Kaban Green Power Hub - Second Annual Compliance Report

31 July 2023

Kaban Wind Farm Pty Ltd as trustee for the Kaban Wind Farm Trust

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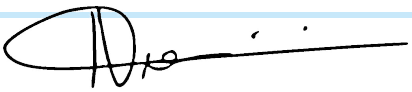
Declaration of accuracy

In making this declaration, I am aware that Sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed	
Date	10/8/2023
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Position	Director
Organisation	Kaban Wind Farm Pty Ltd as trustee for the Kaban Wind Farm Trust ACN 637 687 622

1 Introduction

1.1 E2M Scope of Works

E2M has prepared the second annual compliance report on behalf of Kaban Wind Farm Pty Ltd as trustee for the Kaban Wind Farm Trust, ACN 637 687 622, for the Kaban Green Power Hub (the Project). This annual compliance report has been prepared in accordance with the requirements outlined in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) conditions of approval (EPBC 2018/8289). The objective of this report is to determine if the Project has achieved compliance with all relevant conditions.

The scope of works included reviewing the Project conditions of approval (EPBC 2018/8289) and assessing compliance by reviewing documentation provided by Neoen Australia during the twelve-month period ending on 19 May 2023.

1.2 Kaban Green Power Hub Activity Status

The Kaban Green Power Hub approved action is to construct and operate a wind farm with up to 29 turbines and associated infrastructure south west of Cairns, in Kaban, far north Queensland. A total of twenty-eight turbines were installed for this project.

Commission/ing means the first date in which a turbine is installed – this occurred in August 22. Neoen notified the department of commissioning on the 25 May 2023.

Turbines 1 to 17 were energised and operational by January 2023. The remaining eleven turbines were operational by 20 May 2023.

At the end of this reporting period (19 May 23), the Project was coming to the end of construction and many of the turbines were operational. During this reporting period the following activities took place:

- Installation, upgrading and maintenance of erosion and sediment controls
- Installation of operational facilities, substation components, turbine footings
- Transportation and installation of the remainder of all turbine components
- Ongoing underground cable installation; and
- Energisation of turbines.

1.3 Compliance Assessment Methods

For each condition of the approval, compliance was rated as per the rationale outlined in Table 1.

Table 1: Compliance Scoring

Rating	Abbreviation	Rationale
Compliant	C	Demonstrated compliance with Condition
Non-compliant	NC	Not compliant with Condition

Rating	Abbreviation	Rationale
Not Applicable	NA	Condition not activated at the time of the compliance assessment or Condition not applicable.

The scope of works was subject to several limitations, including:

- The findings of this report represent E2M's opinion based on the information made available for review and assessment, which is assumed to be true and correct. Information provided was not independently verified
- The scope of assessment was limited to review of:
  - the documents, images, registers provided by the Principal Contractor responsible for construction activities (Vestas Australia Wind Technologies Pty Ltd)
  - documentation provided by Neoen
  - information collected during site visits by E2M that were required as part of ongoing monitoring works
- Sampling or laboratory analysis were not conducted as part of this compliance assessment.

2 E2M Compliance Assessment Results

2.1 EPBC Conditions Compliance

Assessment of the Project against the conditions of approval (EPBC 2018/8289) was conducted. As outlined in Table 2, compliance was assessed for a total of 41 conditions. Of these, a total of 15 were not applicable due to the stage of the project had not yet activated response to conditions.

The results of the compliance assessment are included in Table 3, with supporting information provided in Appendix 1 to Appendix 10.

Table 2: Summary of Compliance Results

Total Conditions	Total Non-applicable conditions	Total Applicable Conditions	# Compliant	# Non-compliant	% Compliant
42	15	27	27	0	100

2.2 Performance Criteria Assessment

An assessment of effectiveness of the performance criteria within the Vegetation Management Plan, Fauna Management Plan and Offset Area Management plan is required by the EPBC Conditions of Approval. These assessments are included in Appendix 1. The assessments determined that the mitigation measures have been effective in avoiding and minimising impacts of the Project upon Matters of National Environmental Significance. The following key findings were noted, namely:

- During construction there were two deaths of non-threatened animals plus one death of the EPBC Act listed animal, the northern quoll (*Dasyurus hallucatus*). The death of the northern quoll was investigated but the cause was unclear. All personnel working on-site were notified, and additional care and vigilance was recommended when using and moving equipment. All bulk earth works were complete at this point and it was outside of breeding season, so no further actions nor changes to the FMP were required. It was possible the quoll was transported on-site within an engine bay/cavity. No further incidents involving quolls were observed.
- Fauna Management Plan mitigation and management measures were considered appropriate and the wildlife interaction register identifies the successful relocation, handling and management of fauna disturbed by clearing activities. No new risks were identified and no changes required to the Fauna Management Plan
- One incident of erosion and sedimentation was noted during a significant, one in 200-year rain event. The Department was notified and an investigation was conducted by Neoen. Corrective actions were identified and implemented, however no changes to the Fauna Management Plan were required
- As previously reported to the Department, there was some evidence of sedimentation entering waterways inhabited by magnificent brood frog. Erosion and sediment controls (ESC) were reviewed as a result. Additional ESC measures were installed to reduce waterflows and sedimentation at the construction/MBF habitat interface. No changes were required to the Fauna Management Plan, and;

