly. Spatial distribution of *L. camara* has remained consistent with the baseline, with individuals recorded at all 20 assessment sites. However, spatial distribution of *L. montevidensis* has increased, with individuals recorded at nine sites in baseline surveys, and at 13 sites in 2023 monitoring. The reduction in lantana cover can be attributed to weed management works, however the increased spatial distribution indicates a need for continued efforts to control these weed species. An example of Lantana coverage can be seen in Figure 3.

Table 4: Summary of BioCondition results for 2021 to 2023

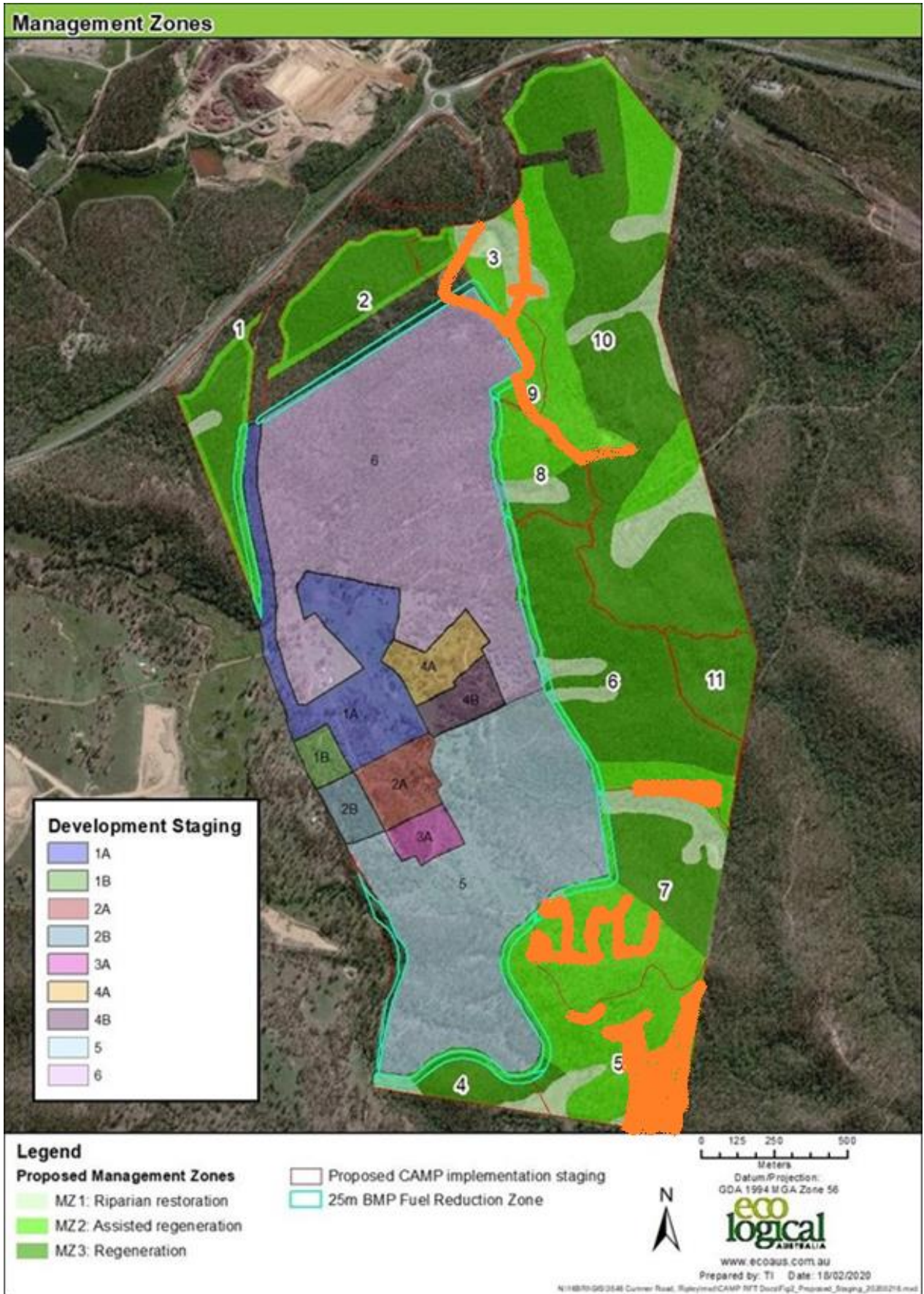| Site ID	MZ	RE	Condition	Benchmark used	Overall BioCondition score 2021	Overall BioCondition score 2022	Overall BioCondition score 2023	BioCondition class 2021	BioCondition class 2022	BioCondition class 2023
1	2	12.9-10.2	Remnant	12.9-10.2	0.61	0.61	0.63	2	2	2
2	3	12.9-10.2	Remnant	12.9-10.2	0.76	0.76	0.78	2	2	2
3	1	12.9-10.7 (pre-clear)	Non-remnant	12.9-10.7	0.33	0.33	0.40	4	4	3
4	2	12.8.17	Remnant	12.8.17	0.59	0.65	0.60	3	2	2
5	3	12.9-10.2	Remnant	12.9-10.2	0.67	0.67	0.69	2	2	2
6	1	12.9-10.2	Remnant	12.9-10.2	0.61	0.54	0.51	2	3	3

Figure 1: Management worked undertaken by Evolve in April to June 2023. Orange areas indicate where herbicide spray has been utilised (Mapping from Evolve).
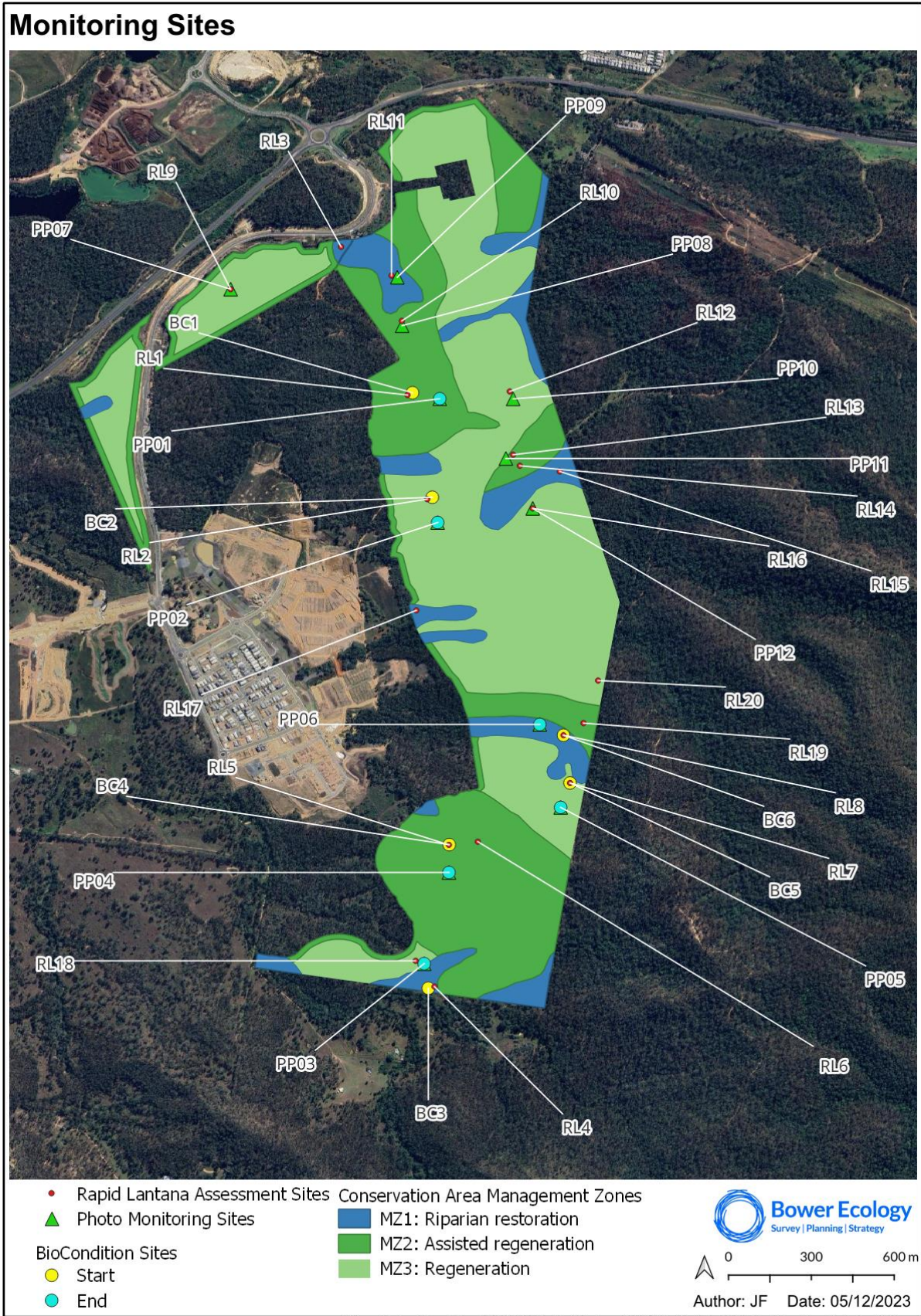
Figure 2: Location of the BioCondition (BC) plots, rapid Lantana camara monitoring plots (RL) and photo monitoring (PP) plots within the CAMP Area and management zones.

Figure 3: Example photos from BioCondition plots and photoplots showing the range of Lantana camara coverage found in the CAMP Area. Photo monitoring site 6 (top, left and right), rapid Lantana monitoring plot 8 (centre left and right), and BioCondition 6 (bottom left and right).

3.3   Koala Monitoring Report

The Conservation Management Area has a designated Koala Management Plan which has management actions to improve habitat value from the baseline condition:

- Planting and assisted regeneration
- Fire management (see Section 3.1.4)
- Weed control (see Section 3.1.2)
- Feral species management (see Section 3.1.5)
- Restrict vehicle access

No evidence of koalas was recorded during any of the surveys conducted across the site in 2023. According to SAT calculations, koala activity was determined to be 0%; this is lower than both 2019 baseline results (0.51% activity) and 2021 monitoring results (0.41%), which both indicate a low koala population density. This reduction in calculated activity, however, is unlikely to represent a reduction in actual koala activity, as incidental observations confirm the species' continued presence on the site. One koala scat was observed incidentally during the monitoring event, below a tree with probable koala scratch marks. Additionally, a koala was observed incidentally on the CAMP fence within a week of the monitoring event (separate to the koala monitoring event).

The following results can be visualised in Figure 4:
- No koalas detected in strip transects
- No koala calls were recorded on the BioAcoustic Recorders.
- No koalas were detected during nocturnal call playback surveys
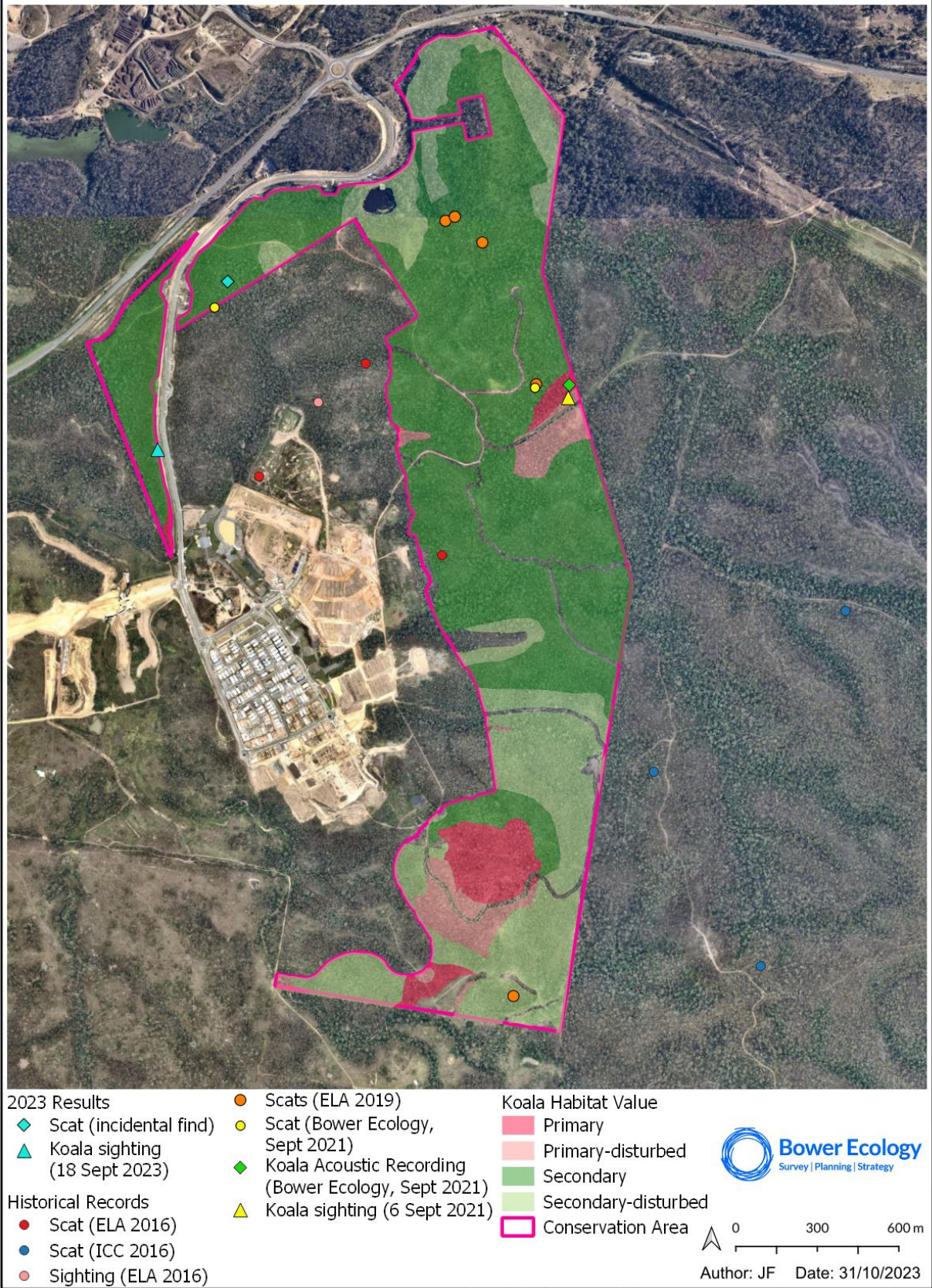- Koala scats were found at none of the 33 RGSAT survey locations

Figure 4: Findings from the 2023 Koala survey (including previous years)

3.4   Bushfire Management Report

The Conservation Management Area has three core fire management zones (Figure 5), each with their own strategy:

- Protection Zone
    - *Fine fuel layer not to exceed low to moderate risk or 5 tonnes/ha*
- Wildfire Mitigation Zone
    - *Maximum overall fuel hazard less than high or <8 tonnes/ha in ground and shrub layer,*
    - *Planned burns occur at lower end of recommended intervals, and area treated is 0-80% of the block* (Table 5*)*
    - *Fuel management by slashing, selective shrub clearing and trail construction*
- Conservation Zone
    - *Planned burns occur at lower end of recommended intervals, and area treated is 0-80% of the block (*Table 5*)*

Table 5: Recommended intervals for planned burns in wildfire mitigation and conservation zones

Regional Ecosystem	Recommended interval	Recommended season	% burnt in this reporting interval	% burnt in history of CAMP implementation
12.9-10.2	4-25y	Summer - Winter	≈1.9	≈1.9
12.9-10.7a	4-25y	Summer - Winter	0	0
12.8.24	4-25y	Summer - Winter	0	0
12.9-10.17	8-20y	Summer - Winter	≈1.9	≈1.9
12.8.17	3-6y	Summer - late Autumn	0	0
12.3.3	3-6y	Summer - late Autumn	0	0

Fire Lore was contracted by Evolve to undertake the bushfire management in White Rock. The work was completed from 21st of August to 23rd of August 2023. Approximately 45% of burn block 11 undertook management which approximately equates to 3.8% of the total CAMP Area. The management area is highlighted in Figure 6.

The 2023 burn couldn't be completed due to safety concerns. The additional unsuitable weather conditions throughout the controlled burn season also resulted in constraints, which prevented the enactment of bushfire management plans.

Another contractor, FireLand, was approved in late 2023 to carry out a complete assessment and review of the fire trails and burn blocks, manage fire trails (in cooperation with Evolve) and plan the proposed burns for 2024.
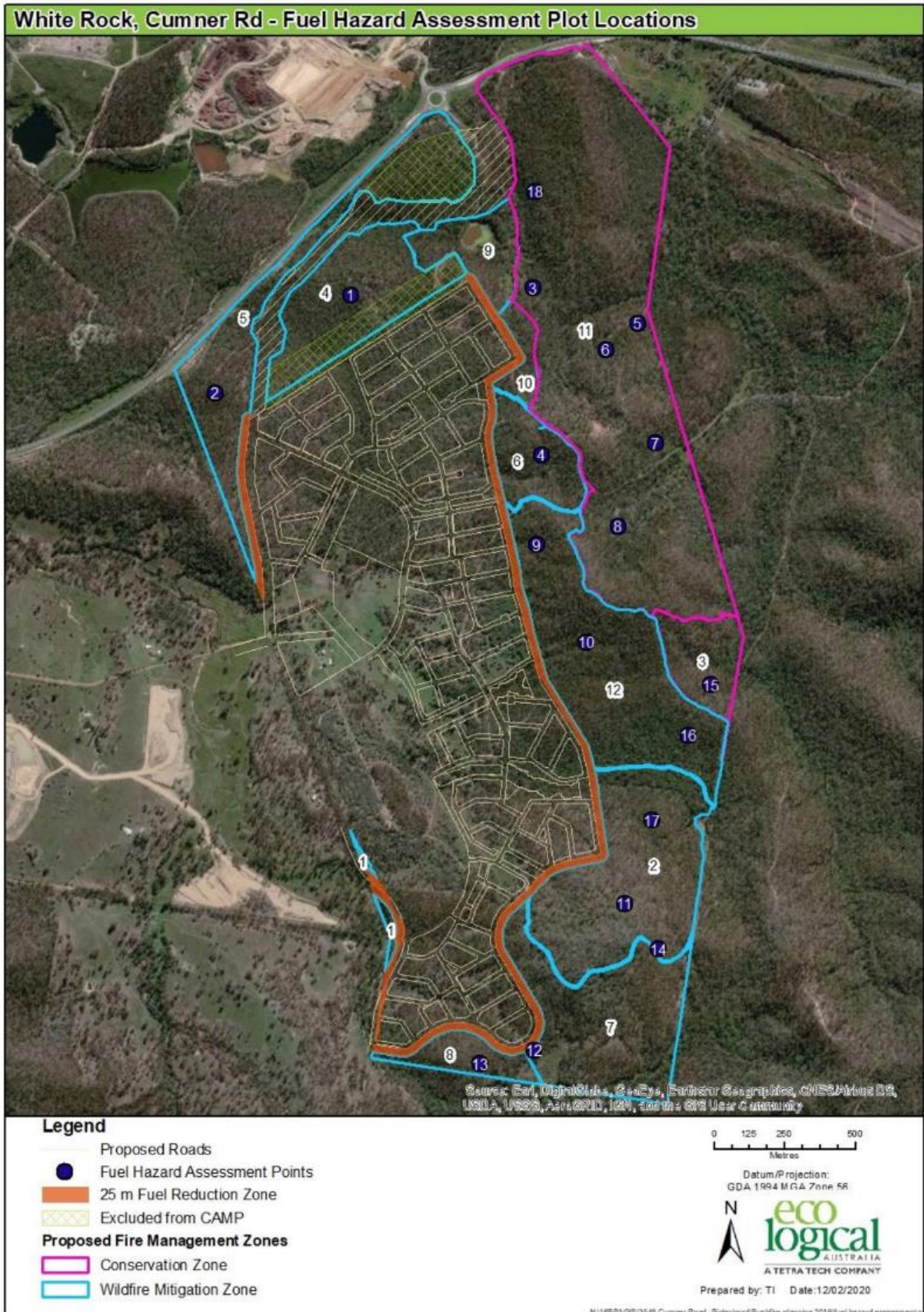
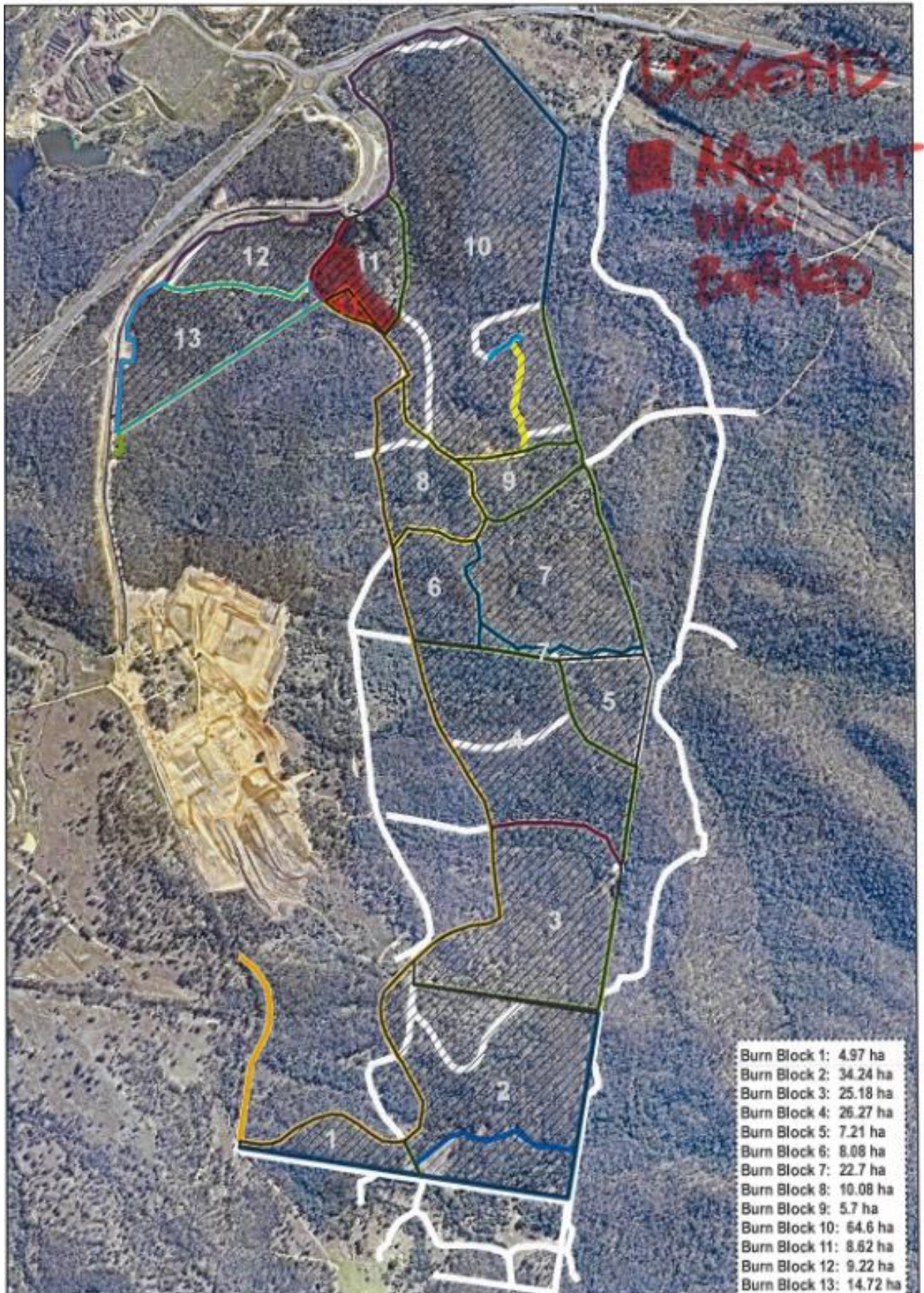*Figure 5: Fire Management Zones (Mapping by Evolve).*

Figure 6: Bushfire Management Undertaken in August 2023 by Firelore prior to change in contactors (Mapping by Evolve).