- Post commissioning, there has been two observations of the dead spectacle flying-fox and 5 observations of migratory bird carcasses within 350 metres of turbines in operation. The department was notified of the spectacled flying-fox incidents. Relevant changes to the turbine high-risk profiling were made, based on the spectacled flying-fox and migratory bird observations. No changes to the Fauna Management Plan or the Bird and Bat Adaptive Management Plan were required.

New Environmental Risks

As required by the Department's Annual Compliance Report Guidelines (2014), new environmental risks require consideration. The following new risks have been identified:

- Risk of fire to MBF –Two sites impacted by uncontrolled fire (outside of Neoen control) – highlights the risks and importance of controlled burns
- Ongoing presence of feral dogs
- There has been an increase in cane toad breeding habitat within the construction footprint. However, there is no obvious increase in cane toad populations within the magnificent brood frog breeding habitat.

Table 3: EPBC Conditions

Condition No.	Condition	Compliance	Evidence
Maximum clearing limits			
1	To minimise impacts on **EPBC Act listed threatened species and communities**, the approval holder must not **clear** more than 129 hectares (ha) of habitat for **EPBC Act listed threatened species and communities** within the **project area**, including no more than: a) 95.2 ha of **Prostanthera habitat**. b) 3 ha of **Magnificent Brood Frog habitat**. c) 61.2 ha of **Greater Glider habitat**. d) 100 ha of **Northern Quoll habitat**, including no more than 5.6 ha of **Northern Quoll denning habitat**.	Compliant	Current shapefiles/spatial assessment provided by Vestas, 23 May 2022. Refer to Appendix 2 for map series depicting the total project footprint clearing and areas of habitat cleared. There was no additional clearing during the 2022-2023 reporting period.
EPBC Act listed threatened and migratory species management			
2	The approval holder must implement the Vegetation **Management Plan** and **Fauna Management Plan** for the duration of this approval.	Compliant	The requirements of the Vegetation Management Plan and Fauna Management Plan have been implemented during the previous 12 month period. A Construction Environmental Management Plan was developed and implemented for the construction phase, which incorporates the VMP and FMP requirements. A review of the VMP and FMP mitigation and management measures against site practises was conducted and determined that the measures are being effectively implemented.
3	The approval holder must report against each performance criterion specified in the **Vegetation Management Plan (VMP)** and **Fauna Management Plan (FMP)** and provide an	Compliant	Refer to Appendix 1 for a report against each performance criterion included within the FMP and VMP as well as an assessment of effectiveness of these measures.

Condition No.	Condition	Compliance	Evidence
	evaluation of the effectiveness of the measures implemented to avoid and mitigate impacts of the action on **EPBC Act listed threatened species and communities** and **EPBC Act listed migratory species** in each annual **compliance report** required under condition 35.		
4	To minimise **impacts** on *Prostanthera clotteniana*, the approval holder must undertake **pre-clearance surveys** of all potential **Prostanthera habitat**. The approval holder must prevent any direct or indirect impacts to any *Prostanthera clotteniana* individual.	N/A	All pre-clearance surveys were conducted prior to this audit period.
Turbine strike monitoring and management			
5	The approval holder must submit a Bird and Bat Adaptive Management Plan (BBAMP) for the **Minister's** approval prior to **commissioning**. The approval holder must not commence **operation** of the wind farm unless the **Minister** has approved the BBAMP in writing. The approval holder must implement the approved BBAMP throughout **operation**.	Compliant	Implemented during September 2022 following commissioning, when the first monthly carcass search was performed.
5A	The BBAMP must build on the **Bird and Bat Management Plan** to propose and justify methods and procedures which ensure that the action does not cause significant mortality by turbine strike on any **EPBC Act listed bird or bat species** within the life of the action by ensuring that the effects of wind turbines are managed, monitored and limited such that **impacts** to **EPBC Act listed bird and bat species** are reliably detected, quantified, reported and responded to.	Compliant	Implemented during September 2022 following commissioning, when the first monthly carcass search was performed. Two incidents involving spectacled-flying fox were reported to the department. These were considered one-off events, with insufficient evidence and trends, to trigger operational changes.

Condition No.	Condition	Compliance	Evidence
6	To inform the risk **profile** of each turbine, the approval holder must undertake bird and bat utilisation surveys, including: a) Prior to **commissioning**, the approval holder must undertake pre commissioning bird and bat utilisation surveys over a period of at least 24 months, including at least one survey undertaken at or adjacent to each proposed wind turbine location in each of at least one wet season and one dry season in succession.	Compliant	Three bird and bat utilisation surveys were conducted over a period of 24 months, including one dry season survey (2021) and two wet season surveys. The consecutive wet season survey was performed during March 2022. Reports are provided in Appendix 3.
	b) Commencing within 3 months after **commissioning**, the approval holder must undertake post-commissioning bird and bat utilisation surveys over a period of at least 24 months, including at least one survey at or adjacent to each wind turbine in each of at least two wet seasons and two dry seasons in succession.	Compliant	Commissioning on August 2022, survey on March 2022. While there was some delay between commissioning and the first post-commissioning survey, the department was made aware of this. Constraints, such as, electrical storms, significant rain events and peak construction activity made performing BBUS unsafe and impractical.
7	At least one survey in each 12 month period of bird and bat utilisation surveys required under condition 6 must be conducted within the **migratory period** of each **EPBC Act listed migratory species**.	Compliant	The first of the four post-commissioning survey's was completed during March 2023. March is a suitable month for detection of all EPBC Act listed migratory species, see Appendix D.
8	The approval holder must report on the results of the bird and bat utilisation surveys required under condition 6 in each annual compliance **report** required under condition 35 until all bird	Compliant	Refer to reports included within Appendix 3.

Condition No.	Condition	Compliance	Evidence
	and bat utilisation surveys have been reported on.		
9	All bird and bat utilisation surveys must be conducted by a **suitably qualified ecologist.**	Compliant	Refer to report included within Appendix 3. Surveys were conducted by: Dean Jones, Principal ecologist with over 25 years' experience. A Class bird bander. Chays Ogston, senior ecologist and R Class bird bander.
10	Prior to commissioning, the approval holder must assign a risk profile to each turbine within the project area using the results of the pre commissioning bird and bat utilisation surveys required under condition 6(a).	N/A	Last audit period
11	If, during bird and bat utilisation surveys required under condition 6 or during any other monitoring or incidental observation during operation, one or more individual of an **EPBC Act listed bird or bat species** is detected within the **vicinity** of a **low-risk turbine**, the approval holder must assign that turbine to be a **high-risk turbine** within five **business days** of the detection	Compliant	Refer to Appendix 3. Any incidental observations detected by construction workers, site environmental officer or independent ecologist were noted in principal contractor environmental register or by the approval holder environmental representative. Any findings that changed the risk profile of turbines and subsequent changes to survey design, was then shared with consultant performing monthly carcass searches.
12	During **operation**, the approval holder must include a list of the **risk profiles** of each turbine within the **project area** in each annual **compliance report** required under condition 35.	Compliant	Risk profiles were provided and updated as required, after any significant findings during incidental and monthly carcass search activities.
13	During **operation**, the approval holder must undertake turbine strike monitoring in accordance with the **Bird and Bat Management Plan** at monitoring sites identified in the **Bird and Bat Management Plan** and at all **high-risk turbines** identified as required under conditions 10 and 11.	Compliant	One month of scavenger surveys missed (May 2023) due to safety concerns.

Condition No.	Condition	Compliance	Evidence
14	The approval holder must annually evaluate the effectiveness of the measures implemented to avoid and mitigate impacts of turbine collision on EPBC Act listed bird and bat species and report on that evaluation, and performance against the impact triggers, in each annual compliance report required under condition 35.	Compliant	Annual mortality assessments are performed after a 12 month monitoring period. As such, the 12 month reporting period has not been completed and a formal estimate of annual mortality for EPBC listed birds and bats has not been calculated. No other triggers have been activated. However, NEOEN has gained approval through CASA and the department (June 2023) to reduce the number of lights and their intensity to mitigate microbat strikes.
15	If an impact trigger is reached or exceeded, the approval holder must implement the adaptive management procedure described in the Bird and Bat Management Plan. The approval holder must, on each occasion that an impact trigger is reached or exceeded, report on the steps taken and outcomes of implementing the adaptive management procedure, including details of the mitigation measures that have been or will be implemented and an assessment of their likely effectiveness in the first annual compliance report required under condition 35 following an impact trigger being reached or exceeded.	Compliant	Check second flying-fox strike – requested department advise on adaptive management as per BBAMP (E2M 2021).
16	Within 20 business days of an impact trigger being reached or exceeded, if application of the adaptive management procedure required under condition 15 identifies, in respect of any wind turbine or number of wind turbines, that additional mitigation measures are required but no alternative mitigation measures can or will be implemented; and	Compliant	No triggers reached

Condition No.	Condition	Compliance	Evidence
	a) If the additional mitigation measures are required in respect of the Ghost Bat or Spectacled Flying-fox, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** between sunset and sunrise each day; and/or b) If the additional mitigation measures are required in respect of any nocturnal **EPBC Act listed migratory species**, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** between sunset and sunrise each day during the **migratory period** of any **EPBC Act listed migratory species** for which an **impact trigger** has been reached or exceeded; and/or c) If the additional mitigation measures are required in respect of any diurnal **EPBC Act listed migratory species**, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** between sunrise and sunset each day during the **migratory period** of any **EPBC Act listed migratory species** for which an **impact trigger** has been reached or exceeded; and/or		