3.5   Pest Management Report

Figure 7 describes the pest management works undertaken in the Conservation Area in 2023.

Table 6: Methods of pest management works conducted the Conservation Area in 2023 by Evolve

Month	Pest Management Conducted
September	• Initial reconnaissance assessment; • Additional cameras in evident zones of pest activity; • Pre-bait material was laid in areas of high activity.
October	• Candid Pest Ejectors (CPEs) were laid; • 1080 baits were set up; • In five days of work six Feral Pigs and one Wild Dog were shot and removed from the Conservation Area.

This reporting period saw the third year of monitoring events. Surveys occurred in Spring and Autumn as required. Within the Conservation Area, 5 individual pests were recorded in 2023 whilst within the WRSMCE, 16 individual pests were observed (see Table 7 and Figure 7).

Similar to the baseline surveys conducted in 2021/2022, the central and southern areas of the CAMP and WRSMCE recorded the most pest activity with emphasis on camera 12 located closest to Six Mile Creek, capturing 3 out of 4 targeted pest species (Feral Pig, Fox and Wild Dog). A map of all remote camera locations and recorded targeted pest species can be seen in Figure 7.

Other key results for each target pest species include:

- No feral cats were detected in the Spring and Autumn surveys conducted.
- Although there was a measured increase in wild dog individuals in the adjacent WRSMCE Area, there was no measurable increase of wild dog individuals in the Conservation Area (when compared to spring 2022, for instance).
- Fox numbers were generally consistent with baseline observations when the Conservation Area and the WRSMCE Area are viewed individually.
- There was a significant decrease in feral pigs across the 2023 Autumn and Spring seasons for feral pigs, compared to the previous years

Detailed analysis is provided in Appendix C. The report demonstrates that the pest fauna management performance criteria documented in the EPBC Act approval have been met. That is, there has been a demonstrated reduction in pest numbers.

Table 7: Number of individuals recorded across the two 2023 monitoring events

Survey Area	Number of individuals identified for each target pest species				
	Feral Cat	**Wild Dog**	**Fox**	**Feral Pig**	**Total**
Conservation Area	0	1	2	2	5
WRSMCE Area	0	4	4	8	16
Total	0	5	6	10	21
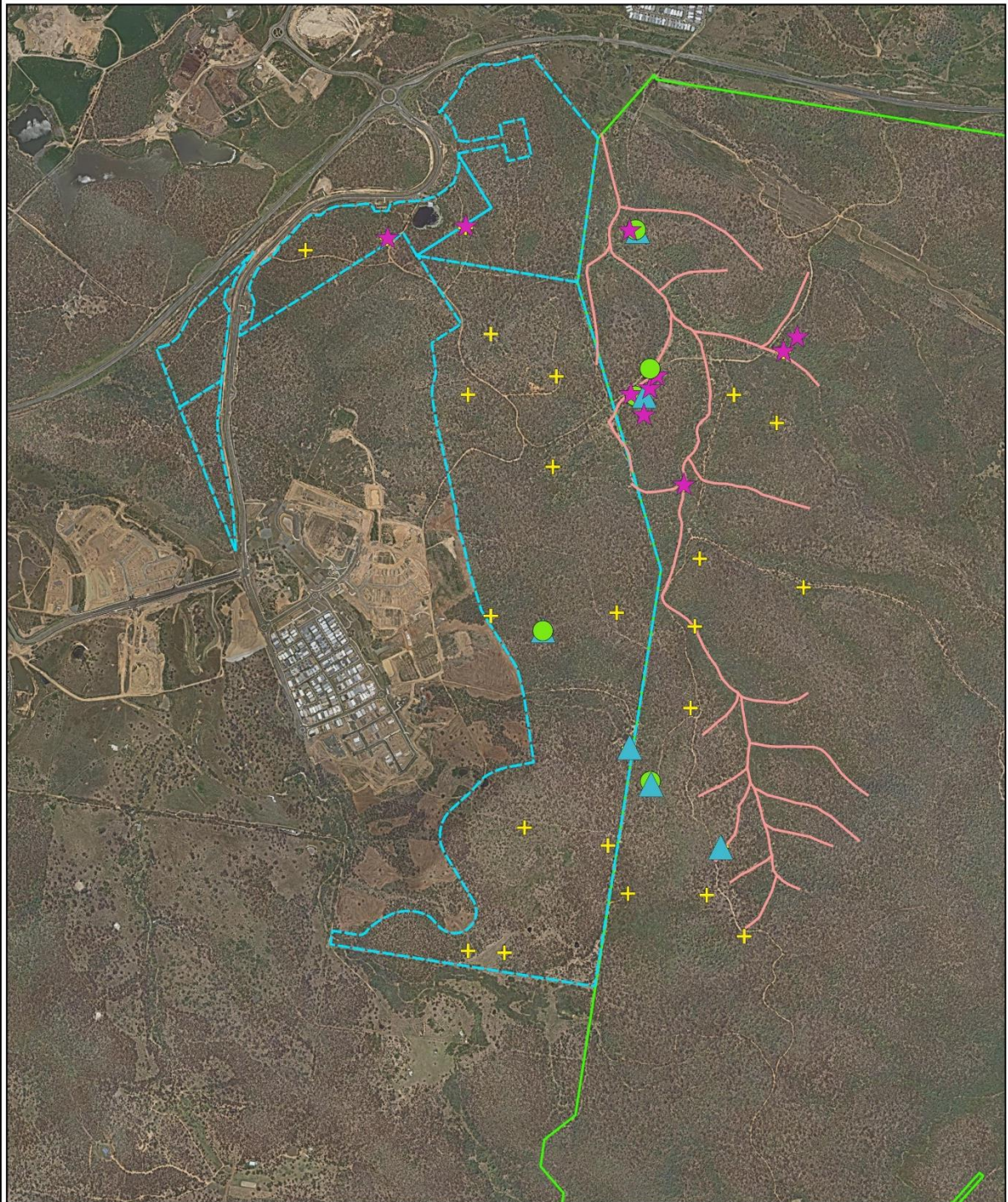
Figure 7: Pest monitoring results across the Spring and Autumn surveys conducted in 2023

4   Conclusion

Monitoring surveys and reporting for vegetation, weeds, Koala, and pest animals have all been completed as required under the EPBC Act approval. Weed management has occurred as per CAMP requirements. Upcoming works comprise:

- weed management works will focus on the mechanical removal of remaining large lantana patches across the site and follow up herbicide spraying in these cleared patches. Ground teams will target areas inaccessible by machine, hand pulling and spraying weeds.
- Plans are underway to have some revegetation areas ready for planting installation by winter 2024.
- Scheduling and undertaking of bushfire management (track maintenance, establishment and ecological burns).
- Further baiting and trapping events for targeted pest species monthly throughout 2024.

The project is mostly in compliance with the EPBC Act approval. The only exception is that the legal securing of Zone 1 is now overdue; however this will not prevent the continued management of the conservation area in a manner consistent with the CAMP. Plan sealing and registration of the title of the two lots associated with Zone 1 is imminent, and this will allow establishment of a Voluntary Declaration over the land (via the Qld *Vegetation Management Act 1999*).

5   References

Bower Ecology 2023a. *White Rock Koala Monitoring Report- Report No. 2 (2023).* Prepared for Intrapac Property
    Pty Ltd.

Bower Ecology 2023c. White Rock Pest Monitoring Report- First Year Survey (2023). Prepared for Intrapac
    Property Pty Ltd.

Bower Ecology 2023b. *White Rock Vegetation Monitoring Report (2023).* Prepared for Intrapac Property Pty Ltd.

Evolve 2023a. *Progress Report- Quarter 2 Works 2023.* Prepared for Bower Ecology and Intrapac Property Pty
    Ltd.

Evolve 2023b. *Progress Report- Quarter 3 Works 2023.* Prepared for Bower Ecology and Intrapac Property Pty
    Ltd.

Appendix A - Vegetation Monitoring Report 2023

Appendix A - Vegetation Monitoring Report 2023

White Rock Conservation Area Management Plan

Vegetation Monitoring Report 2023

Prepared for Intrapac White Rock Pty Ltd

7 February 2024

Document Tracking

Project Name	White Rock Vegetation Monitoring
Project Number	0003
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Executive Summary

This report represents the second year of Conservation Area Management Plan (CAMP) management for EPBC2014/7388. All methods employed were consistent with past monitoring and the approved Conservation Area Management Plan.

Overall, the condition of most of the six assessment sites, as measured via the BioCondition methodology (Eyre et al., 2015), has generally improved since baseline surveys were conducted. In summary:

- Three out of six sites have remained in relatively the same condition over the monitoring period since baseline surveys (sites 1, 2 and 5);
- One site (site 3) has improved between 2022 and 2023 monitoring;
- One site (site 4) improved between baseline and 2022 monitoring, and since 2022 has remained in the same condition;
- One site (site 6) declined between baseline and 2022 monitoring, and since 2022 has remained in the same condition.

Major trends in BioCondition were generally positive, including trends in increased species richness, increased or stable canopy cover, increased or stable perennial grass cover, and decreased weed cover. Weed management has resulted in a continued reduction in the overall cover of lantana species.

The programme of rehabilitation works met the first three years of the CAMP strategy for bushland management relevant to this report – primary weed treatment has occurred in target areas and has been successful. Completion of primary weed treatment is required across the site, as is continued maintenance work to successfully reduce the abundance of Lantana species.

1   Introduction

1.1.   Project Background

In December 2019, approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was received by Intrapac Property QLD Pty Ltd (Intrapac) for the development of a mixed-use sub-division and associated infrastructure (the development) at White Rock in the Ripley Valley (EPBC 2014/7388). The development encompasses 473 ha (project area), including a 249 ha Conservation Area (Figure 2).

There are multiple environmental outcomes intended for the development's Conservation Area. These outcomes include in-situ biodiversity offsets aimed to reduce the impacts of the project. Specifically, the Conservation Area comprises dedicated offset areas to protect Koala and Grey-headed Flying Fox habitat values, as defined within the EPBC Act.

An approved Conservation Area Management Plan (CAMP) prescribes the monitoring and management of the Conservation Area. This document intends to ensure the offset area in the Conservation Area achieves the habitat targets for Koala and Grey-headed flying fox.

Disruptions caused by the Coronavirus pandemic resulted in scheduling delays in 2020. This included delays to all works related to the Conservation Area Management Plan. In February 2021 a variation to the initial approval was approved. This approved variation allowed postponement of CAMP actions, with an adjusted schedule also provided within the varied approval.

Annual monitoring reports are required under the conditions of the approval and under the CAMP, and these will inform the Annual EPBC Act Compliance Report. An adaptive management approach has been employed in the CAMP to ensure management practices in will be guided by monitoring results. Annual management, monitoring and reporting requirements are detailed in the CAMP for the following:

- Vegetation rehabilitation and management
- Koala population monitoring
- Bushfire management
- Pest monitoring and management

Implementation of the CAMP began in 2019. CAMP implementation will continue for the duration of the on-maintenance period of the project (the first 11 years), after which handover to the Ipswich City Council and integration into the adjacent White Rock – Spring Mountain Conservation Estate (WRSMCE) is planned. Baseline vegetation monitoring occurred in 2021 and this report addresses the results of the second round of annual vegetation monitoring for the on-maintenance period of the project. Vegetation monitoring informs the following areas of the CAMP performance criteria (Table 11):

- Revegetation management requirements
- Weed control
- Bushfire management
- Native tree management

The general intention for the Conservation Area is to allow an improvement in habitat value for species listed as MNES – the Koala and the Grey-headed Flying Fox; as well as to meet the performance and completion criteria listed in the EPBC Act approval. Three distinct management zones (MZs) are defined within the Conservation Area under the CAMP. The categorisation of these

zones details the type and degree of effort necessary to reach specific rehabilitation objectives. The zones are as follows (Figure 2):

- **MZ1: Riparian Restoration** - the portion of the Conservation Area adjacent to drainage lines and the property boundary, with a total area of approximately 30 ha. This zone includes areas of exotic pasture with no canopy present, and is characterised by higher amounts of water, nutrients, and disturbance, and as such, exotic species are present in higher densities than in the other zones.
- **MZ2: Assisted Regeneration** - the portion of the Conservation Area that has currently low resilience or is likely to have low resilience in the future, with a total area of approximately 91 ha. This zone includes areas of dense lantana towards the south of the site and a 20 m buffer on all development edges which will be subject to greater impacts in the future.
- **MZ3: Regeneration** - the remainder of the Conservation Area with a total area of approximately 128 ha. This zone is in good condition with low weed density throughout.

1.2. Objectives and scope of work

The objective of this report is to provide the results of the second round of vegetation monitoring, to report on any changes in comparison to baseline surveys conducted in 2021 and monitoring undertaken in 2022. This addresses the CAMP performance criteria which requires annual monitoring and reporting (Table 11 in Appendix E).

1.2.1. Monitoring requirements

This vegetation monitoring requires BioCondition assessments (Eyre *et al.,* 2015), a rapid assessment *Lantana camara* survey, and an assessment of the results of both against the objectives of the CAMP and the conditions of the EPBC Act approval.

Year 2 monitoring surveyed established sites within the three management zones (MZ1, MZ2, MZ3) to assess any changes in the two years since baseline monitoring was conducted. Parts of the Conservation Area were heavily impacted by lantana species when the CAMP was developed; *Lantana camara* (bush lantana) and *L. montevidensis* (creeping lantana) were the dominant weed species across the site. To monitor improvement following weed removal works, a rapid lantana assessment is required to be undertaken as part of each monitoring event.

1.2.2. Management years

This report represents monitoring undertaken in year 4 of CAMP works program, as scheduled in the EPBC Act approval (EPBC 2014/7388). For reference, the management years are measured against the approval of the action on 3/12/2019. Past reporting has reported management years based on the date of the signed variation; however this has been now corrected. That is:

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Year 1 means the period until 12 months from the date of the approval of the action
Year 2 means the period until 24 months from the date of the approval of the action
Year 3 means the period until 36 months from the date of the approval of the action
Year 4 means the period until 48 months from the date of the approval of the action
Year 5 means the period until 60 months from the date of the approval of the action
Year 6 means the period until 72 months from the date of the approval of the action
Year 7 means the period until 84 months from the date of the approval of the action
Year 8 means the period until 96 months from the date of the approval of the action
Year 9 means the period until 108 months from the date of the approval of the action
Year 10 means the period until 120 months from the date of the approval of the action
Year 11 means the period until 136 months from the date of the approval of the action
Year 12 means the period until 148 months from the date of the approval of the action
Year 16 means the period until 192 months from the date of the approval of the action
Year 21 means the period until 252 months from the date of the approval of the action
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The next monitoring event (year 5) will occur in 2024. Ongoing monitoring by Intrapac will then occur on an annual basis for the first 11 years (on-maintenance period) of the CAMP program.

1.3. Study site description

The development is located in the Ripley Valley, 8 km east of the Ripley urban core, 8 km west of the Springfield Town Centre, 15 km from the Ipswich CBD, and 35 km from the Brisbane CBD (Figure 1).

Positioned just south of the Centenary Highway, the northern boundary of the development is delimited by the highway. To the west of the development is an area cleared in lowland sections for agricultural purposes that is expected to transition into urban development in the future as part of the Ripley Valley Priority Development Area (PDA). Within the Conservation Area is a matrix of mature / maturing vegetation (Figure 3). This vegetation extends to the east of the development boundary into the WRSMCE, forming part of an extensive area of vegetation associated with the Flinders Karawatha Corridor (DEHP 2014).

1.3.1. Vegetation Communities

Within the Conservation Area, eight broad vegetation communities were identified during initial ecological surveys (ELA 2017). These communities, and their areas, are listed in Table 1 and shown in Figure 3.

Table 1: Vegetation communities within the Conservation Area (ELA 2017)

Community	Area (ha)
Acacia +/- scattered Eucalypts (i.e. *Eucalyptus tereticornus, Eucalyptus crebra*)	3.8
Dam	1.1
Exotic Grassland +/- sparse Acacia and Eucalypts (i.e *E. tereticornus, E. crebra*)	5.5
E. tereticornis (Forest Red Gum) on alluvium	0.8
E. tereticornis, *Lophostemon suaveolens* (Swamp Box) and *E. crebra* (Narrow-leaved Ironbark).	8.1
E. crebra, *E. tereticornis*, *E. melanophloia* (Silver Leaved Ironbark)	15.6
Corymbia citriodora (Spotted gum)	9.8
C. citriodora, *E. crebra*, *E. melanophloia*, and other Eucalypts	183.1
E. acmenoides (White Mahogany), *E. major* (Grey Gum), *C. citriodora*	21.6
Total	**249.4**

The central part of the Conservation Area is dominated by *Corymbia citriodora* (spotted gum) forest and woodland on sandstone slopes.

The northern section of the Conservation Area is dominated by *Eucalyptus acmenoides* (White Mahogany), *Eucalyptus major* (Grey Gum) and Spotted Gum Forest. The lower elevations of the Conservation Area, particularly in the south, are dominated by *Eucalyptus tereticornis* (Forest Red Gum), *Lophostemon suaveolens* (Swamp Box) and *Eucalyptus crebra* (Narrow-leaved Ironbark).

A basalt hill in the south of the Conservation Area contains Narrow-leaved Ironbark, Forest Red Gum and *Eucalyptus melanophloia* (Silver Leaved Ironbark).