Condition No.	Condition	Compliance	Evidence
	d) If the additional mitigation measures are required in respect of any cathemeral **EPBC Act listed migratory species** or any **EPBC Act listed migratory species** for which diel activity is unknown, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** the **migratory period** of any **EPBC Act listed migratory species** for which an **impact trigger** has been reached or exceeded.		
17	Any request by the approval holder to cease or reduce the curtailment required under condition 16 must demonstrate how the ceasing or reducing of the curtailment will not result in any additional **impact** on **EPBC Act listed bird and bat species**.	N/A	The measures in Condition 16 have not been activated.
Environmental offsets			
18	To compensate for the **clearance** of Magnificent **Brood Frog habitat** and **Greater Glider habitat** as specified in condition 1(b)-(c), the approval holder must legally secure all environmental offsets proposed in the **Offset Area Management Plan** (OAMP) within 18 months of the **commencement of the action**. The **Offset Area Management Plan** must be attached to the legal mechanism used to **legally secure** the offset areas.	Compliant	A variation to this condition was approved, which extends the timeframe to an 18-month period. The Offsets were secured on-time, on 30 August 2022. See Appendix 6.
19	The approval holder must notify the Department within five **business days** of the legal security mechanism for each offset area being executed.	Compliant	The department was notified on 30 August 2022.

Condition No.	Condition	Compliance	Evidence
20	The legal mechanism used to **legally secure** the offset areas must remain in force for at least the duration of this approval.	Compliant	Offsets remain in force.
21	To ensure that the offsets required under condition 18 provide a conservation gain in accordance with the **EPBC Act Environmental Offsets Policy**, the **completion criteria** must be achieved within 20 years of the **commencement of the action** and then be maintained or improved for the duration of the approval.	N/A	This condition has not been activated. However, management within the offset area has commenced, with the following actions undertaken: Cattle removal Commencing the replacement of all top barbed wire with barbless within greater glider offset areas Controlled ecological burns commenced September 2022 Intensive weed treatment to remove priority weeds has commenced within all offsets. Habitat quality assessment surveys were performed March 2023
22	To ensure that the offsets required under condition 18 provide ongoing habitat for the Magnificent Brood Frog and Greater Glider, the key habitat features identified in the **Offset Area Management Plan** must be maintained or improved for the duration of the approval.	Compliant	Done with BBUS survey – OAMP report getting prepared Habitat quality assessment survey was performed in March 2023, see Appendix 7. Management within the offset area has commenced, with the following actions undertaken: Cattle removal Annual magnificent brood frog population survey Annual greater glider population survey the replacement of all top barbed wire with barbless within greater glider offset areas and fenceline maintenance Controlled ecological burn scheduled for upcoming burn season, as per the Landscape Fire Management Plan, see Appendix 8.

Condition No.	Condition	Compliance	Evidence
			Intensive weed treatment to remove priority weeds has commenced within all offset areas.
23	To ensure that the completion criteria will be achieved, performance against performance targets must be reported in each annual compliance report required under condition 35.	Compliant	Refer to Appendix 1 for a report against each performance criterion included within the OAMP as an assessment of effectiveness of these measures.
24	If a **performance target** is not met at the completion of each five year period, the approval holder must, on each occasion that a **performance target** is not met, report on the corrective action/s that will be implemented and an assessment of their likely effectiveness in the first annual compliance **report** required under condition 35 following a **performance target** not being met and all subsequent **compliance reports** required under condition 35 for the life of the approval.	N/A	Not required until May 2026
25	If any of the **completion criteria** are not met within 20 years of the **commencement of the action**, the approval holder must, within 10 **business days** of the 20th anniversary of the **commencement of the action**, notify the **Department** of the **completion criteria** that have not been met. Within 6 months of the 20th anniversary of the **commencement of the action**, if the approval holder has not met all of the **completion criteria**, the approval holder must submit a supplementary Offset Area Management Plan that details the additional and/or revised management measures that will be implemented and/or alternative offset or offsets that will be provided to compensate for the failed offset and submit it to the	N/A	Not required until May 2042

Condition No.	Condition	Compliance	Evidence
	Department to be approved in writing by the **Minister**. If approved in writing by the **Minister**, the approval holder must implement the approved supplementary Offset Area Management Plan.		
26	At least 12 months and no more than 24 months following **commissioning**, the approval holder must submit a Residual Impacts Report which details the actual residual **impact** of the action on Magnificent **Brood Frog habitat** and **Greater Glider habitat** to the Department. The Residual Impacts Report must be informed by a scientifically robust program of monitoring that has been endorsed by an **independent suitably qualified amphibian expert** and conducted by a **suitably qualified ecologist**. The Residual Impacts Report must be prepared by an **independent suitably qualified ecologist**.	N/A	The project was commissioned August 2022. This requires completion by August 2024.
27	If the actual residual **impact** of the action on **Magnificent Brood Frog habitat** or **Greater Glider habitat** is greater than the **impact** of the action on Magnificent **Brood Frog habitat** or **Greater Glider habitat** already offset, the approval holder must provide an environmental offset to compensate for the additional residual **impact** consistent with the **EPBC Act Environmental Offsets Policy**. The approval holder must, within 60 **business days** of submitting the Residual Impacts Report required under condition 26, submit a supplementary Offset Area Management Plan to the **Department** to be approved in writing by the **Minister**. If approved in writing by the **Minister**,	N/A	N/A

Condition No.	Condition	Compliance	Evidence
	the approval holder must implement the approved supplementary Offset Area Management Plan.		
28	The supplementary Offset Area Management Plan, whether submitted under the requirements of condition 23 or condition 25, must include: a) Details to demonstrate how the offset compensates for the residual **impact** on **Magnificent Brood Frog habitat** and **Greater Glider habitat** in accordance with the principles of the **EPBC Act Environmental Offsets Policy**; b) A description of the offset, including location, size, condition, environmental values present and surrounding land uses; c) Baseline data and other supporting evidence that documents the presence of each **listed threatened species** and the quality of each **listed threatened species** habitat within the offset area; d) An assessment of **site habitat quality** using a method agreed to in writing by the Department; e) Details of how the offset area will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for each **listed threatened species**;	N/A	N/A

Condition No.	Condition	Compliance	Evidence
	f) Maps and **shapefiles** to clearly define the location and boundaries of the offset area, accompanied by **offset attributes**; g) Specific offset completion criteria derived from the **site habitat quality** to demonstrate the improvement in the quality of each **listed threatened species** habitat in the offset area over the duration of this approval; h) Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria; i) Interim performance targets that set targets at appropriate intervals for progress towards achieving the offset completion criteria; j) Details of the nature, timing and frequency of monitoring to inform progress against achieving the interim performance targets (the frequency of monitoring must be sufficient to track progress towards each set of interim performance targets, and sufficient to determine whether the offset area is likely to achieve those interim performance targets in adequate time to implement all necessary corrective actions);		

Condition No.	Condition	Compliance	Evidence
	k) Proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim performance targets have been achieved; l) Timing for the implementation of corrective actions if monitoring activities indicate the interim performance targets will not or have not been achieved; m) Evidence of how the management actions and corrective actions take into account relevant **approved conservation advices** and are consistent with relevant **recovery plans** and **threat abatement plans**; and n) Details of the legal mechanism for **legally securing** the offset area, such that legal security remains in force over the offset area for at least the duration of this approval.		
29	The approval holder must notify the Department in writing of the date of **commencement of the action** and the date of **commissioning** within 10 **business days** after the date of **commencement of the action**. The approval holder must notify the **Department** in writing of the date of **commissioning** within 10 **business days** after the date of **commissioning**.	Compliant	While the notification of commissioning was late, it was provided to the Department on the 25 May 2023.
30	If the **commencement of the action** does not occur within 5 years from the date of this approval, then the approval holder must not	N/A	The action has commenced.

Condition No.	Condition	Compliance	Evidence
	commence the action without the prior written agreement of the **Minister**.		
Compliance records			
31	The approval holder must maintain accurate and complete **compliance records**.	Compliant	Records are made and kept in accordance with CEMP. Activities and registers associated with maintaining compliance during the construction period were provided for review. Records of compliance during construction activities have been maintained and kept by Vestas and Neoen.
32	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.	NA	No requests for compliance records were made during this compliance period.
Preparation and publication of plans			
33	The approval holder must: a) submit **plans** electronically to the **Department**; b) publish each **plan** on the website within 20 **business days** of the date of this approval, unless otherwise agreed to in writing by the **Minister** or, if a **plan** requires the	Compliant	All plans have been submitted to the Department. All plans have been submitted electronically. Sensitive data has been redacted. Plans are available on website: https://kabangreenpowerhub.com.au/documents/

Condition No.	Condition	Compliance	Evidence
	approval of the **Minister**, within 20 **business days** of the date of the **Minister** approving the **plan**; 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.		
34	The approval holder must ensure that any **monitoring** data (including **sensitive ecological data**), surveys, maps, and other spatial and metadata required under a **plan** and conditions of this approval, is prepared in accordance with the **Department's** *Guidelines for biological survey and mapped data* (2018) and submitted electronically to the **Department** in accordance with the requirements of the **plan** and conditions.	Compliant	Monitoring reports have been published on the Project website.
Annual compliance reporting			
35	The approval holder must prepare a compliance **report** for each 12-month period following the date of **commencement of** the **action**, or otherwise in accordance with an annual date that has been 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;	Compliant	The first Annual Compliance Report was submitted before 12 August 2022

Condition No.	Condition	Compliance	Evidence
	b) notify the **Department** by email that a **compliance report** has been published on the **website** and provide the weblink for the **compliance report** 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 five **business days** of publication. **Note**: **Compliance reports** may be published on the **Department**'s website.		
Reporting non-compliance			
36	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) any condition which is or may be in breach;	Compliant	Notification of non-compliance was provided for three incidents in accordance with this condition: 16 January 2023: Potential spectacled flying-fox turbine collision. 20 February 2023: SFF carcass detection after likely collision with turbine. 21 December 2022, Potential erosion and sedimentation in magnificent brood frog habitat from 1 in 200 year rainfall event.