White Rock–Spring Mountain Conservation Estate to the east of the Conservation Area consists of over 2500 ha of mostly intact and generally remnant vegetation.
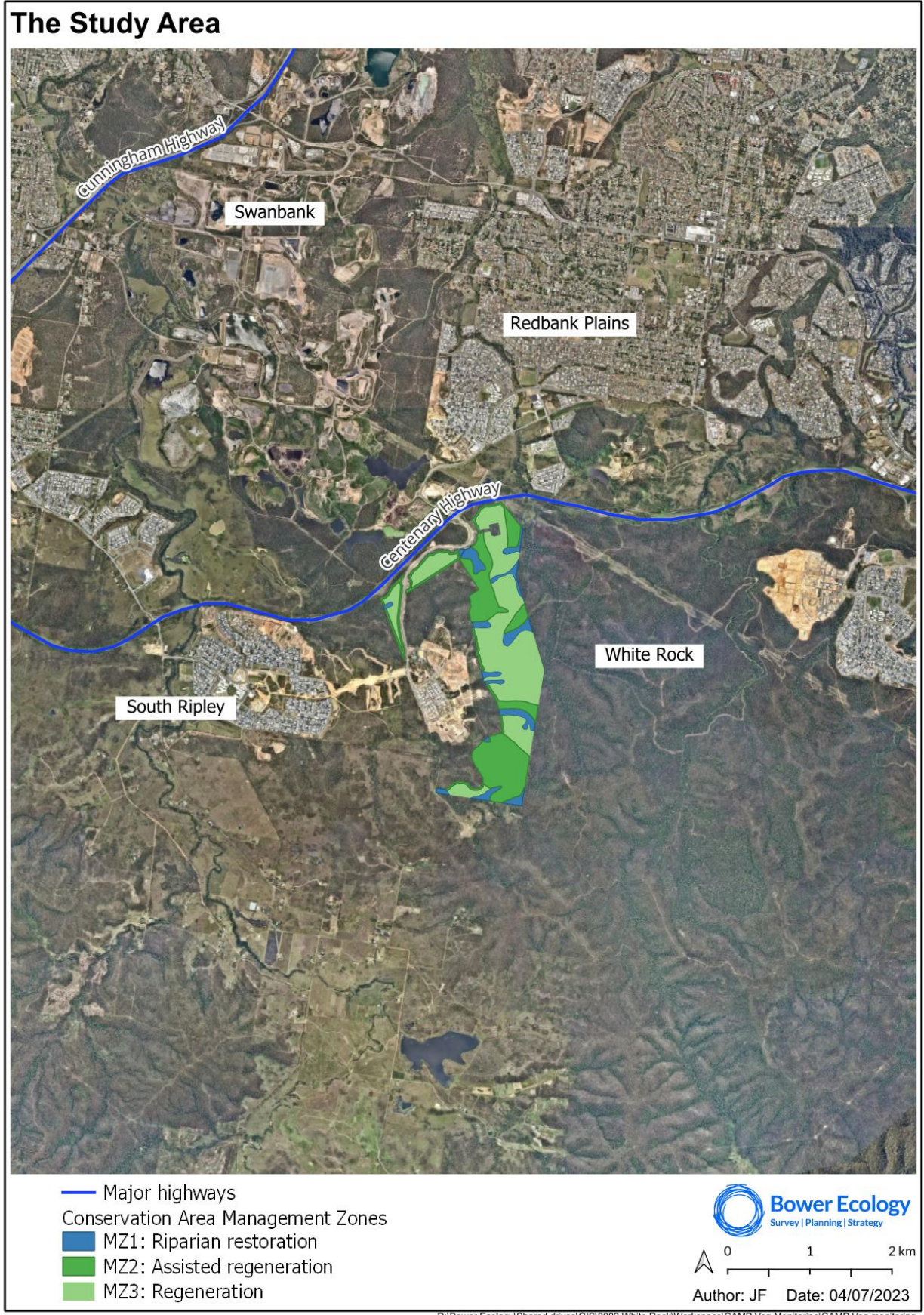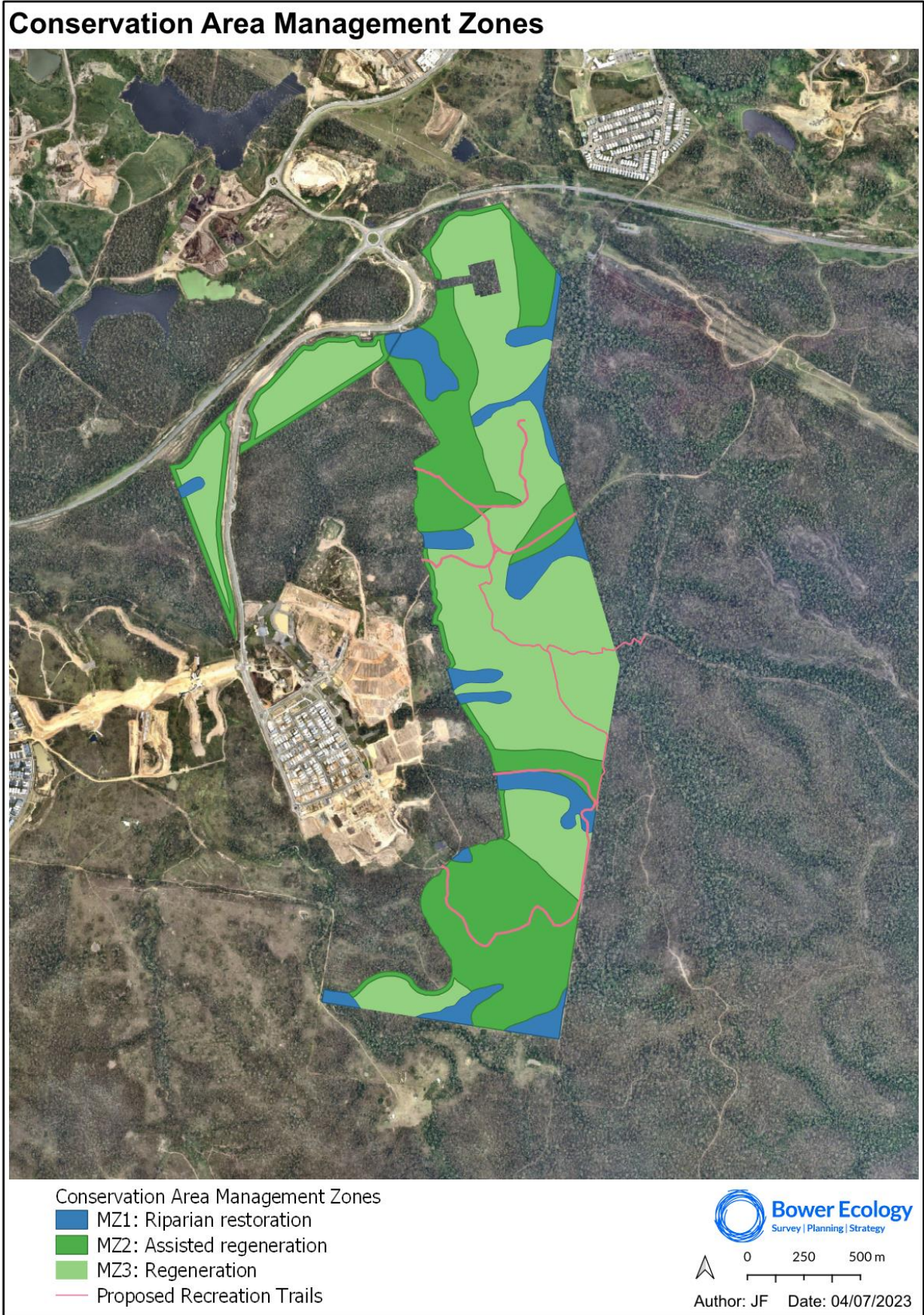
Figure 1: Local context

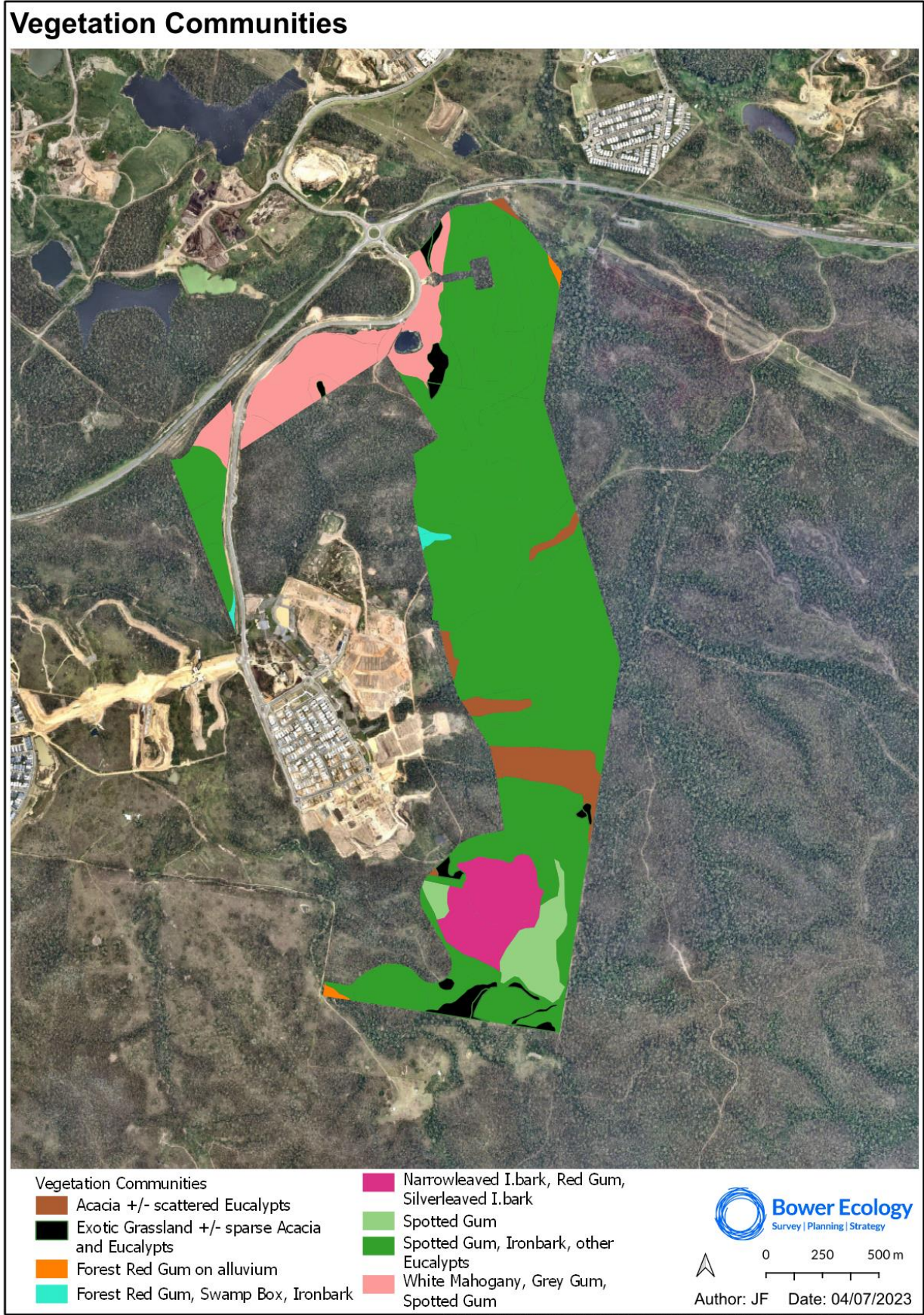*Figure 2: White Rock conservation area management zones*

Figure 3: Vegetation communities within the CAMP area

2   Methodology

2.1.   Ecological Monitoring Methodology

Field surveys were conducted as per the requirements of the CAMP (ELA 2020), as detailed in the 2021 baseline report (ELA 2021). Two suitably qualified ecologists completed the monitoring over three days, between the 31st of May to 9th of June 2023. Field surveys undertaken were BioCondition assessments, rapid lantana assessments, and the monitoring of 12 established photo monitoring points (Figure 4). Methods are detailed below.

2.1.1.   BioCondition Assessments

Six established BioCondition sites (Figure 5) were assessed in accordance with the BioCondition Manual (Eyre *et al.,* 2015). At each site, assessment of the following site-based attributes was undertaken within a 100 m x 50 m (0.5 ha) nested sampling plot:

- Recruitment of woody perennial shrubs
- Native species richness (tree, shrub, forb and grass)
- Tree canopy height
- Tree canopy cover
- Shrub canopy cover
- Native perennial grass cover
- Organic litter cover
- Number of large trees
- Coarse woody debris abundance
- Non-native plant cover

At each BioCondition site, photographs were taken from the centre point of the 100 m transect facing both the start and the end points.

2.1.2.   Photo Monitoring

Photo monitoring points were established during baseline surveys to be utilised as permanent reference points. Each point was demarcated with a unique tree tag or pin to be used as a centre point from which to take photographs. Tree tags and pins were used instead of more permanent ground pegs as the potential risk of unexploded ordinances (UXOs) in the area rendered the installation of ground pegs too dangerous. The photo monitoring points provide a visual indication of changes to vegetation within the Project Area.

Photographs were taken at 12 photo monitoring sites (four sites per MZ) (Figure 6). From the marked centre point, one photograph was taken at each of four compass points: north, south, east and west. A 20 m tape and a compass were used to determine a straight line between opposite compass points, and a GPS location was recorded for each photograph.

Due to the temporary nature of tree tags and pins, not all the original photo monitoring points could be found during 2022 monitoring, and some photos were taken in inaccurate locations. During 2023 monitoring, permanent ground pegs (star pickets) were installed at photo monitoring locations with the assistance of OPEC Systems staff utilising a ground penetrating radar to identify potential UXOs and therefore safe locations to install clearly labelled ground pegs. Future monitoring photos will be taken from these pegged locations; 2023 monitoring photos will form the new baseline with which all future monitoring photos will be compared.

2.1.3. Rapid Assessment of Lantana Infestations

A Rapid Lantana Assessment (RLA) was conducted at 20 established sites (Figure 7). At each site, a 20 m by 10 m survey plot was determined. Percentage cover (projective foliage cover) of *Lantana camara* and *Lantana montevidensis* was estimated within each survey plot. For increased accuracy and repeatability, cover was estimated at 2 m intervals along the 20 m length of each survey plot; summed estimates produced a cover estimate for the entire plot. A photograph was taken at each survey plot, to provide a visual indication of changes to lantana cover over time.

2.2. Data Analysis

Site and landscape attribute data were analysed as per the BioCondition Assessment Manual Version 2.2 (Eyre *et. al* 2015).

2.2.1. Site-based Attributes

Data for each site-based attribute data was scored relative to the Queensland Herbarium Benchmarks. The BioCondition score for each site was calculated by dividing the sum of the site-based attribute scores by the maximum possible score for that site's specific ecosystem type.

2.2.2. Landscape-scale Attributes

The influence of the surrounding landscape on the vegetation quality within the Project Area was quantified via assessment of the following attributes:

- Patch size
- Context
- Connectivity

As per the BioCondition Assessment Manual (Eyre *et al.,* 2015), a score was determined for each attribute, and an overall landscape-attribute numerical score out of 20 was generated for each BioCondition assessment site.

2.3. Survey Limitations

The same limitations continue to apply regarding the detection success for flora.
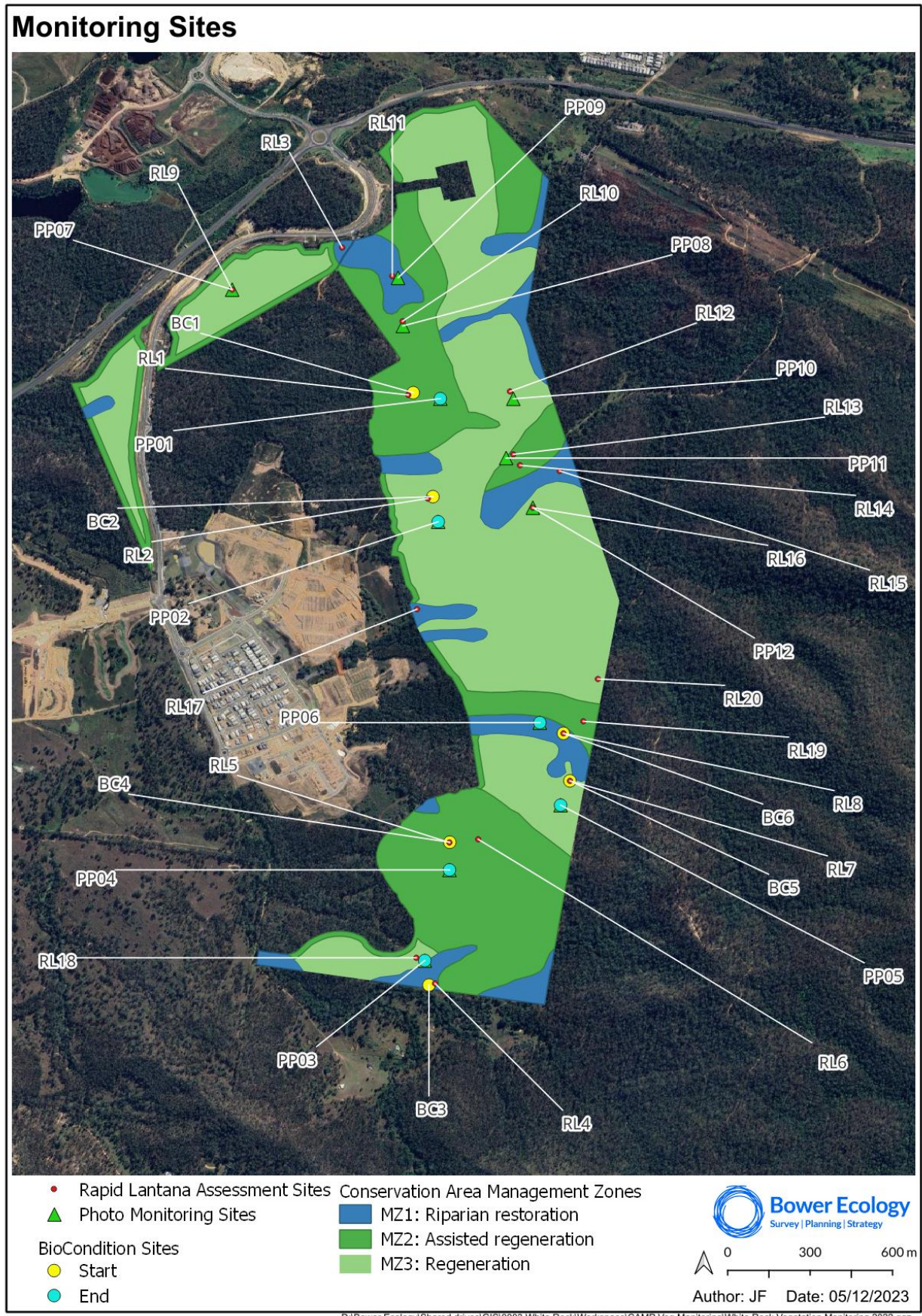
Figure 4: White Rock vegetation monitoring sites

3   Results

3.1. Survey timing and conditions

This year represents the third vegetation monitoring event on this site. To match delays in the baseline surveys, and to reflect the rainfall that occurred throughout the months preceding surveys this year (Table 2), all BioCondition, weed and photopoints were completed between the 31st of May and 9th of June.

Weather conditions for the six months preceding the 2023 monitoring event are presented in Table 3. Climate data was obtained from recordings taken at the Greenbank (Defence) weather station, approximately 14 km east of the development site (BOM 2023). Total rainfall over the three months leading up to the 2023 surveys (February – April) was lower than that over the same months in the previous four years. This is likely to have affected vegetation growth, and therefore survey results.

Table 2: February to April rainfall (mm) for 2019 to 2023 (BOM 2023).

Date	2019	2020	2021	2022	2023
February	40.4	320	150	792.2	51.2
March	131.6	82.2	248.8	171	79.6
April	75.6	3	88.8	45	49.6
Total Rainfall (mm)	**247.6**	**405.2**	**487.6**	**1008.2**	**180.4**

Table 3: Weather conditions for the six months preceding the May 2023 monitoring event (BOM 2023).

Date	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023
Mean Minimum Temperature (°C)	13.4	16.3	17.9	18.1	18.7	13.1
Mean Maximum Temperature (°C)	29	29.1	31.5	31.7	31.9	27.2
Total Rainfall (mm)	59.8	67	101.8	51.2	79.6	49.6

3.2. BioCondition Assessments

As per the requirements of the CAMP, six permanent BioCondition assessment sites were established in representative sites of vegetation communities and MZs (Figure 5). Two sites were established in each of the MZs (MZ1, MZ2, and MZ3) and occurred in two regional ecosystems in remnant condition and one non-remnant area. Assessment sites are detailed in Table 4 and Table 7.

During the 2023 monitoring event, the exact location of the start and finish position of two sites were unable to be located because permanent markers have not yet been installed (due to unexploded ordnances prevent star picket installation). For site BC4 the survey team were unable to locate the original end point and have re-set one based on an estimate of the original trajectory and the previously recorded GPS location by Eco Logical Australia Pty Ltd. Site BC6 has been relocated completely as the bank on which it was originally has collapsed. In both cases the new location is within the same management zone and within 100m of the original plot location. See Figure 5 for current plot locations – all of which have now had steel star pickets installed to indicate the start and finish of the plot.

The average score for MZ1 was 3; the average score for both MZ2 and MZ3 was 2. The majority of sites (1, 2, 4 and 5) scored a class of 2, representing vegetation approaching functional biodiversity condition. Two sites, site 3 and site 6 received a lower score of class 3, representing vegetation approaching dysfunctional biodiversity condition. Site 3 has improved in condition in comparison to the baseline, increasing from BioCondition class 4 to BioCondition class 3 in 2023. Vegetation condition at Site 6 has decreased in comparison to the baseline, however, as detailed below, the BioCondition score increased at this site in 2023 in comparison to 2022 monitoring. The non-remnant condition of Site 3 explains the low BioCondition score for this site (Table 4).