Condition No.	Condition	Compliance	Evidence
	b) a short description of the **incident** and/or non-compliance; and c) the location (including co-ordinates), date, and time of the **incident** and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.		
37	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: 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	Compliant	The details for the two incidents involving the spectacled flying-fox were provided to the department at the time of notifying the department. A detailed investigation of the potential erosion and sedimentation was submitted to the department on 27 January 2023.
Independent audit			
38	The approval holder must ensure that independent **audits** of compliance with the conditions are conducted as requested in writing by the Minister.	NA	No audits have been requested.

Condition No.	Condition	Compliance	Evidence
39	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) only commence the **independent audit** once the audit criteria have been approved in writing by the **Department**; and c) submit an audit report to the **Department** within the timeframe specified in the approved audit criteria.	NA	NA
40	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.	NA	NA
Completion of the action			
41	Within 30 days after the **completion of the** action, the approval holder must notify the **Department** in writing and provide **completion data**.	NA	NA

3 Conclusion

E2M has prepared this annual compliance report for the Kaban Green Power Hub (the Project), in accordance with the requirements outlined in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) conditions of approval (EPBC 2018/8289). The compliance assessment was conducted based on information provided by the Proponent and the Construction contractor, along with information captured by E2M as part of compliance monitoring activities.

The annual compliance report determined that a total of 15 conditions out of 42 were not applicable, due to the stage of the Project. All of the active 27 conditions were determined to be compliant.

An assessment of the effectiveness of performance criteria for the Vegetation Management Plan, Fauna Management Plan and Offset Area Management Plan was conducted to determine if mitigation measures have been effective in avoiding and minimising impacts of the Project upon Matters of National Environmental Significance. No changes were required to the management plans.

It was noted that three incidents occurred within the annual period, namely:

- Two potential turbine strikes of EPBC listed bats (spectacled flying-foxes); and
- Potential sedimentation and erosion event within a waterway inhabited by magnificent brood frog.

These incidents were notified and investigated in accordance with the Project conditions.

Appendix 1 Vegetation, Fauna and Offset Area Management Plan Assessment of Effectiveness

Table A1: Assessment of Effectiveness of Vegetation Management Plan Performance Criteria

Performance Criteria	Comment	Review of Effectiveness
Micro-siting does not result in additional disturbance to threatened flora or communities above what is approved.	There has been no additional disturbance to threatened flora or communities as a result of micro-siting. Refer to Appendix 2.	VMP mitigation and management measures have been effective to date.
No exceedance of approved clearing limits.	Exceedance of approved clearing limits has not occurred. Refer to Appendix 2.	VMP mitigation and management measures have been effective to date.
No introduction or spread of priority weed species within the site and successful removal of priority weed species within the disturbance footprint.	The VMP is being implemented to prevent the introduction and spread of priority weed species. Pre-construction weed survey and mapping was completed by E2M and treatment completed by certified weed contractor. Vestas has commissioned further weed survey and treatment during construction, February to April 23.	VMP mitigation and management measures have been effective to date.
No loss or decline in threatened flora population sizes resulting from indirect impacts associated with construction and operation.	The Project has implemented suitable controls to manage indirect impacts, including erosion and sediment control measures and dust suppression measures. Integrated GIS into heavy plant used for clearing activities to ensure disturbance footprint is not exceeded.	Monitoring was performed by ecologist during May 2022 November 2022 to count threatened flora populations. There was no loss or decline in EPBC Act listed flora species, Appendix 9.

Performance Criteria	Comment	Review of Effectiveness
Progressive stabilisation of disturbed areas and rehabilitation of the disturbance footprint following construction.	The VMP requires progressive stabilisation, which is underway. Temporary rehabilitation for soil stabilisation was utilised during wet season construction activities. Soil binders have also been used to minimise erosion and sedimentation. Most areas of construction activities are nearing completion. Within these areas, top-soil has been re-instated and final rehabilitation is underway. Installations for final designs of erosion and sediment controls have been completed including large rock-filled sediment traps with jute matting, rock checks, culverts and rock lining of roadside drainage. See Appendix 4 for photographs.	VMP mitigation and management measures have been effective to date.