Three sites had different overall scores in 2023 in comparison to the 2021 baseline:

- Site 3 (non-remnant) had a baseline score of 0.33, therefore BioCondition class 4. This remained consistent at 2022 monitoring. The score for this site increased to 0.4 in 2023, therefore BioCondition class 3.
- Site 4 had a baseline score of 0.59, therefore BioCondition class 3; between the 2021 and 2022 monitoring events, the overall score for this site increased to 0.65, and the BioCondition class reduced to 2. In 2023, the score decreased slightly to 0.6, but the BioCondition class remained at 2 (Table 4).
- Site 6 had a baseline score of 0.61, therefore BioCondition class 2; between the 2021 and 2022 monitoring events, the overall score for this site decreased to 0.54, therefore BioCondition class 3. In 2023, the score decreased to 0.51, but the BioCondition class remained at 3 (Table 4).
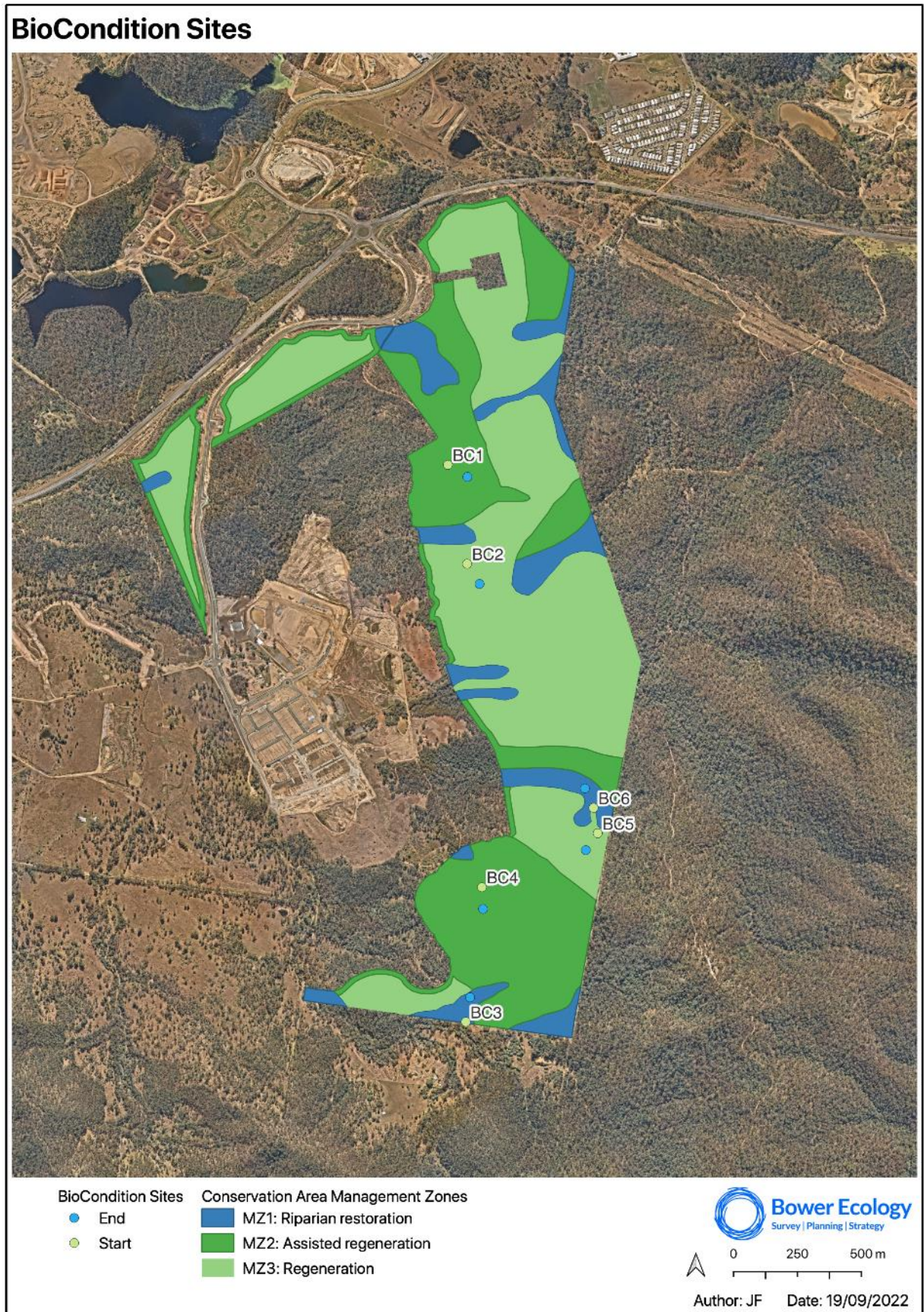
Figure 5: White Rock BioCondition assessment site

Table 4: Summary of BioCondition results for 2021 to 2023

Site ID	MZ	RE	Condition	Benchmark used	Overall BioCondition score 2021	Overall BioCondition score 2022	Overall BioCondition score 2023	BioCondition class 2021	BioCondition class 2022	BioCondition class 2023
1	2	12.9-10.2	Remnant	12.9-10.2	0.61	0.61	0.63	2	2	2
2	3	12.9-10.2	Remnant	12.9-10.2	0.76	0.76	0.78	2	2	2
3	1	12.9-10.7 (pre-clear)	Non-remnant	12.9-10.7	0.33	0.33	0.40	4	4	3
4	2	12.8.17	Remnant	12.8.17	0.59	0.65	0.60	3	2	2
5	3	12.9-10.2	Remnant	12.9-10.2	0.67	0.67	0.69	2	2	2
6	1	12.9-10.2	Remnant	12.9-10.2	0.61	0.54	0.51	2	3	3

Table 5: Site-based vegetation condition attributes contributing to BioCondition results for 2021, 2022 and 2023

Site ID / RE	BC1 / RE12.9-10.2			BC2 / RE12.9-10.2			BC3 / RE12.9-10.7			BC4 / RE12.8.17			BC5 / RE12.9-10.2			BC6 / RE12.9-10.2		
Management zone	2			3			1			2			3			1		
Year	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Field based attributes																		
Recruitment (% dominant canopy spp. regenerating)	100	100	91	60	75	71	100	100	67	25	100	75	50	86	75	25	0	50
Native tree sp. richness (no. native tree spp. in 100 x 50 m plot)	3	8	11	5	4	7	1	1	6	4	4	8	4	7	8	4	6	8
Native shrub sp. richness (no. native shrub spp. in 50 x 10 m plot)	3	6	4	7	5	7	1	2	6	3	4	9	6	5	4	3	5	4
Native grass sp. richness (no. native grass spp. in 50 x 10 m plot)	6	9	6	5	4	6	2	5	2	7	9	7	8	6	8	7	7	4
Native forb sp. richness (no. native forb spp. in 50 x 10 m plot)	10	6	2	7	5	2	3	11	3	10	4	7	8	11	0	10	6	1
Tree Canopy Height (median height of canopy layer in 100 x 50 m plot)	14	15	15	20	14	16	5	5	7	22	22	15	17	17	18	22	10	12
Tree Canopy Cover (% native canopy cover along 100 m transect)	40.5	74	33	36	71	51	1	1	2	32	32	46	80	59	62	32	44	83
Shrub canopy cover (% native shrub cover along 100 m transect)	58	25	5	0.5	22	15	2.5	0	5	25.5	14	21	9	40	27	25.5	0	2
Native perennial grass cover (average % cover of five 1 x 1 m quadrats)	0	29	4	23	69	66	2.4	96	99	0.6	10	16	5	6	3	0.6	1	3
Organic litter cover (average % cover of five 1 x 1 m quadrats)	89.6	56	89	60	28	46	17.6	0	0	48.4	15	85	78.4	79	98	48.4	94.8	100
Large trees (no. living trees / ha with DBH greater than benchmark DBH)	6	16	0	6	16	10	0	0	0	2	3	3	8	8	8	2	10	10
Coarse woody debris (total length / ha (m))	222	24	56	255	150	33	0	0	0	340	0	10	30	5	73	340	0	15
Weed cover (% total vegetation cover within 50 x 10 m plot comprised of exotic spp.)	35	26	23	2	0	0	90	6	11	80	72	31	10	24	8	80	100	37

3.3. Photo Monitoring

A total of 12 photo monitoring sites were established across the three different MZ, four in each zone in the Conservation Area (Figure 6), six of which are co-located with the six BioCondition survey sites (Figure 5). Photo monitoring sites are designed to deliver comparative results over the course of the CAMP program. Due to the variations in location between the 2021, 2022 and 2023 photographs (see Section 2.1.2), no accurate comparison can be made. Photos taken during 2023 monitoring will form the new baseline with which future monitoring photos will be compared. Digital photos taken at each site are available in Appendix C: Photo monitoring sites; some 2022 photos are included, where photo point locations appeared to be similar.
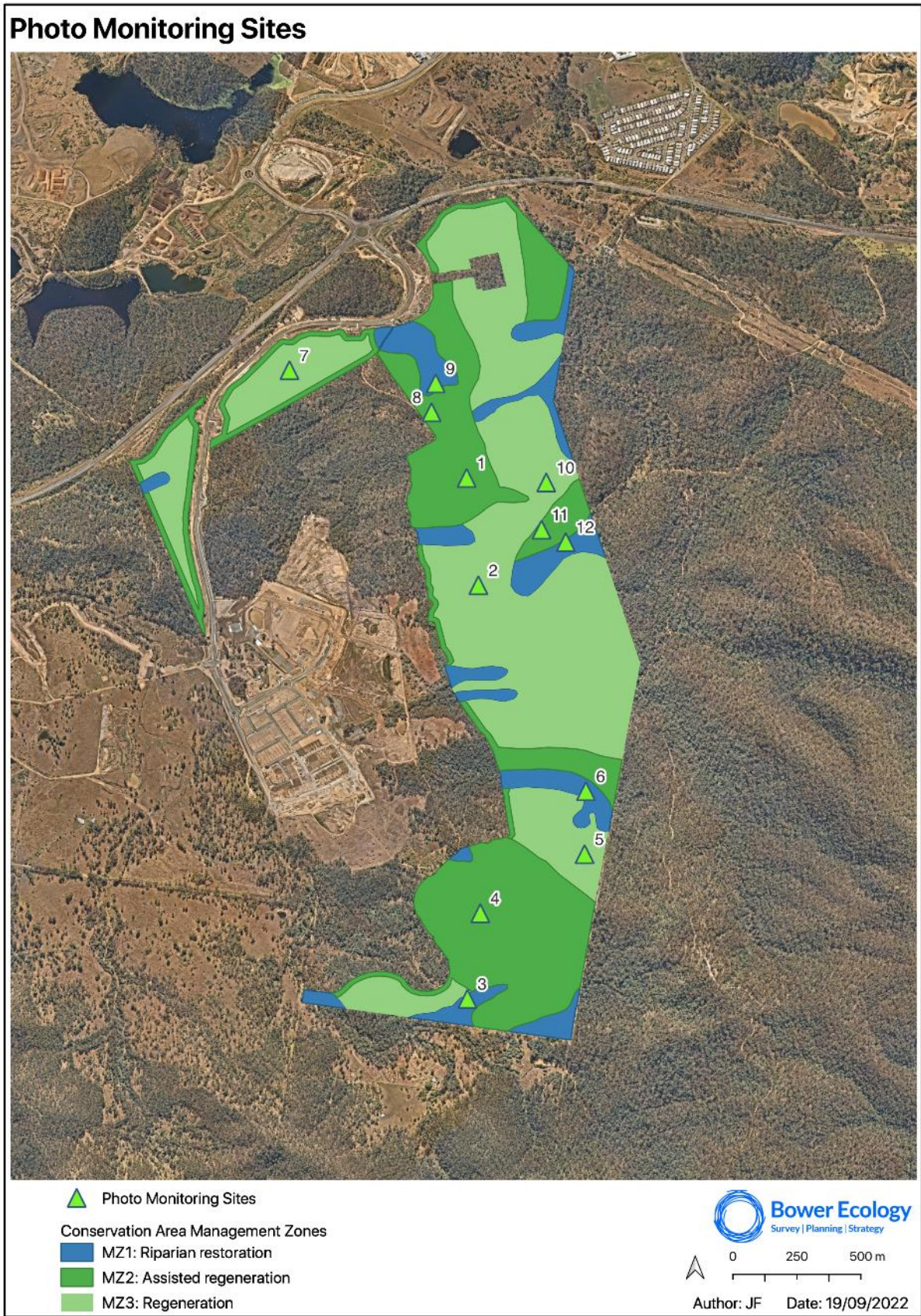
Figure 6: White Rock photo monitoring sites

3.4. Rapid assessments of lantana infestations

A total of 20 rapid lantana assessment sites were monitored across the Project Area: six sites in MZ1, seven sites in MZ2, and seven sites in MZ3 (Figure 7). *Lantana camara* (lantana shrub) was recorded at all 20 sites; this is consistent with baseline monitoring. *Lantana montevidensis* (creeping lantana) was recorded at 13 sites; this is greater than the number of sites at which this species has been previously recorded. While the presence of lantana was recorded at more sites than in previous monitoring events, the percentage cover averaged across all rapid assessment sites was significantly less than the baseline for both species (Table 6). Photographs in Table 10 illustrate the declining lantana cover indicated by the survey results.

While lantana species show a stable or increasing trend in spatial distribution, both species demonstrate a decreasing trend in percentage cover (percent foliage cover). For *Lantana camara*, spatial distribution remains consistent with the baseline, while percentage cover averaged across all sites shows a decreasing trend over time. At 18 sites, *L. camara* cover has reduced in comparison to 2021 baseline results. For *L. montevidensis*, spatial distribution shows an increasing trend, while percentage cover averaged across all sites was lower than 2021 baseline results. Most sites at which *L. montevidensis* was recorded show low coverage, however two sites (RL7 and RL15) were found to have significantly higher coverage in comparison to the baseline.

Figure 8 illustrates approximate areas in which weed management was undertaken in April to June 2023.

Table 6: Lantana Rapid Assessment results

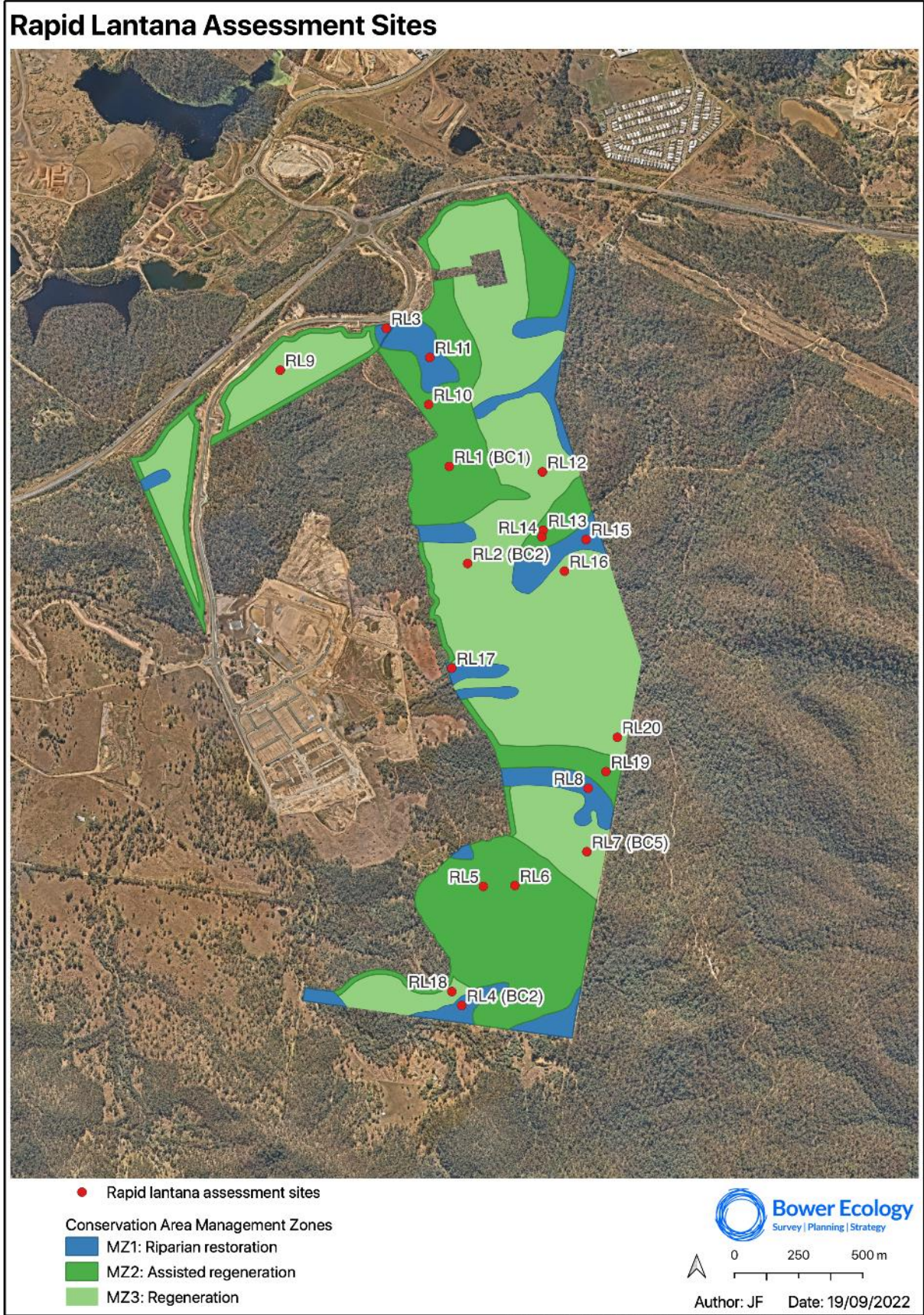| Site ID	MZ	Percent Cover *L. camara* 2021	Percent Cover *L. camara* 2022	Percent Cover *L. camara* 2023	Percent Cover *L. montevidensis* 2021	Percent Cover *L. montevidensis* 2022	Percent Cover *L. montevidensis* 2023
RL1	2	35	26	**1**	0	0	**0**
RL2	3	10	0	**1**	10	0	**0**
RL3	1	80	5	**3**	0	0	**0**
RL4	1	10	0	**10**	0	0	**0.1**
RL5	2	35	0	**6.5**	50	0	**0.25**
RL6	2	30	5	**4**	30	0	**1**
RL7	3	5	24	**4.5**	0	0	**8**
RL8	1	80	0	**4**	0	0	**0**
RL9	3	35	0	**1**	0	0	**0.1**
RL10	2	50	6	**1.5**	0	0	**1**
RL11	1	30	15	**2**	5	0	**0**
RL12	3	35	0	**0.25**	35	20	**35**
RL13	2	40	20	**43**	5	15	**5**
RL14	2	80	11	**9**	15	11	**0.5**
RL15	1	80	0	**4**	0	0	**12**
RL16	3	1	0	**18**	55	0	**3.5**
RL17	1	55	100	**40**	40	0	**0**
RL18	3	70	0	**2.5**	0	0	**0**
RL19	2	65	20	**6**	0	3	**1**
RL20	3	10	0	**2**	0	0	**0.1**
Site Mean		41.8	11.6	**8.16**	12.3	2.45	**3.38**

Figure 7: White Rock rapid lantana assessment sites
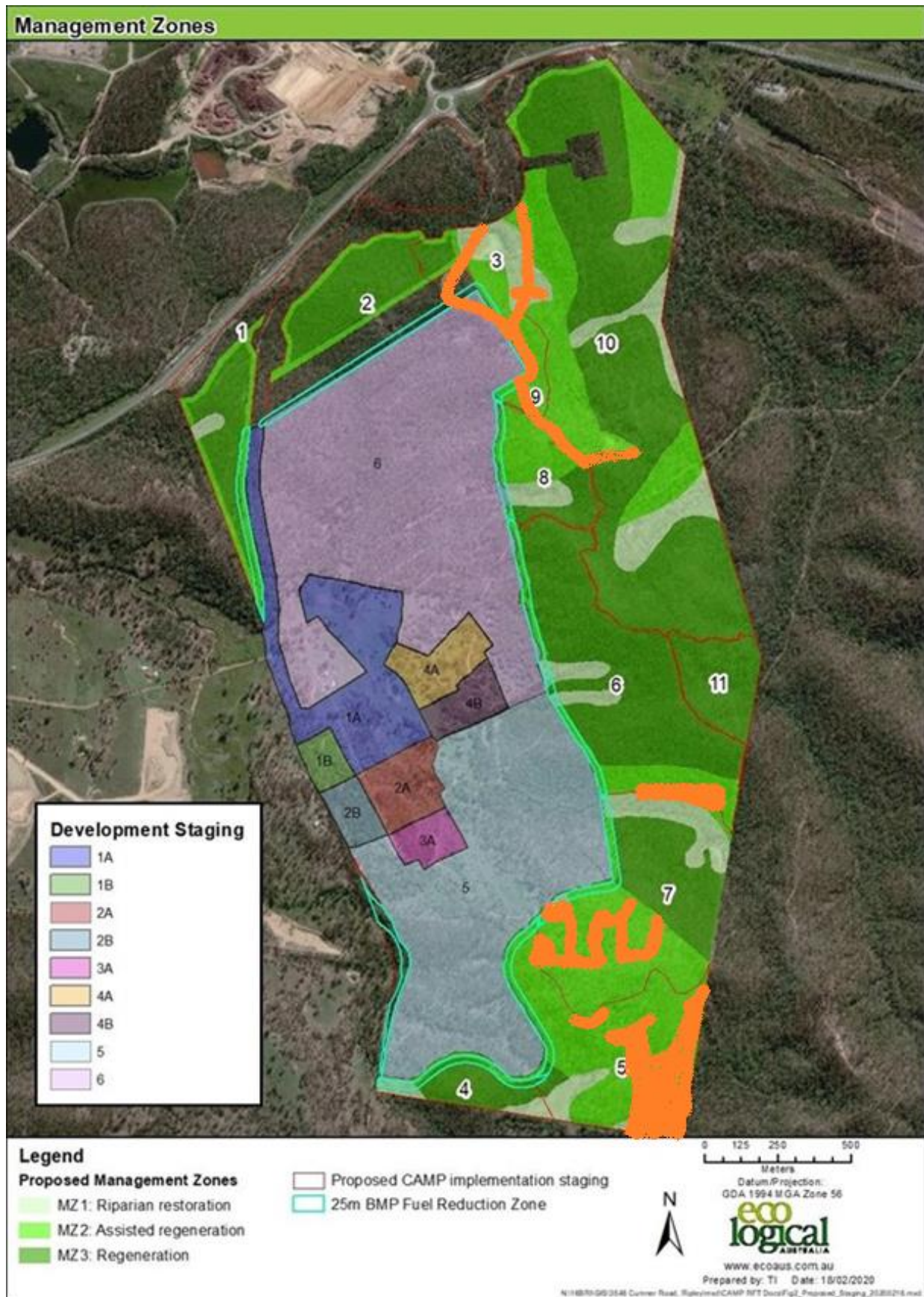
Figure 8: Weed treatment works undertaken by Evolve in April to June 2023. Orange areas indicate where herbicide spray has been utilised (Mapping from Evolve).