Table A2: Assessment of Effectiveness of Fauna Management Plan Performance Criteria

Performance Criteria	Comment	Review of Effectiveness
Micro-siting does not result in additional disturbance to magnificent brood frog and greater glider habitat above what is approved	There has been no additional disturbance to threatened fauna habitat as a result of micro-siting. Refer to Appendix 2.	FMP mitigation and management measures have been effective to date.
Micro-siting limits the removal of hollow-bearing trees	Disturbance limits have not been exceeded. Significant habitat trees were identified prior to clearing activities. These were not removed.	FMP mitigation and management measures have been effective to date.
Construction: No injury to native fauna	Spotter catchers were employed during clearing activities of all disturbance areas. Any animal found during clearing activities were relocated to safety. Any injured animals were either taken to local veterinarian for assessment and euthanised if required, or humanely euthanised on site by spotter catcher. Records of fauna interactions were reviewed. Total wildlife relocations: 16 Deaths: 2 non-threatened wallabies were killed during two separate collisions with light vehicles.There was one death of EPBC Act listed, Northern quoll (Dasyurus hallucatus) late in construction activities. Cause of death was unclear. A message to increase vigilance at pre-start vehicle	While there were two deaths of non-threatened wallabies and one threatened northern quoll, the FMP mitigation and management measures were considered appropriate, and the wildlife interaction register identifies the successful relocation, handling and management of fauna disturbed by construction activities.

Performance Criteria	Comment	Review of Effectiveness
	inspections and before moving equipment was issued to all personnel on-site.	
All habitat features (i.e. hollow logs and limbs) are relocated to adjacent habitat	Numerous habitat features were relocated to surrounding habitat.	FMP mitigation and management measures have been effective to date.
No exceedance of approved clearing limits	Exceedance of approved clearing limits has not occurred. Refer to Appendix 2.	FMP mitigation and management measures have been effective to date.
An Erosion and Sediment Control Plan (ESCP) is prepared and implemented to limit potential impacts on threatened fauna, specifically magnificent brood frog	An ESCP was developed and implemented.	As previously reported to the Department, there was some evidence of sedimentation entering waterways inhabited by magnificent brood frog. ESC controls were reviewed as a result. Additional control measures were installed to reduce waterflows and sedimentation at the construction/MBF habitat interface. Independent civil engineers (TOPO) were consulted to inspect areas of concern for a re-design to improve water shedding from the site during significant rain events. A report from TOPO was issued and the installation of new controls has been initiated, Appendix 10.

Performance Criteria	Comment	Review of Effectiveness
Disturbance is limited to the disturbance footprint	There has been no clearing outside the disturbance footprint.	FMP mitigation and management measures have been effective to date.
No loss or decline in threatened fauna population sizes resulting from indirect impacts associated with construction and operation	Annual monitoring of the magnificent brood frog was conducted as required by the FMP. Greater glider monitoring was also conducted. Annual monitoring reports were prepared for these surveys, Appendix 5 No loss or decline of threatened fauna was identified.	FMP mitigation and management measures have been effective to date
No introduction or spread of priority weed species within the site and successful removal of priority weed species within the disturbance footprint	The FMP is being implemented to prevent the introduction and spread of priority weed species. Pre-construction weed survey and mapping was completed by E2M and treatment completed by certified weed contractor. Vestas has commissioned further weed survey and treatment during construction, March/April 23 to treat priority weeds.	FMP mitigation and management measures have been effective to date.
No increase in hydrocarbon abundance within magnificent brood frog habitat	Regular monitoring has occurred to determine the effectiveness of the FMP in maintaining hydrocarbon abundance.	FMP mitigation and management measures have been effective to date.
No increase in sedimentation of magnificent brood frog habitat	An ESCP was developed and implemented. Regular monitoring of magnificent brood frog habitat has also occurred to determine effectiveness of the FMP in limiting sedimentation within magnificent brood frog habitat.	As previously reported to the Department, there was some evidence of sedimentation entering waterways inhabited by magnificent brood frog. ESC controls were reviewed as a result. Control