4   Discussion

Overall, lantana cover, the key trait expected to respond to management, shows a decreasing trend since baseline surveys were conducted in 2021, while spatial distribution of lantana shows an increasing trend. Since weed management works commenced, the coverage of both species of lantana has declined significantly. Spatial distribution of *L. camara* has remained consistent with the baseline, with individuals recorded at all 20 assessment sites. Spatial distribution of *L. montevidensis* has increased, with individuals recorded at nine sites in baseline surveys, and at 13 sites in 2023 monitoring. The reduction in lantana cover can be attributed to weed management works, however the increased spatial distribution indicates a need for continued efforts to control these weed species.

The BioCondition assessment sites have all remained relatively stable between 2022 and 2023 monitoring. The exception to this is Site BC3, the non-remnant vegetation site, which has improved one BioCondition score point from 4 to 3. Specific attributes with short response times, for example native forb and grass diversity, and perennial grass cover, have shown varied patterns in comparison to 2022 monitoring. That is:

- Native forb species richness has decreased at five of the six BioCondition assessment sites and increased at one (Table 5). The decrease is expected to be due to significantly lower rainfall in the months preceding the 2023 surveys, in comparison to previous years.
- Native grass species richness has increased at two BioCondition assessment sites and decreased at four (Table 5). The decrease in annual native grasses is also likely to be a result of significantly lower rainfall in the months preceding the 2023 surveys, in comparison to previous years.
- Perennial grass cover has increased at two BioCondition assessment sites, decreased at two, and remained relatively consistently high at two (Site 2 decreased slightly from 69% in 2022 to 66% in 2023; Site 3 increased slightly from 99% in 2022 to 96% in 2023) (Table 5). Changes in perennial grass cover at most sites were relatively small, and expected to be within the realm of observer variation; therefore recorded changes are unlikely to represent significant actual changes in cover.

Some ecosystem traits take longer to mature than the attributes listed above. Trends in traits such as canopy cover, tree species richness and the number of large trees will take longer to emerge than the two-year period that elapsed between 2021 baseline surveys and 2023 monitoring. It is expected that trends will begin to become apparent in future years.

Recommendations for management for the next annual cycle emerging from this report are:

- Ensure continued maintenance weed management to control the cover of lantana species. Once lantana (particularly bush lantana, *L. camara*) is removed, it can open new niches for other invasive species to proliferate. The condition of control sites will be continued to be monitored and, if other weeds of concern emerge, they will be added to the weed monitoring schedule.
- As management begins to focus on other methods of restoration such as ecological burns, works may consider undertaking burns in areas where creeping lantana is worst; although it is acknowledged that several factors are considered when determining the location of burns.

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Appendix A: BioCondition Scores

Table 7: BioCondition analysis and scoring for Year 2 2023 monitoring

Management zone	2		3		1		2		3		1	
Site ID / RE	BC1 / RE12.9-10.2		BC2 / RE12.9-10.2		BC3 / RE12.9-10.7		BC4 / RE12.8.17		BC5 / RE12.9-10.2		BC6 / RE12.9-10.2	
Value Type	Field value	Score	Field value	Score	Field value	Score	Field value	Score	Field value	Score	Field value	Score
Field based attributes												
Recruitment	91	5	71	3	67	3	75	5	75	5	50	3
Native tree sp. richness	11	5	7	5	6	5	8	5	8	5	8	5
Native shrub sp. richness	4	3	7	5	6	5	9	5	4	3	4	3
Native grass sp. richness	6	3	6	3	2	3	7	3	8	5	4	3
Native forb sp. richness	2	3	2	3	3	0	7	3	0	0	1	0
Tree Canopy Height	15	5	16	5	7	3	15	5	18	5	12	5
Tree Canopy Cover	33	5	51	5	2	0	46	5	62	5	83	3
Shrub canopy cover	5	5	15	3	5	5	21	3	27	3	2	3
Native perennial grass cover	4	1	66	5	99	5	16	3	3	1	3	0
Organic litter cover	89	5	46	5	0	0	85	3	98	3	100	3
Large trees	0	0	10	10	0	0	3	5	8	10	10	10
Coarse woody debris	56	5	33	0	0	0	10	0	73	5	15	0
Weed cover	23	5	0	10	11	3	31	3	8	5	37	3
Total Field based attributes		**50**		**62**		**32**		**48**		**55**		**41**
GIS based attributes												
Fragmented - Patch size		10		10		5		10		10		10
Fragmented - Connectivity		5		5		4		5		5		5
Fragmented - Context		5		5		4		5		5		5
Total GIS attributes		**20**		**20**		**13**		**20**		**20**		**20**
Total BioCondition Score		**63**		**78**		**40**		**60**		**69**		**51**
Weighted Ecosystem Score		**0.63**		**0.78**		**0.40**		**0.60**		**0.69**		**0.51**
Final Classification		**2**		**2**		**3**		**2**		**2**		**3**

Appendix B: BioCondition site photos

Table 8: BioCondition site photos

BC01	2021	2022	2023
Start Towards Centre	Photo not available		
End Towards Centre	Photo not available		

BC02	2021	2022	2023
Start Towards Centre	Photo not available		
End Towards Centre	Photo not available		

BC03	2021	2022	2023
Start Towards Centre	Photo not available		
End Towards Centre	Photo not available		

BC04	2021	2022	2023
Start Towards Centre	Photo not available	Photo not available	
End Towards Centre	Photo not available	Photo not available	

BC05	2021	2022	2023
Start Towards Centre	Photo not available	Photo not available	
End Towards Centre	Photo not available		

BC06	2021	2022		2023
Start Towards Centre	Photo not available			
End Towards Centre	Photo not available			

Appendix C: Photo monitoring sites

Table 9: Photo monitoring digital images

PP01	2021	2022	2023
North			
East			

| South | | | | |
| West | | | | |

PP02	2021	2022	2023
North			
East			

South				
West				

PP03	2021	2022	2023
North			
East			

South				
West				

PP04	2021	2022	2023
North		Photo not available	
East			

South			
West		Photo not available	

PP05	2021	2022	2023
North			
East			

South			
West			

PP06	2021	2022	2023
North			
East			

| South | | | |
| West | | | |

PP07	2021	2022	2023
North			8 June 2023 9:44:19 am Centenary Highway White Rock City of Ipswich Queensland PP07-LN-AN
East		Photo not available	8 June 2023 9:45:48 am 259-283 Cumner Road White Rock City of Ipswich Queensland PP07-L0-AE

South		Photo not available	
West		Photo not available	

PP08	2021	2022	2023
North			
East		Photo not available	

| South | | Photo not available | |
| West | | Photo not available | |

PP09	2021	2022	2023
North		Photo not available	
East		Photo not available	

| South | | Photo not available | |
| West | | | |

PP10	2021	2022	2023
North			
East		Photo not available	

South		Photo not available	
West		Photo not available	

PP11	2021	2022	2023
North			
East		Photo not available	

South		Photo not available	
West		Photo not available	

PP12	2021	2022	2023
North		Photo not available	
East		Photo not available	

South			
West		Photo not available	

Appendix D: Lantana rapid assessment photos

Table 10: Rapid lantana assessment digital images

Plot	2021	2022	2023
1			
2			

3			
4		Photo not available	

| 7 | | Photo not available | |
| 8 | | | |

9		
		1 Dec 2023 9:38:48 am 56J 483843 6938059 RL09

10		
	Photo not available	1 Dec 2023 10:09:26 am 56J 484469 6937880 RL10

13		
14		
	Photo not available	

Appendix E: Camp Performance criteria

The performance criteria required for the site have been identified in Table 11 and are consistent with the EPBC Act approval. Performance criteria specifically related to the current monitoring event are highlighted orange in Table 11 below. Performance criteria are considered as interim targets, which will guide works towards the completion criteria stated in the CAMP. If monitoring indicates that the management actions are not resulting in achievement of the performance criteria, the program may require revision in consultation with ICC and all other relevant authorities.

Table 11: CAMP performance criteria

Task	Establishment				Maintenance
	Preliminary		Management		
	By end of year 3*		Between end of year 3 and end of year 10*	Year 11*	Years 12-21*
Construction-related management actions					
Translocation of habitat / logs	Translocation undertaken, minimal damage to CA vegetation.		N/A		
Fencing / signage / (and maintenance)	Infrastructure installed.		No more than 5% of fencing compromised at any time		
Sediment and erosion control (and maintenance)	Sediment / erosion works installed		Sediment and erosion control devices checked and repaired annually in Quarter 1		
Waste	Initial waste removal undertaken, ongoing waste removed quarterly / as required		Waste removed Quarterly and as required		
Bushland management actions					
Fire management	Bush fire management plan (BFMP) completed. Fire management works undertaken as specified in the BFMP.		Fire management works undertaken as specified in the BFMP.		
Significant flora management	Undertaken as per specifications in Section 7.3. After works are complete, monitoring of planted / seeded individuals must be undertaken				N/A

Pest fauna management	Two survey events completed to determine baseline of dogs/cats/foxes within the Conservation Management Area and reference sites within the adjacent White Rock Conservation Estate Area. Development of a pest management plan that specifies how feral dogs, cats and foxes will be reduced in the Conservation Management Area. Development of a survey methodology that is sufficient to demonstrate any reduction of feral dogs, cats and foxes in the Conservation Management Area, relative to the baseline and reference sites within the adjacent White Rock Conservation Estate Area.	Between end of year 3 and the end of year 6, no increase in pests against baseline, or in the event of evidence of an increase in pests in the general area as measured at reference sites within the White Rock Conservation Estate Area, then demonstrated reduction in pests relative to the reference sites, measured annually.	From the beginning of year 7 to end of approval, maintain a reduction in pests relative to baseline, measured annually, or in the event of evidence of an increase of pests in the general area, measured at reference sites within the White Rock Conservation Estate Area, then demonstrated reduction relative to these reference sites, measured annually.
Bushfire/recreation trails (and maintenance)	Fire access tracks established	At a minimum, bushfire management trails drivable at least one month prior to fire season as determined in BFMP. No more than 10% of designated multipurpose trails unwalkable at any time.	
Revegetation requirements assessed	Revegetation requirements assessed every year prior to planting season until Year 8		N/A
Revegetation works	N/A	Revegetation is undertaken to planting specifications and consistent with the Regional Ecosystem type. All revegetation to be completed by the end of Year 8 (at least 20% of works will be completed by the end of each year [years 4 to 8]). Minimum 90% survival rate of revegetation or equivalent stem density (i.e. through natural regen) at the end of each year and by the end of Year 11.	N/A
Weed control	Targeted primary treatment over approximately 10% of area.	Primary and secondary works undertaken in all areas by the end of Year 8 (at least 20% of	A minimum of three years of maintenance undertaken in all areas

	Targeted primary treatment within all mosaic burn areas (post burn), estimated to be 10% pending preparation of BFMP	works will be completed by the end of each year [years 4 to 8]). Targeted primary treatment within all mosaic burn areas (post burn).	<5% coverage of mature woody weeds in any zone <25% exotic groundcover in Management Zone 1 and Management Zone 2 <10% exotic groundcover in each zone in Management Zone 3 Targeted primary treatment within all mosaic burn areas (post burn).
Native tree management	Identification of tree thinning areas	All thinning activities undertaken as specified in Section 7.7 by the end of Year 8	All management zones and portions thereof have koala food trees present consistent with the associated Regional Ecosystem type.
Monitoring and reporting			
Monitoring and annual reporting	Monitoring points installed / baseline established prior to works	Annual and final monitoring undertaken in as specified in **Section 9** of the CAMP	
CAMP Review, aiming to minimise threatening processes to koalas and GHFF	N/A	CAMP reviewed and updated at Year 6, 11, 16 and 21	

* Year 1 means the period until 12 months from the date of the approval of the action

Year 2 means the period until 24 months from the date of the approval of the action

Year 3 means the period until 36 months from the date of the approval of the action

Year 4 means the period until 48 months from the date of the approval of the action

Year 5 means the period until 60 months from the date of the approval of the action

Year 6 means the period until 72 months from the date of the approval of the action

Year 7 means the period until 84 months from the date of the approval of the action

Year 8 means the period until 96 months from the date of the approval of the action

Year 9 means the period until 108 months from the date of the approval of the action

Year 10 means the period until 120 months from the date of the approval of the action

Year 11 means the period until 136 months from the date of the approval of the action

Year 12 means the period until 148 months from the date of the approval of the action

Year 16 means the period until 192 months from the date of the approval of the action

Year 21 means the period until 252 months from the date of the approval of the action

Appendix B - Koala Monitoring Report 2023

White Rock Koala Monitoring Report

Report No. 3 (2023)

Prepared for Intrapac White Rock Pty Ltd

31 January 2024

Bower Ecology
Survey | Planning | Strategy

Document Tracking

Project Name	White Rock Koala Report - Report No. 3 (2023)
Prepared By	JF
Reviewed By	SJ
Approved By	SJ
Version	1
Status	Final

This report should be cited as 'Bower Ecology Pty Ltd 2024, *White Rock Koala Monitoring Report - Report No. 3 (2023)*. Prepared for Intrapac White Rock Pty Ltd.'

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1. Introduction

1.1. Project background

Ripley Land Holdings Pty Ltd, Northrow (Qld) Pty Ltd and TDC (Qld) Pty Ltd (the proponents) received approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in December 2019 for the proposed development of a mixed-use sub-division and associated infrastructure at White Rock in Ripley Valley (EPBC 2014/7388).

The White Rock development includes five subject lots, covering a total of 472.8 ha, with the proposed development footprint encompassing a total of 224 ha (Figure 1). The development will result in a number of end uses, including residential, commercial, greenspace, recreation/sporting, educational, roads and easements for internal services.

A koala offset area of approximately 240 was established to the north and east of the project area adjoining the White Rock - Spring Mountain Conservation Estate (Figure 1). The initiative aims to enhance habitat quality and landscape connectivity of local koala populations.

A Koala Management Plan (KMP) and Conservation Area Management Plan (CAMP) have been prepared in support of assessment requirements under the EPBC Act. These plans outline management actions to avoid and minimise impacts of the development on koala, as well as describing management and monitoring of this proposed koala offset area. The plans require monitoring and reporting to be undertaken every two years.

1.2. Objectives and scope of work

The purpose of the monitoring survey is to undertake a targeted survey within the study area to determine the current koala population and health.

Specifically, the objectives of the monitoring are to:

- Confirm the population size on within the study area via a systematic survey.
- Identify the landscape usage, and hence important areas of habitat for foraging, breeding and connectivity.
- Identify the incidence / severity of disease, especially Chlamydia.
- Compare current population data with baseline population data .

This report presents the third koala monitoring event and has occurred during a time when approximately 50% of the proposed development footprint (adjacent to the koala offset area) has been cleared of vegetation (Figure 1).
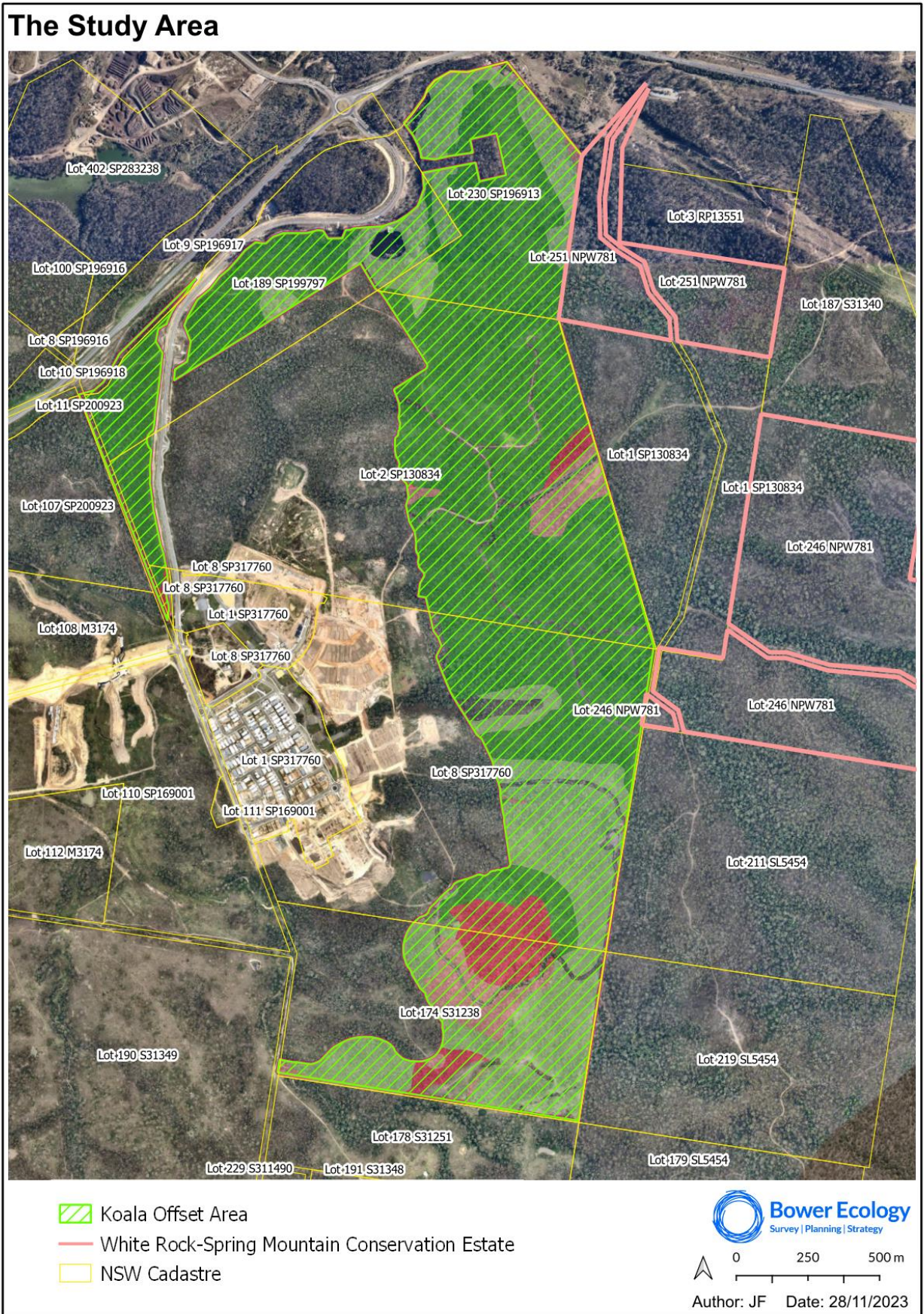
Figure 1: Project area and location

1.3. Koala habitat within the study area

Koala habitat is defined as land that supports koalas through the inclusion of specific habitat attributes. Koala habitat contains koala food tree species, has connectivity to other koala habitat, and is located near to areas occupied by koalas (DCEEW, 2022). Koala food trees are generally considered to be any tree of the following genus: *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* and *Melaleuca* (ANU, 2021).

The study area (koala offset area) comprises a total area of 240.8 ha, of which 233 ha have been mapped as primary and secondary koala habitat (disturbed and undisturbed) as shown in Figure 2. Eight different vegetation communities have been mapped within the study area (Table 1 and Figure 2).

Past surveys undertaken by Natural Solutions (2008) and Enviro-Studio (2013) within the study area and surrounds have failed to detect koalas within the area. However, several koala scats were recorded to the east in White Rock-Spring Mountain Conservation Estate as part of Ipswich City Council's koala surveys undertaken in September 2015.

Eco Logical Australia Pty Ltd (ELA) has also previously conducted targeted surveys for koala in September 2016 with multiple scats encountered, as well as one koala sighting in forest towards the north of the development area (Figure 2).

In 2019, an initial baseline survey was conducted following CAMP and KMP protocols (ELA 2019). This survey, established the baseline under these management plans, in accordance with sections 6.2 and 6.3 of the KMP. Several scats were recorded in the north and south of the site during the baseline survey (Figure 2). Surveys were repeated in 2021, as per the management plans, and evidence of koala was recorded (Bower Ecology, 2021). Spotlighting detected one koala in the east of the site, and male koala calls were recorded in the same area; scats were confirmed at two locations in the east and west of the site (Figure 2).

Table 1: Summary of study area and habitat type

Habitat Value	Dominant vegetation community	Area (ha)	Proportion of area (%)
Primary	Narrow leaved Ironbark, Red Gum and Silver leaved Ironbark; Forest Red Gum, Swamp Box and Ironbark	12.13	5.04
Primary (disturbed)	Acacia +/- scattered Eucalypts; Forest Red Gum on alluvium; Forest Red Gum, Swamp Box and Ironbark; Narrow leaved Ironbark, Red Gum and Silver leaved Ironbark;	11.91	4.95
Secondary	Spotted Gum, Ironbark and other Eucalypts; White Mahogany, Grey Gum and Spotted Gum	145.43	60.93
Secondary (disturbed)	Exotic Grassland +/- sparse Acacia and Eucalypts; Spotted Gum; Spotted Gum, Ironbark and other Eucalypts; White Mahogany, Grey Gum and Spotted Gum	63.80	26.49
Non-habitat	-	7.55	3.13
	Total:	**240.82**	**100.00**

Koala Habitat and Previous Survey Records

Historical Koala Observations
- ● Scat (ELA 2016)
- ● Sighting (ELA 2016)
- ● Scat (ELA 2019)
- ● Scat (Bower Ecology 2021)
- △ Sighting (Bower Ecology, 6 Sept 2021)

Koala Habitat Value
- Primary
- Primary-disturbed
- Secondary
- Secondary-disturbed

☐ Conservation Area

Bower Ecology — Survey | Planning | Strategy

0   250   500 m

Author: JF   Date: 05/12/2023

D:\Bower Ecology\Shared drives\GIS\0003 White Rock\Workspace\2023 Koala Monitoring\20230912 Koala Monitoring.qgz

Figure 2: Koala habitat and previous survey records

2. Methodology

Most field surveys were undertaken over six days between the 4th and 9th of September 2023, inclusive. Bioacoustic detector surveys were conducted between the 27th of September and 3rd of October 2023, inclusive.

The monitoring survey consisted of data collection by two field staff, using the following four methodologies:

- Strip transects using thermal drone.
- Spotlighting and call playback.
- Acoustic detectors.
- Regularised Grid-based Spot Assessment Technique (RGSAT) surveys.

In accordance with recommendations set out in the *EPBC Act referral guidelines for the vulnerable koala* (DoE, 2014) koala surveys were carried out during September, over a period of six days and five nights. Koala activity is at its peak between August – January (breeding season) and resident breeding females are most easily observed. The following sections outline the methods undertaken for each monitoring component.

2.1. Field survey methods

2.1.1   Strip transects – Thermal detection drone

Systematic searches of multiple strip transects with fixed boundaries were undertaken across the study area, using a drone mounted with both a RGB full colour and a thermal camera, in accordance with koala survey guidelines outlined by Beranek et. al. (2021) and Yungentob et. al. (2021).

Prior to the baseline survey event (2019), the location of survey transects was allocated at desktop level and refined during the baseline field survey (ELA 2019). Preliminary mapping of the location of transects was also undertaken in 2019 to ensure adequate coverage (min. 30% of the study area) was achieved. Transects were arranged systematically to provide adequate coverage of all habitat types within the study area and were located perpendicular to the contours of the landscape where possible.

The location of the 2019 baseline monitoring strip transects was replicated for the 2023 survey. A total of 35 strip transects comprising a survey area of approximately 63 ha were conducted across study area. Location of strip transects are presented in Figure 3.

A Remotely Piloted Aircraft (RPA) accredited field team used a thermal drone (DJI Mavic 3T) to survey the 35 pre-established strip transects; parallel, linear transects, as per Beranek et. al. (2021). Surveys were conducted in the two to three hours after dawn, depending on weather conditions, to maximise thermal contrast between koalas and their surroundings. Any thermal signatures found were cross-referenced with a 4k colour camera for positive species identification (Howell et. al., 2022; Witt et. Al., 2020).

Koala density was calculated for the study area using the number of independent koalas detected per hectare of bushland searched.

2.1.2   Spotlight and call playback

The 2019 and 2021 monitoring spotlighting and call playback methods were expanded for this 2023 survey, with the addition of a tenth call playback location to increase site coverage further, and increased call playback time. This expansion was in-line with the Department of Conservation and the Environment survey guidelines (DEC, 2004).

Spotlighting and call playback was conducted over five nights from 4 – 8 September 2023 by two qualified ecologists. Ten call playback sites were visited, each repeated twice throughout the survey, with slow-driving spotlighting completed between playback sites.

Four call playback sessions were conducted per survey night. Call playback protocol consisted of 5 minutes pre-listen for koala calls, spotlight of immediate area surrounding playback location, 5 minutes of intermittent call

playback, 10 minutes of listening, repeat of spotlighting immediate area to finish. A total of 2.5 hours of spotlighting and call playback was conducted each night, with a total of 12.5 hours across 5 nights for each of the two staff members. Call playback locations are illustrated in Figure 3.

2.1.3   Acoustic detectors

Acoustic detectors were used to determine koala presence / abundance within study area. Unattended acoustic recorders were placed within study area in vegetation providing koala habitat.

Three Bioacoustic Recorders were deployed across the study area for five nights between 27 September and 3 October 2023. Each of the three bioacoustic recorders were in operation for nine hours per night for five consecutive nights. Recording began 1 hour before sunset and finished 8 hours after sunset. A total of 15 nights (135 hours) of recording time was captured and analysed for koala calls. Bioacoustic recorders 1 and 2 were relocated midway through the survey to increase coverage across the study area. The locations where the recorders were deployed are illustrated in Figure 3.

2.1.4   Regularised grid-based SPOT Assessment Technique survey

As per Biolink (2008), the RGBSAT survey technique is an adaptation of the Spot Assessment Technique (SAT) methodology originally developed by Phillips and Callaghan in 2011. It enables the detection of koala habitat use at a low carrying capacity as well as the delineation of the areal extent that is currently utilised or occupied.

The 33 RGBSAT sites surveyed during the 2019 baseline event were re-surveyed during this 2023 monitoring event (Figure 3). During field survey, once located, each point was sampled using the SAT Methodology as per Phillips and Callaghan (2011).

The location of koala scats identified during this process were recorded and a sample of the scat was collected. Koala scats identified incidentally, either during the strip transects or whilst walking in between sites were also recorded and a sample collected. Scats were identified by ecologists in the field, any suspected koala scats were sent to a scat identification expert for further verification.
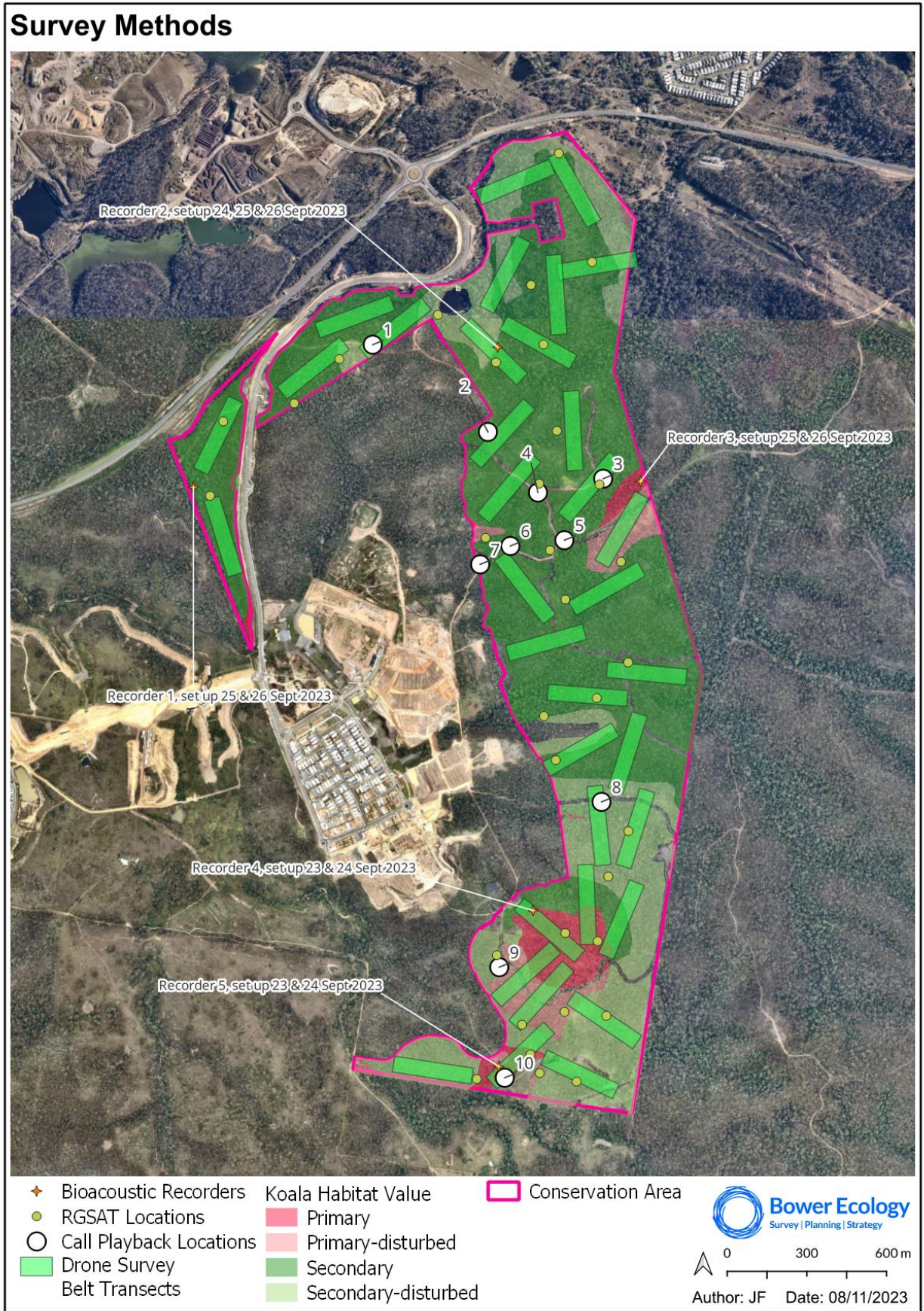
Figure 3: Transect, call playback, RGSAT and bioacoustic recorder locations

2.2. Data analysis

Acoustic data was analysed with software specifically designed for handling sound files visually presenting spectrograms. This enabled visual and audial review of each hour of recording data to identify koala calls.

All scats collected were sent for confirmation of species by scat experts at Scatsabout.

The results of the RGBSAT surveys were used to calculate a koala activity level across the study area in accordance with the method described in Phillips and Callaghan (2011). The koala activity level is calculated as the percentage equivalent of the proportion of surveyed trees where koala scat are identified. For the purposes of this assessment, an average koala activity level for the study area was calculating as the number of trees where scats were identified divided by the total number of trees surveyed and the result converted to a percentage.

2.3. Survey limitations

All fauna assessments are subject to inherent limitations in the detection success of targeted species. These limitations often result in a degree of false-absence records (i.e., a species is present, but not detected). It is important that the limitations to surveys are identified, and the survey results are viewed with these constraints in mind.

Limitations that may have affected the koala monitoring assessment include:

- Koala have large home ranges and may not have been present in this this part of their home range during the survey. This is particularly relevant to the current survey area, which is located directly adjacent to large tracts of suitable koala habitat within the White Rock Conservation Area.
- Biological factors such as sex, age-class, and breeding biology, which may influence koala habitat use and detectability during different times of year, although surveys were undertaken during the spring breeding period in order to maximise detection.

Irrespective of the limitations identified, the combination of survey timing, design and study area coverage ensured the best possible chances for koala detection.

Importantly, these limitations do not affect the repeatability of survey technique in future years.

2.2. Data analysis

3. Results

3.1. Survey timing and conditions

Climate data was obtained from recordings taken at Greenbank (Defence) weather station located approximately 14 km east of study area (BoM, 2021). Weather conditions leading up to and at the time of survey are presented in Table 2. Rainfall in the three months (June – August) leading up to survey period was 88 mm which was lower than that of the long-term average of 110 mm for the same months.

Table 2: Weather conditions preceding and during the field survey

Date	Temperature (°C)		Total rainfall (mm)	Max wind gust (km/h)
	Minimum	Maximum		
June 2023	-0.4	27.3	7.8	39
July 2023	0.9	27.9	51.4	44
August 2023	1.8	30.3	28.8	39
4 September 2023	13.6	25.3	3.2	30
5 September 2023	12.4	30.3	0	28
6 September 2023	14.1	27.1	4.4	31
7 September 2023	11.2	28.1	0	30
8 September 2023	11.7	28.1	0	35
27 September 2023	8.3	32.2	0	33
28 September 2023	13.2	30.8	0	33
29 September 2023	13.3	28.3	28.8	26
30 September 2023	11.7	29.5	0	31
1 October 2023	10.9	27.9	0	33
2 October 2023	10	30.4	0	28
3 October 2023	11.1	28.2	0	31

3.2. Strip transects

No koalas were detected during diurnal drone strip transect surveys.

3.3. Call playback

No koalas were detected during nocturnal call playback surveys.

3.4. Acoustic detectors

No koala calls were recorded on the BioAcoustic Recorders.

3.5. Regularised grid-based Spot Assessment Technique survey

Koala scats were found at none of the 33 RGSAT survey locations. From this result, the average koala activity level for the entire study area was calculated to be 0%.

One confirmed koala scat was found incidentally between RGSAT locations 1 and 2, within the area of strip transect 23 (Figure 4). This is within the secondary koala habitat in the north-west of the study area. As it was found incidentally, it does not form part of the RGSAT koala activity calculations.
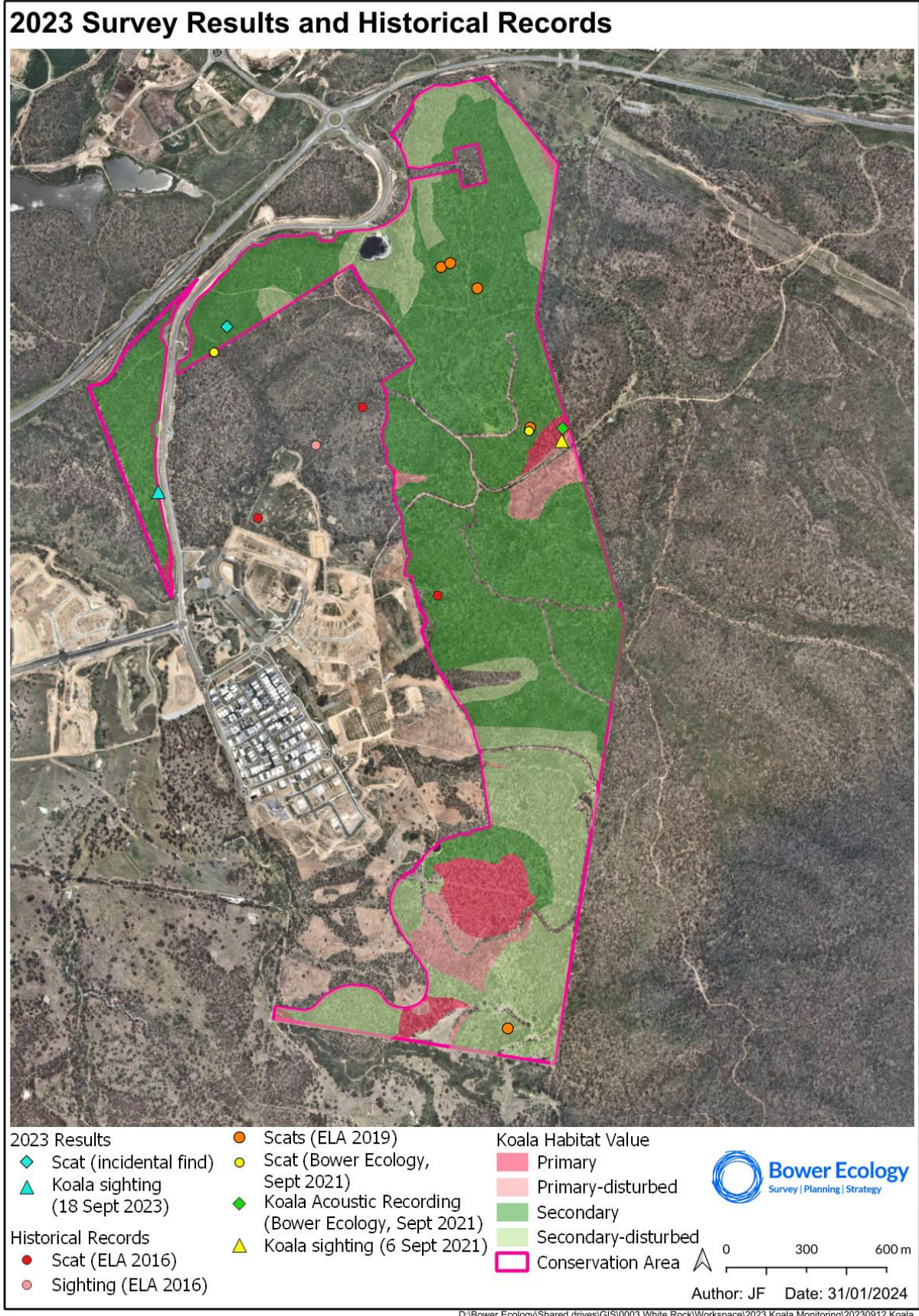
Figure 4: Results of the 2023 koala surveys, including historical records.

3.6. Incidental Koala sighting

On September 2023, during the week after the koala monitoring event, a koala was observed on the CAMP fence (Figure 4 and Figure 5). The local animal hospital was contacted, and its staff collected the koala to be examined by a vet and released.

Figure 5: Incidental koala observation on CAMP fence, 18/09/2023.

3.7. General fauna observations

A total of six fauna species were opportunistically observed during spotlighting surveys and are summarised in Table 3. Species listed as Vulnerable under the NSW BC Act are marked with an asterisk (*).

Table 3: Fauna observations

Animals	Observations
Birds	Australian Owlet-nightjar (*Aegotheles cristatus*) Scarlet Honeyeater (*Myzomela sanguinolenta*) Barn Owl (*Tyto alba*)
Macropods	Red-necked Wallaby (*Macropus rufogriseus*)
Arboreal mammals	Squirrel Glider (*Petaurus norfolcensis*)* Black Flying Fox (*Pteropus 13lecto*)

4. Discussion

4.1. Koala monitoring outcomes

No evidence of koalas was recorded during any of the surveys conducted across the site. According to SAT calculations, koala activity was determined to be 0%; this is lower than both 2019 baseline results (0.51% activity) and 2021 monitoring results (0.41%), which both indicate a low koala population density. This reduction in calculated activity, however, is unlikely to represent a reduction in actual koala activity, as incidental observations confirm the species' continued presence on the site. One koala scat was observed incidentally during the monitoring event, below a tree with probable koala scratch marks. Additionally, a koala was observed on the CAMP fence within a week of the monitoring event.

Based on the locations of the recorded koala scat and observed koala (Figure 4), koalas were determined to be utilising secondary habitat that dominates the study area. However, given the historical observations of koala and scats across the study area (Figure 2), it is expected that koalas utilise all habitat (primary, secondary and disturbed) across the entire study area.

The koala incidentally observed in the week after the monitoring event was not examined by an experienced fauna biologist, and details of the vet's examination are unknown. As a result, no health assessment was undertaken in situ. From photographic records, however, the individual appeared to be in reasonable health, and there was no obvious signs of blindness or wet bottom.

4.2. Audit against monitoring requirements

Table 4 provides an audit of how each of the monitoring objectives from the KMP have been achieved during this survey.

Table 4: Monitoring objectives and results

Monitoring objectives	Survey results
Confirm the population size within the study area via a systematic survey	Koala are confirmed to be utilising habitat within the study area via the detection of scats in secondary habitat and observation of a koala on the CAMP fence. Whilst a numerical Koala population size could not be established, is expected to be low due to the absence of evidence recorded during survey efforts.
Identify the landscape usage, and hence important areas of habitat for foraging, breeding and connectivity	Several historical Koala records are located within the study area and surrounding region. Koala are confirmed to be utilising habitat in the study area via the detection of scats and the observation of one koala in the week after the monitoring event. Koala are also expected to be utilising the small areas of primary, primary (disturbed) and secondary (disturbed) habitat within the study area, as these areas have been determined to have greater koala habitat value and there are no known barriers to koala utilisation. Although scat and koala sightings were both located in the north-western extent of the study area, the entire study area is predicted to provide foraging, breeding and connectivity habitat for koala.
Identify the incidence / severity of disease, especially Chlamydia	This was undertaken during this monitoring event (despite limitations stated in Section 4.1) and this element of the scope will be continued to be monitored in future monitoring events.
Compare current population data with baseline population data.	The average koala activity level for the study area was determined to be 0%. This is a reduction in the koala activity level of 0.51% determined by the baseline survey in 2019 and in the activity level of 0.41% determined in 2021 monitoring, as discussed in section 4.1. However, evidence of koalas was recorded incidentally, confirming the species' continued presence on the site, as discussed in section 4.1.

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Appendix C - Pest Monitoring Report 2023

Bower Ecology
Survey | Planning | Strategy

White Rock Pest Monitoring Report

Report No. 2 (2023)

Prepared for Intrapac White Rock Pty Ltd

23 January 2024

Document Tracking

Project Name	White Rock Pest Monitoring Report – Report No. 2 (2023)
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Disclaimer

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Executive Summary

Approval under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) was obtained for the development of a mixed-use subdivision and associated infrastructure (the development) at White Rock in Ripley Valley (EPBC Act referral 2014/738, December 2019).

The EPBC Act approval requires pest management and monitoring to occur, as . This report summarises the findings of the first annual pest survey (post baseline monitoring) for the development of White Rock. Subsequent sections highlight the methodology and results obtained as well as recommendations on how to manage targeted pest species. This report covers two monitoring events (Autumn and Spring 2023) and has been designed to provide direct comparison against the two-year long baseline surveys and reporting conducted at White Rock prior to this monitoring event.

Targeted pest species were the Feral Cat, Fox, Wild Dog and Feral Pigs. These species have been identified as high risk to the Conservation Area with further management required for all targeted species. The activity of these pest species was recorded through remote camera traps and visualised into descriptive maps. Overall, there was a significant decrease in activity among all species in comparison to the baseline surveys. This can be attributed to the targeted pest management undertaken in the Conservation Area between the baseline surveys and fourth year reporting surveys. Further management is required for the Northern and Central parts of the Conservation Area due to the concentrated pest fauna activity in these areas.

The report demonstrates that the pest fauna management performance criteria documented in the EPBC Act approval have been met. That is, there has been a demonstrated reduction in pest numbers.

1   Introduction

The objective of this report is to communicate the outcomes of the seasonal pest monitoring surveys undertaken as part of the White Rock project. Further information on project background and scope of this report are provided below.

1.1.   Project Background

Approval under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) was obtained for the development of a mixed-use subdivision and associated infrastructure (the development) at White Rock in Ripley Valley (EPBC Act referral 2014/738, December 2019).

As required under the approval, the Conservation Area Management Plan (CAMP; Eco Logical Australia, 2020a) allocates 249 ha of land east of the proposed White Rock development as Conservation Area and EPBC Act offset area. The Conservation Area is also adjacent to the White Rock - Spring Mountain Conservation Estate (WRSMCE) (Figure 1), which is managed by Ipswich City Council (ICC).

The Conservation Area meets the requirements outlined under Queensland's *Environmental Offsets Act 2014* and the EPBC Act for impacts to Koala (*Phascolarctos cinereus*) and Grey-Headed Flying Fox (*Pteropus poliocephalus*) (GHFF) habitat, as defined by the EPBC Act. The CAMP requires improvement of Koala and GHFF habitat and overall health of bushland.

The CAMP is also supported by a Pest Management Plan (PMP; Eco Logical Australia 2020b) for the area, which outlines targeted pest management requirements for the Conservation Area. One of the primary objectives of the PMP and CAMP is to manage pest fauna within the Conservation Area, particularly those posing a threat to Koalas, with the eventual integration into the White Rock - Spring Mountain Conservation Estate (WRSMCE).

The European Red Fox (*Vulpes vulpes*) and Feral Cat (*Felis Catus*) have been identified as severe threats to native wildlife and threats to vital ecosystem processes (Department of the Environment and Energy, 2014). The *Nature Conservation (Koala) Conservation Plan 2017* (NCKCP) identifies the Wild Dog (*Canis lupus/Canis lupus dingo*) as a direct threat to Koala populations that requires strategic management. The PMP and CAMP recognises these pest species as a threat to local Koala populations and other native wildlife and subsequent potential impacts resulting in ecosystem fragmentation and introduction of additional pest species.

Upon the completion of the CAMP's on-maintenance period, assuming all PMP and CAMP requirements and targets have been achieved, the Conservation Area is intended to be handed over to the ICC for administrative and management purposes.
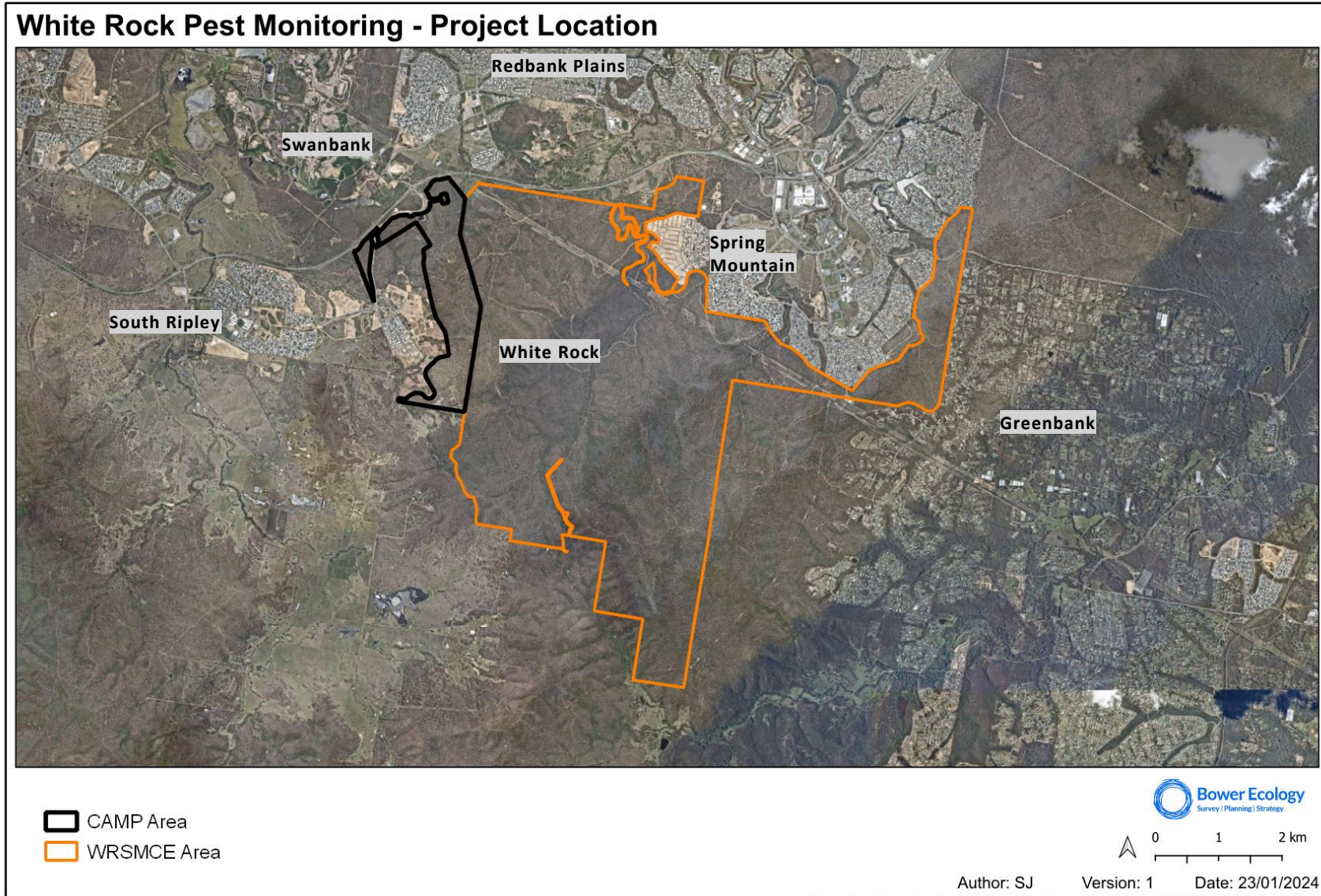
Figure 1: WRSMCE and CAMP area

1.2. Scope

The objective of this report is to provide comprehensive insights into the size and distribution of the designated species across the study area. This includes Foxes, Feral Pigs, Feral Cats, and Wild Dogs.

The PMP stipulates the necessity of two targeted surveys, one in Autumn and one in Spring, conducted within both the Conservation Area and the White Rock - Spring Mountain Conservation Estate (WRSMCE).

The specific tasks in this undertaking are as follows:

- Utilise remote cameras to monitor and identify variations in populations of feral animals
- Conduct targeted baseline surveys for pest fauna, employing methods such as incidental observations, area searches, and remote cameras. The identified pest species include Foxes, Feral Cats, Wild Dogs, and Feral Pigs (Section 2.1);
- Identify any additional feral or pest species to enhance the adaptive management strategies outlined in the PMP;
- Compile a report, represented by this document, outlining the baseline discoveries in alignment with the PMP;
- Articulate the actions for managing pest fauna, guided by the Conservation Area Management Plan (CAMP), to meet the criteria outlined in Table 1.

Table 1: Bushland management actions relating to pest fauna management

Task	Establishment	Management	Maintenance
	By end of year 3	**End of year 3 to end of year 6 (the current period)**	**Beginning of year 7 to end of approval (end of year 12)**
Pest Fauna Management	Two survey events completed to determine baseline of Wild Dogs/Feral Cats/foxes within the Conservation Management Area and reference sites within the adjacent White Rock - Spring Mountain Conservation Estate Development of a pest management plan that specifies how feral Wild Dogs, Feral Cats and foxes will be reduced in the Conservation Management Area.	Between end of year 3 and end of year 6, no increase in pests against baseline, or, in the event of evidence on an increase of pests in the general area as measured at the reference sites within the White Rock - Spring Mountain Conservation Estate, then demonstrated reduction in pests relative to these reference sites, measured annually.	From beginning of year 6 to end of approval, maintain a reduction in pests relative to baseline, measured annually, or in the event of evidence of an increase of pests in the general area, as measured at reference sites within the White Rock - Spring Mountain Conservation Estate, then demonstrated reduction relative to these reference sites, measured annually.

1.3. Study Area Description

The Conservation Area (Figure 1), delimited to the north by the Centenary Highway, spans approximately 250 hectares. To the west of the study area, land has been cleared for agricultural purposes in lowland areas, with plans for future urban development as part of the Ripley Valley Priority Development Area (PDA). The Conservation Area comprises a mix of maturing and mature vegetation, extending eastward into the White Rock - Spring Mountain Conservation Estate (WRSMCE) over approximately 2,500 hectares. This larger area is part of the extensive vegetation associated with the Flinders Karawatha Corridor, as per the Department of Environment and Heritage Protection (2014). It's important to note that the portion of the WRSMCE used in this study is proportionate to the size and vegetation community composition of the Conservation Area but does not represent the entirety of the WRSMCE.

The vegetation communities within the Conservation Area have been identified through initial ecological surveys conducted by Eco Logical Australia in 2017, revealing eight broad vegetation communities. These communities are summarized in Table 2.

Table 2: Vegetation Communities in the Conservation Area and WRSMCE

Vegetation Community	Area (ha)
Acacia +/- scattered Eucalypts (i.e., *Eucalyptus tereticornus, Eucalyptus crebra*)	3.8
Dam	1.1
Exotic Grassland +/- sparse Acacia and Eucalypts (i.e*., E. tereticornus, E. crebra*)	5.5
E. tereticornis (Forest Red Gum) on alluvium	0.8
E. tereticornis, Lophostemon suaveolens (Swamp Box) and *E. crebra* (Narrow-leaved Ironbark).	8.1
E. crebra, E. tereticornis, E. melanophloia (Silver Leaved Ironbark)	15.6
Corymbia citriodora (Spotted gum)	9.8
C. citriodora, E. crebra, E. melanophloia, and other Eucalypts	183.1
E. acmenoides (White Mahogany), *E. major* (Grey Gum), *C. citriodora*	21.6
Total	**249.4**

2   Methods

2.1.   Field Survey

In Spring and Autumn of 2023, two survey events were conducted in the Conservation Area and WRSMCE by a team of two ecologists. The Spring survey was conducted between 24 April 2023 and 16 May 2023 and the Autumn survey between 2 October 2023 and 15 October 2023 (Table 3). A total of 49 days of remote data was collected to complete the survey, however only the first 14 days recorded are used in the results in accordance with the PMP. Monitoring was undertaken in a manner consistent with the baseline surveys. The primary objective of these field surveys was to monitor the activity of targeted pest species in the Conservation Area and WRSMCE. Detailed descriptions of each field method are provided in the subsequent sections.

Table 3: Details of the pest surveys conducted in 2023

Survey Round	Start Date	End Date	Survey Effort (Days)	Survey Effort (days) used in the analysis
Autumn 2023	24-Apr	16-May	29	14
Spring 2023	2-Oct	15-Oct	20	14

2.1.1.   Remote Camera

A total of 30 remote infrared motion-sensitive cameras were deployed, each for a minimum of 14 days (Table 3), during both the Spring and Autumn surveys in 2023. Although cameras were left longer than the required 14-day period, only data from the first fortnight was used in the results. The remote monitoring specifically targeted 15 locations within the Conservation Area and an additional 15 reference sites within the White Rock - Spring Mountain Conservation Estate (WRSMCE). (see Table 4 and Figure 3). To ensure an even distribution of survey sites, preliminary camera site locations were planned at a desktop level using a 250 m x 250 m grid over the Conservation Area and WRSMCE before the commencement of 2021 baseline surveys.

To maintain accuracy, GPS was used to record the coordinates, along with descriptions (including camera height, angle, and orientation), and photographs of each location. This information was captured during the baseline surveys in 2021 to establish consistent monitoring locations for the Pest Management Plan (PMP) (Figure 3 and Table 4).

Bait stations were set opposite the cameras to lure the target species (Figure 2). Following the PMP, the bait type and volume remained consistent throughout the study. A golf ball sized bait ball designed to attract Foxes, Feral Cats and Wild Dogs was placed in each station. The bait consisted of wet cat food mixed with dry oats, peanut butter, and honey.

Figure 2: Camera set up in riparian zone facing down towards bait station
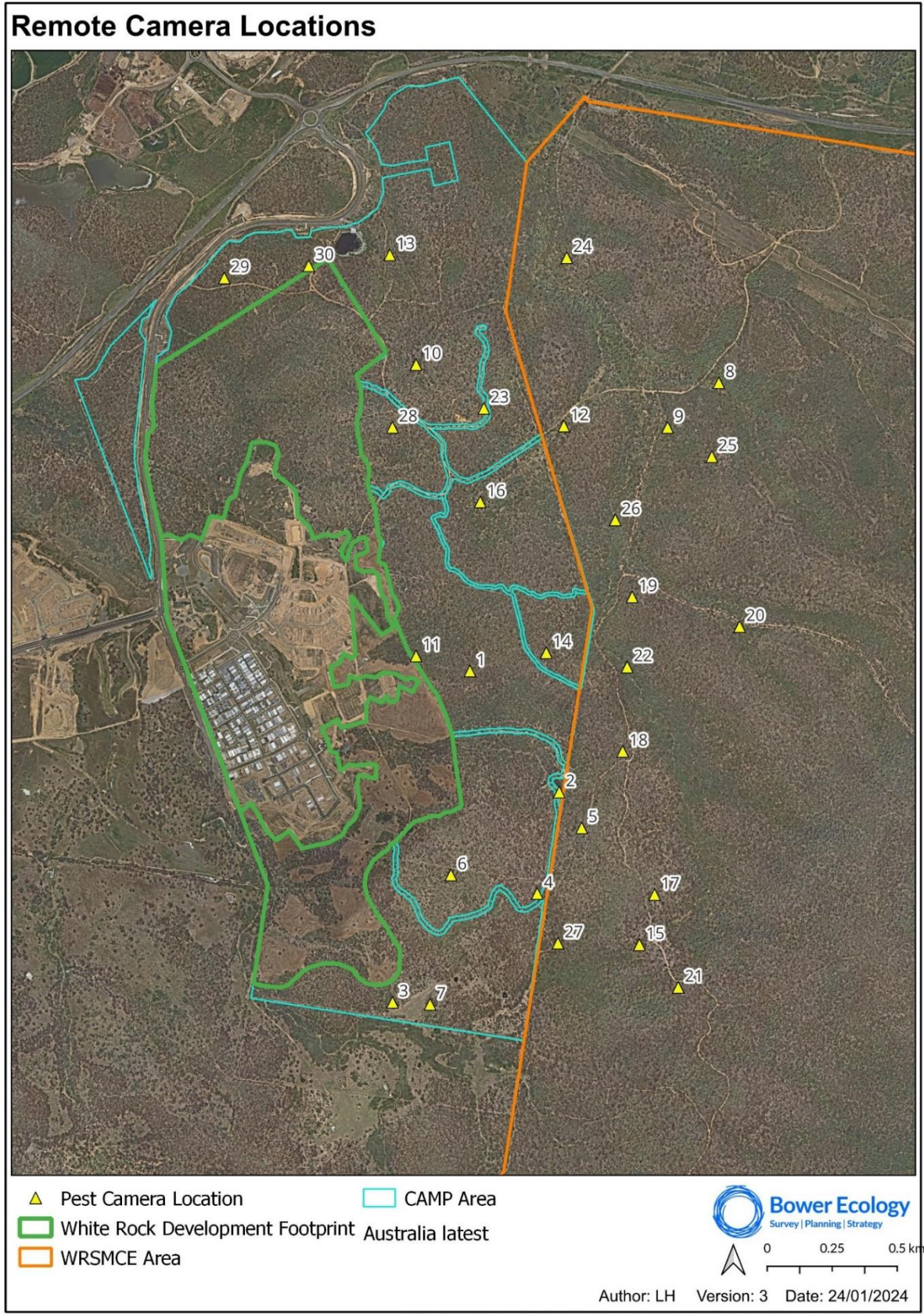
Figure 3: Remote camera locations in the Conservation Area and WRSMCE

Table 4: Locations of the remote camera in the CAMP and WRSMCE

Camera ID	Habitat Type	Latitude	Longitude
Conservation Area			
1	Open Woodlands	-27.695324	152.845646
2	Ephemeral Lake	-27.699531	152.849118
3	Riparian	-27.706814	152.842612
4	Open Woodlands	-27.703044	152.848258
6	Open Woodlands	-27.702399	152.844895
7	Fringing Woodlands	-27.706884	152.844075
10	Open Woodlands	-27.684696	152.84356
11	Open Woodlands	-27.694804	152.843544
13	Fringing Woodlands	-27.680888	152.842545
14	Open Woodlands	-27.694694	152.848621
16	Open Woodlands	-27.689462	152.846056
23	Open Woodlands	-27.686219	152.846201
28	Open Woodlands	-27.686871	152.842637
29	Open Woodlands	-27.681684	152.836091
30	Open Woodlands	-27.681265	152.839382
White Rock- Spring Mountain Conservation Estate			
5	Riparian	-27.700771	152.849993
8	Ephemeral Lake	-27.685341	152.855358
9	Open Woodlands	-27.686888	152.85336
12	Riparian	-27.686831	152.849316
15	Open Woodlands	-27.704824	152.852238
17	Open Woodlands	-27.703084	152.85283
18	Open Woodlands	-27.698117	152.851595
19	Open Woodlands	-27.692763	152.851973
20	Riparian	-27.693796	152.856158
21	Open Woodlands	-27.706305	152.853749
22	Open Woodlands	-27.695192	152.851773
24	Open Woodlands	-27.680993	152.849438
25	Open Woodlands	-27.6879	152.855082
26	Riparian	-27.690093	152.851318
27	Riparian	-27.704739	152.848695

2.2. Incidental finds

All incidental finds were recorded over the course of the two survey events. Incidental finds included breeding places, vegetation disturbance, digging/foraging sites, scat counts, sightings, tracks (paw and hoof prints), and wallowing holes.

2.3. Additional Pest Species

The PMP lists Feral Cats, Foxes, and Wild Dogs as the primary target for the pest monitoring surveys. Feral Pigs were identified in the Autumn 2021 baseline survey within the Conservation Area and are therefore considered an additional species to monitor. Feral Pigs are a restricted species under the *Queensland Biosecurity Act 2014*. Remote camera records of Feral Pigs have been included within this document in line with the baseline surveys.

2.4. Data Analysis

Limited data analysis was conducted comparing the baseline survey to the Autumn and Spring surveys completed in 2023 due to inconsistencies in data collection and data fidelity. During baseline monitoring, simple data analysis was conducted including averages, differences, and similarities. Moving forward statistical analysis including t-tests to determine significance between data sets will be included. This has been highlighted in the survey limitations below.

2.5. Survey Limitations

The baseline surveys were conducted over a 73-day period with varying lengths of surveys for each survey period. This has led to an overabundance of data with inconsistent results, preventing data analysis of the differences between the baseline survey and the fourth year survey. Moving forward the study will be conducted over strict two-week period in compliance with the requirements for the PMP. Any extra data observed outside the allocated time period was removed from the data set.

The survey conducted in Spring 2023 only had 29 active remote cameras due to camera 29 malfunctioning.

Additionally due to previous flooding events remote camera locations were altered slightly. To account for this, a new location was selected within 50m of the original sight. The change of location is not likely to influence results given the mobility of pest species.

3   Results

3.1.   Survey Conditions

Climate data for the Conservation Area was taken from the Greenbank (Defence) weather station (140009), located approximately 14km east of the survey area (BOM, 2023). Table 5 and Figure 4 illustrate the mean maximum and minimum temperatures and the total rainfall per month in 2023. Autumn climatology demonstrates above average temperatures and below average rainfall when compared to the baseline correspondent (Appendix A). On average the conservation area received significantly less rainfall in 2023 than the baseline time periods (Appendix A).

Table 5: Climate data from Greenbank (Defence) weather station (140009) in 2023, depicting mean temperature and rainfall for the time of surveys

Month	Mean Maximum Temperature (°Celsius)	Mean Minimum Temperature (°Celsius)	Total Rainfall (mm)
Jan	31.5	17.9	101.8
Feb	31.7	18.1	51.2
Mar	31.9	18.7	79.6
Apr	27.2	13.1	49.6
May	24	6	85
Jun	23.2	5.7	7.8
Jul	22.4	5.8	51.4
Aug	25.3	7.5	28.8
Sep	27.2	9.9	37.8
Oct	29.3	12.4	31.8
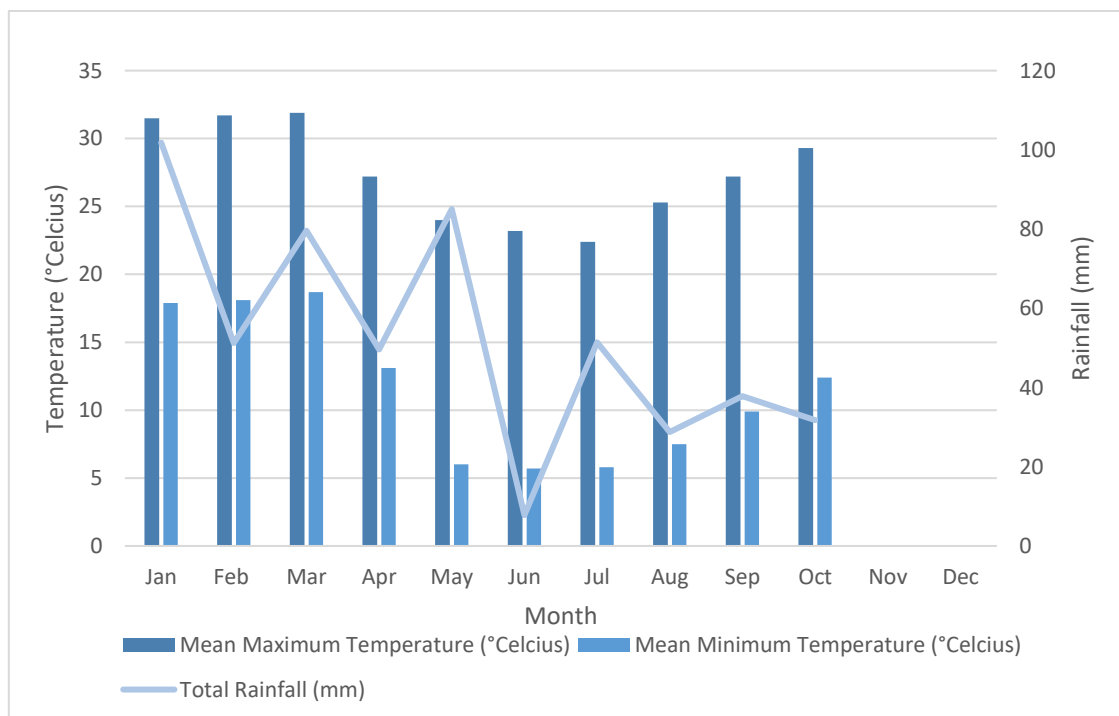
Figure 4:Monthly mean maximum and minimum temperature (bar graph) and rainfall (line graph) in 2023

3.2. Remote Camera Observations

Twenty-one individuals from four pest species were identified from 29 remote cameras over the two monitoring events in 2023, as detailed in Table 6. Autumn surveys captured 15 individuals of the targeted pest species across both CAMP and WRSMCE areas whilst 6 individuals were recorded in the spring survey.

Within the Conservation Area, 5 individual pests were recorded in 2023 whilst within the WRSMCE, 16 individual pests were observed (Table 6 and 7).

Similar to the baseline surveys conducted in 2021/2022, the central and southern areas of the CAMP and WRSMCE recorded the most pest activity with emphasis on camera 12 located closest to Six Mile Creek, capturing 3 out of 4 targeted pest species (Feral Pig, Fox and Wild Dog). A map of all remote camera locations and recorded targeted pest species can be seen in Figure 5.

Other key results (per Table 6 and 7) for each target pest species include:

- No feral cats were detected in the Spring and Autumn surveys conducted.
- Although there was a measured increase in wild dog individuals in the adjacent WRSMCE Area, there was no measurable increase of wild dog individuals in the Conservation Area (when compared to spring 2022, for instance).
- Fox numbers were generally consistent with baseline observations when the Conservation Area and the WRSMCE Area are viewed individually.
- There was a significant decrease in feral pigs across the 2023 Autumn and Spring seasons for feral pigs, compared to the previous years

With regards to native fauna, an in-depth break down of each camera's results can be found in Appendix B.
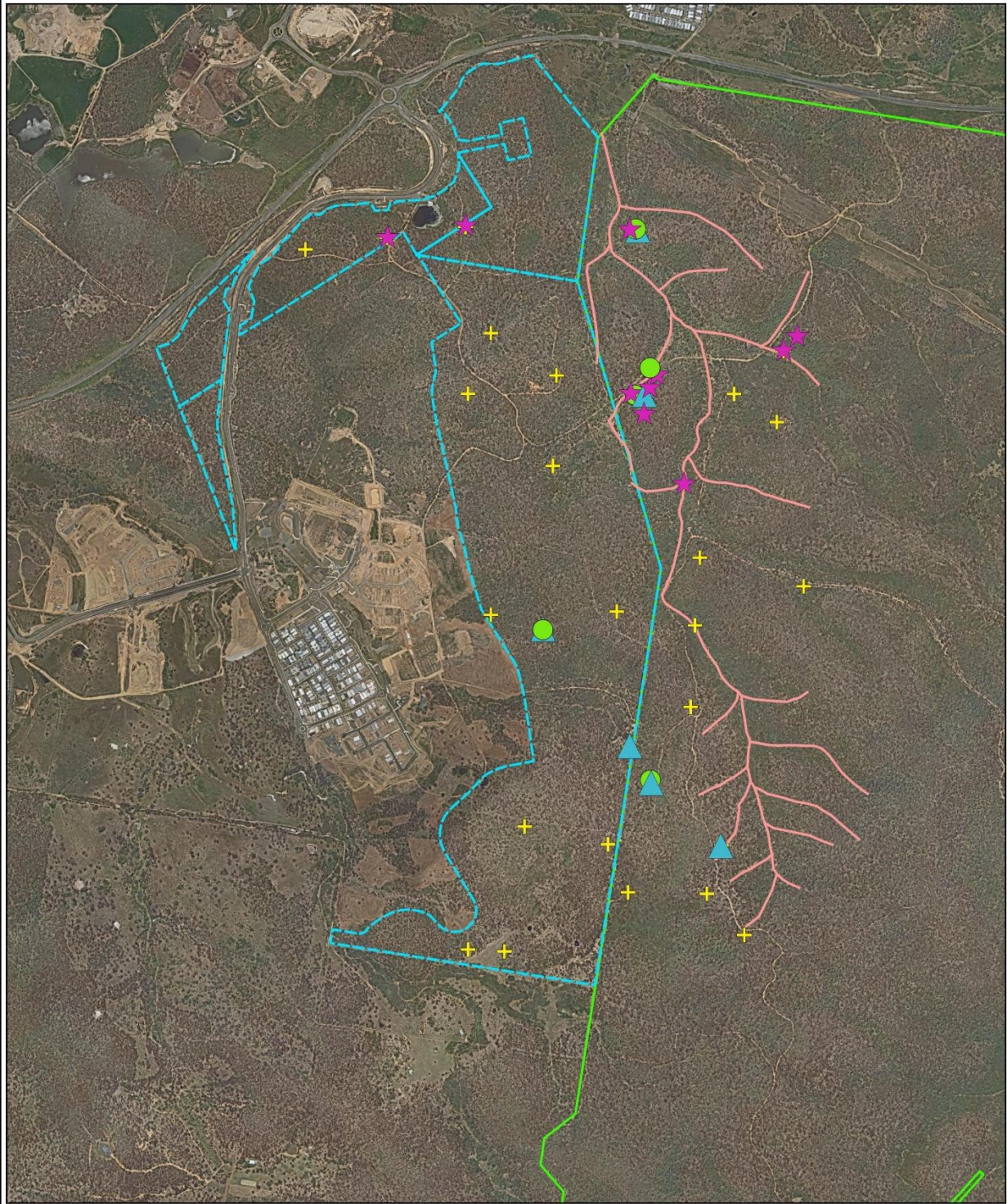
Figure 5: Recorded observations of targeted pest species from the Autumn and Spring surveys of 2023

Table 6: Sum of results from all years of monitoring

	Feral Cat						Wild Dog						Fox						Feral Pig					
	2021		2022		2023		2021		2022		2023		2021		2022		2023		2021		2022		2023	
Season:	Au	Sp	Au	Sp	**Au**	**Sp**	Au	Sp	Au	Sp	**Au**	**Sp**	Au	Sp	Au	Sp	**Au**	**Sp**	Au	Sp	Au	Sp	**Au**	**Sp**
Duration (days)	14	14	14	16	14	14	14	14	14	16	14	14	14	14	14	16	14	14	14	14	14	16	14	14
Conservation Area	1	1	0	1	**0**	**0**	0	0	0	1	**1**	**0**	2	1	2	0	**2**	**0**	17	9	33	3	**1**	**1**
WRSMCE Area	0	0	0	0	**0**	**0**	1	0	0	1	**3**	**1**	2	0	0	3	**3**	**1**	0	5	3	2	**5**	**3**
Total Individuals	1	1	0	1	**0**	**0**	1	0	0	2	**4**	**1**	4	1	2	3	**5**	**1**	17	14	36	5	**6**	**4**

Table 7: Pest species detected in 2023 by survey event and remote camera ID within each survey area including number of individuals recorded.

Pest Species	Survey period	Conservation Area															WRSMCE Area														
		Cam 1	Cam 2	Cam 3	Cam 4	Cam 6	Cam 7	Cam 10	Cam 11	Cam 13	Cam 14	Cam 16	Cam 23	Cam 28	Cam 29	Cam 30	Cam 5	Cam 8	Cam 9	Cam 12	Cam 15	Cam 17	Cam 18	Cam 19	Cam 20	Cam 21	Cam 22	Cam 24	Cam 25	Cam 26	Cam 27
Feral cat	Autumn																														
	Spring																														
Feral pig	Autumn									1								2		2								1			
	Spring	1														1				2										1	
Red fox	Autumn	1	1																	1		1						1			
	Spring																1														
Wild dog	Autumn	1																		2								1			
	Spring																1														

4   Discussion

4.1. Management of the Conservation Area

Between the baseline surveys in 2021 and 2022 and the first annual survey in 2023, a series pest management was conducted by Evolve Environmental Solutions (Evolve, 2023). The recorded decrease in pest activity (number of indviuduals) of Feral Pigs and Wild Dogs can likely be attributed to these pest management works. Their scope of the pest management work is outlined in Table 8.

Table 8: Pest Management conducted in the Conservation Area

Month	Pest Management Conducted
September 2023	• Initial reconnaissance assessment; • Additional cameras in evident zones of pest activity; • Pre-bait material was laid in areas of high activity.
October 2023	• Candid Pest Ejectors (CPEs) were laid; • 1080 baits were set up; • In five days of work six Feral Pigs and one Wild Dog were shot and removed from the Conservation Area.

Ipswich City Council was contacted to obtain information on any targeted pest management they may have conducted throughout the WRSMCE in 2023. No information was provided however. Thus, it is inconclusive whether the decrease in targeted pest species in the WRSMCE was due to human intervention.

4.2. Discussion of Results

The 2023 surveys recorded a total of 21 pest fauna individuals, of which 5 were inside the Conservation Area and 16 inside the WRSMCE. The remote camera records demonstrated the highest concentration of pest species in central areas as seen in Figure 5. Species had clear habitat preferences, summarised below:

• Feral Pigs preferred valleys, gullies, and waterways.
• Foxes and Wild Dogs favoured ridgelines and open woodlands, however utilised the entire landscape.
• All targeted pest species utilised Six Mile Creek (Figure 5).

Although at this stage the dataset does not lend itself to rigorous statistical analysis[1] the apparent general reduction in pest numbers over time and in comparison to the reference sites in the WRSMCE may be explained by a combination of factors:

• Pest management undertaken in 2023 (see section 4.1).
• The fact that six mile creek exists within the WRSMCE Area and may be a considered an area that could support a higher density of pests.
• On average monthly temperatures were higher and there was less rainfall when compared to the baseline survey conditions (Appendix A, Table 5, and Figure 4). It is probable that these factors decreased the availability of resources and habitat for the pest species and could have partially contributed to the reduced numbers recorded in 2023 in comparison to the baseline surveys.

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[1] Due to the limited number of observations across each season, and across the years. Also due to the variables not being a quantitative metrics (i.e., pest management effort, other variables).

4.3. Observations and Recommendations

Targeted pest control was focused on the southern Conservation Area with emphasis on the riparian area and man-made lakes due to the high concentration of activity for all pest species (as reported in Eco Logical Australia 2022). This is evident in the results obtained in the annual surveys conducted in 2023. Moving forward, pest management should concentrate in the northern and central parts of the Conservation Area in addition to continual management of the southern Conservation Area.

Feral Pigs

Individual Feral Pigs were detected 2 and 8 times in the Conservation Area and the WRSMCE, respectively. The higher proportions of observations in the WRSMCE indicate a preference for gullies and lower lying ground with easy access to a water source (Lopez et al., 2014).

Additionally, observations of Feral Pigs were more frequent throughout the Autumn survey, coinciding with higher rainfall and average temperatures (Figure 4 and Table 5). This is likely due to increased availability of resources and habitat. Detection of the pest occurred in the northern parts of the CAMP and WRSMCE, clustering in valleys and waterways as seen in Figure 5. Observations near constructed lakes and Six Mile Creek suggest Feral Pigs are likely aiding further degradation of the landscape and the dispersal of weeds throughout these areas.

To optimise results the management of Feral Pigs should be concentrated close or next to permanent water sources or gullies. As the pest species is dispersed throughout both the Conservation Area and WRSMCE, any Feral Pig management should be actioned by both the ICC and Intrapac concurrently to ensure full coverage. The Feral Pig control program should be scheduled after the wet season to reflect the higher activity of the species. The populations will likely concentrate in areas of permanent water in the dry season.

A coordinated Feral Pig shooting or baiting program (using Hoggone) is recommended. Hoggone is a sodium nitrate based humane Feral Pig bait that is actively used in Queensland. The Feral Pig baiting program should be in conjunction with the Department of Agriculture, Water and Environment of Australia and PestSmart (Wishart, 2015).

Foxes and Wild Dogs

Foxes were observed six times throughout the study, twice in the Conservation Area and 4 times in the WRSMCE. Wild Dog sightings were recorded 5 times throughout the survey period, once in the Conservation Area and 4 times in the WRSMCE. Both species utilised the landscape but appeared to prefer ridgelines and open woodland illustrated in Figure 5.

Like the Feral Pig, Foxes and Wild Dogs were observed more frequently in WRSMCE than in the Conservation Area. Additionally, all targeted pest species utilised Six Mile Creek as a water source (Camera 12) (Figure 3, Figure 5). Foxes and Wild Dogs were observed to have similar areas of interest, overlapping in habitat frequently. This may be due to similar habits in diet, resource requirements and shelter (Glenn and Dickman, 2014). The shared space creates competition between the species, limiting their carrying capacity due to resource scarcity.

The regulated poison 1080 is a standard method for fox baiting programs. Fox baiting will also manage Wild Dog populations. The Wild Dog and Fox baiting program should be in conjunction with the Department of Agriculture, Water and Environment of Australia and PestSmart (Sharp, 2012).

The poison 1080 has been shown to impact native carnivorous species including the lace monitor (*Varanus varius*) and threatened mammals including the spotted-tail quoll (*Dasyurus maculatus*) and brush-tail phascogale (*Phascogale tapoatafa*). The spotted-tail quoll has a low likelihood of occurrence

within both management areas, so impacts to this species are unlikely. Impacts to lace monitors and brush-tail phascogales can be mitigated by correct dosage and baiting outside of the winter breeding period when young are dependent on females.

Feral Cats

No observations of Feral Cats were recorded in the surveys conducted in Autumn and Spring of 2023. Feral Cats were the least observed species in the baseline survey and have since seen a reduction in evidence of their presence (Table 6). This may be due to the changing habitat that is potentially no longer suitable for the species. Alternatively, Feral Cats may still be present but due to low density populations over a large range no observations were recorded in the 2023 surveys (DCCEEW, 2023). In prior years the species was observed in Northern areas of the Conservation Area however no such sightings or evidence have surfaced recently.

Minimal management is required for Feral Cats as no activity was captured in this annual survey. However, continual monitoring is required. If any activity is evident pest management should be put into place. Refer to Eco Logical baseline report for management solutions (Eco Logical, 2022).

5   Conclusion

Whilst limitations applied to comparison of 2023 pest data against baseline data, it appears that pest fauna numbers have reduced across both the Conservation Area and the WRSMCE. This is expected to be due to both management works and climatic conditions unfavourable to the pest species. It is recommended that pest control be continued, with particular focus on riparian areas and areas around the man-made lake in the south of the Conservation Area. The next rounds of monitoring will take place in autumn and spring 2024.

The report demonstrates that the pest fauna management performance criteria documented in the EPBC Act approval have been met. That is, per Table 1, there has been a demonstrated reduction in pest numbers.

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Appendix A: Historical Climate Data

Historical climate data for the survey area. Data sourced from Greenbank (Defence) weather station (140009).

Month/Year	Mean Maximum Temperature (°Celsius)	Mean Minimum Temperature (°Celsius)	Total Rainfall (mm)
2021			
Jan	30.4	18.6	64.6
Feb	30.5	18.9	150
Mar	28.8	18.4	248.8
Apr	26.2	12.5	88.8
May	23.9	9.7	121.8
Jun	21.6	6.6	18
Jul	21.3	6.4	61.8
Aug	24.1	6.9	18.6
Sep	26.1	8.8	15.2
Oct	29	14.1	176.2
Nov	27.7	16.8	207.8
Dec	30.4	17.8	208
2022			
Jan	29.6	29	129.6
Feb	29.5	18.2	792
Mar	29.4	17.9	171
Apr	27	15.3	45
May	23.3	15.5	327
Jun	21.2	5.7	12
Jul	19.7	6.8	89.6
Aug	22.5	6.5	22
Sep	24.3	10.4	113.6
Oct	26.2	14.2	122.4
Nov	29	13.4	59.8
Dec	29.1	16.3	67

Appendix B: List of all native species observed in the Conservation Area and WRSMCE during 2023 Pest Monitoring.

Common Name	Scientific Name	Remote Camera ID																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Australian Brush turkey	*Alectura lathami*	Y		Y		Y		Y			Y		Y							Y				Y							
Australian magpie	*Gymnorhina tibicen*						Y						Y													Y		Y	Y		Y
Australian Owlet nightjar	*Aegotheles cristatus*							Y			Y			Y						Y				Y						Y	
Bar-shouldered dove	*Geopelia humeralis*								Y										Y					Y	Y						
Black rat	*Rattus rattus*		Y	Y						Y			Y				Y							Y				Y		Y	
Black-striped wallaby	*Macropus dorsalis*						Y		Y						Y								Y								
Brown quail	*Coturnix ypsilophora*												Y																		
Brush-tailed phascogale	*Phascogale tapoatafa*	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y			Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y
Brush-tailed possum	*Trichosurus vulpecula*		Y	Y	Y		Y	Y		Y	Y	Y	Y		Y	Y		Y						Y	Y	Y	Y	Y	Y		
Cane toad	*Rhinella marina*				Y			Y	Y	Y					Y			Y						Y	Y					Y	
Dusky woodswallow	*Artamus cyanopterus*								Y																						
Eastern grey kangaroo	*Macropus giganteus*	Y	Y				Y	Y	Y				Y		Y	Y															
Eastern whip bird	*Psophodes olivaceus*																	Y													

Common name	Scientific name																												
Eastern yellow robin	*Eopsaltria australis*							Y	Y				Y	Y				Y			Y							Y		
European hare	*Lepus europaeus*	Y						Y					Y																	
Fan-tailed cuckoo	*Cacomantis flabelliformis*										Y																			
Golden whistler	*Pachycephala pectoralis*							Y																Y						
Grey butcher bird	*Cracticus torquatus*												Y								Y									
Grey fantail	*Rhipidura albiscapa*					Y	Y	Y									Y	Y		Y									Y	
Grey shrikethrush	*Colluricincla harmonica*												Y																	
House mouse	*Mus musculus*													Y				Y				Y	Y							
Laughing kookaburra	*Dacelo novaeguineae*	Y		Y	Y			Y	Y		Y					Y					Y									
Northern brown bandicoot	*Isoodon macrourus*	Y				Y		Y	Y	Y	Y		Y	Y		Y	Y				Y		Y			Y	Y	Y	Y	
Pheasant coucal	*Centropus phasianinus*																						Y		Y					
Pretty-faced wallaby	*Notamacropus parryi*				Y																			Y						
Red-backed fairy wren	*Malurus melanocephalus*							Y																						
Red-necked wallaby	*Notamacropus rufogriseus*		Y				Y	Y	Y		Y	Y				Y		Y		Y						Y	Y			
Short-beaked echidna	*Tachyglossus aculeatus*	Y				Y		Y		Y						Y											Y			
Silvereye	*Zosterops lateralis*													Y			Y													
Speckled warbler	*Pyrrholaemus sagittatus*							Y					Y					Y								Y				
Spotted quail-thrush	*Cinclosoma punctatum*																											Y		

Common name	Scientific name																															
Squirrel glider	*Petaurus norfolcensis*	Y				Y																											
Swamp wallaby	*Wallabia bicolor*		Y					Y	Y						Y	Y	Y	Y															
Torresian crow	*Corvus orru*			Y						Y	Y		Y																Y	Y		Y	
Weebill	*Smicrornis brevirostris*							Y																									
White-browed scrubwren	*Sericornis frontalis*							Y																									
Yellow-footed antechinus	*Antechinus flavipes*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y		Y	Y			Y	Y	Y	Y	Y	Y	Y
Yellow-rumped thornbill	*Acanthiza chrysorrhoa*		Y																														
Slender-tailed dunnart	*Sminthopsis murina*							Y	Y		Y	Y	Y	Y	Y				Y			Y	Y			Y	Y						