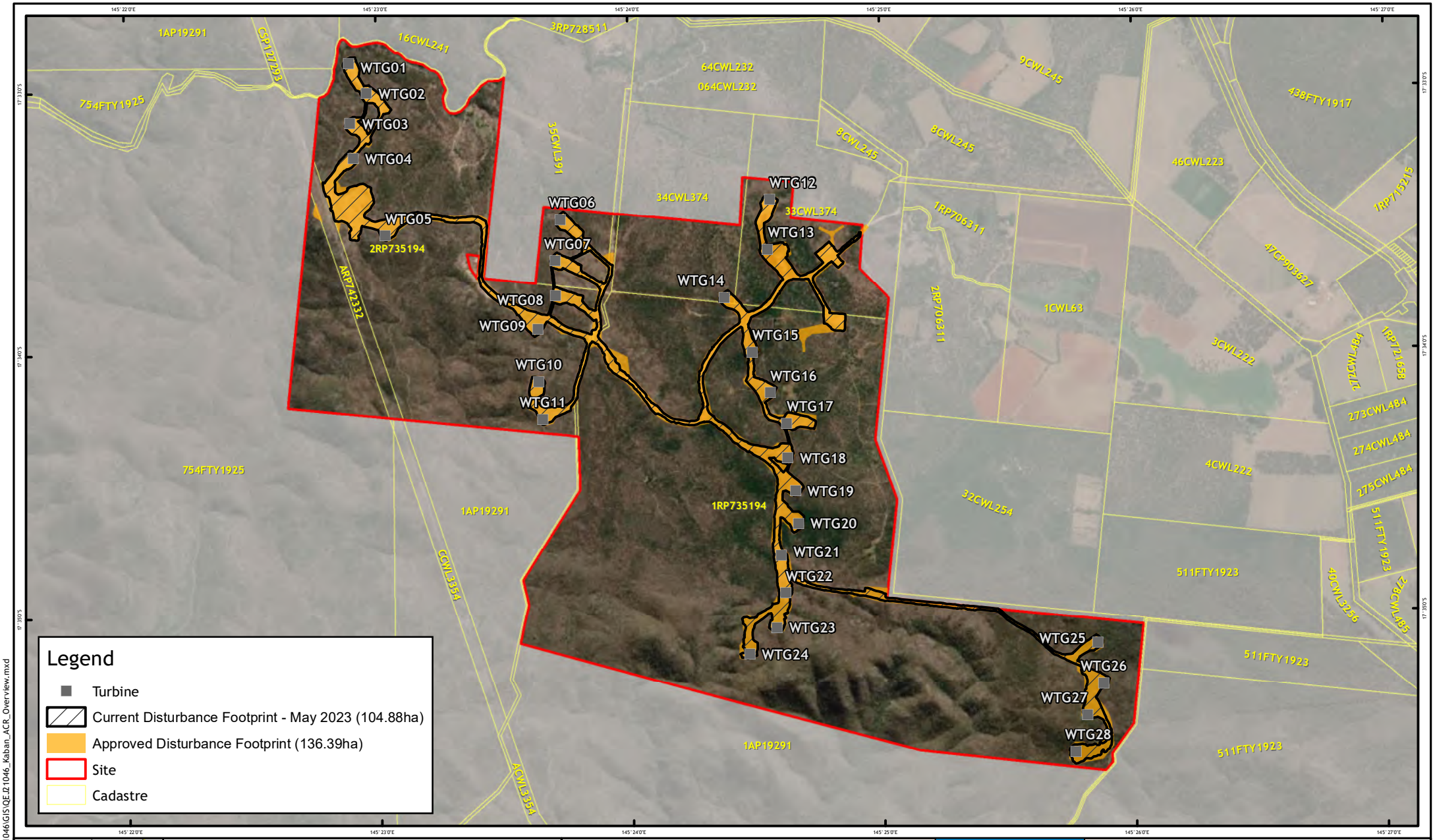
Performance Criteria	Comment	Review of Effectiveness
		measures have been installed to reduce waterflows and sedimentation at the construction/MBF habitat interface. See Appendix 10.
Successful progressive stabilisation of disturbed areas and rehabilitation of the disturbance footprint following construction.	The VMP requires progressive stabilisation, which is underway. Temporary rehabilitation for soil stabilisation was utilised during wet season construction activities. Soil binders have also been used to minimise erosion and sedimentation. Most areas of construction activities are nearing completion. Within these areas, top-soil has been re-instated and final rehabilitation is underway. Installations for final designs of erosion and sediment controls have been completed including large rock-filled sediment traps with jute matting, rock checks, culverts and rock lining of roadside drainage. See Appendix 4 for photographs.	VMP mitigation and management measures have been effective to date.

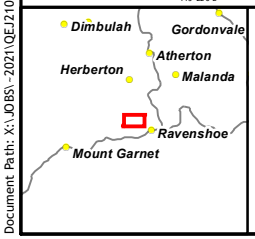
Table A3: Assessment of Effectiveness with Offset Area Management Plan Performance Criteria

Performance Criteria	Comment	Review of Effectiveness
No clearing occurs within the offset area	No clearing observed within the offset area during routine monitoring. All clearing associated with the Project has been outside of offset areas.	OAMP management measures have been effective to date.
Magnificent brood frog abundance remains stable or increases within the offset area	Annual MBF relative abundance monitoring was conducted. Refer to Appendix 5.	OAMP management measures have been effective to date.
Greater glider abundance remains stable or increases within the offset area	Annual greater glider relative abundance monitoring was conducted. Refer to Appendix 5.	OAMP management measures have been effective to date.
No new weeds are introduced to the offset area	A weed survey was conducted in November 21 to establish a baseline for future comparison. Controlled burns commenced in offset areas in September 22 and continued weed treatment carried out during June 23. Reports have been prepared for these activities.	OAMP management measures have been effective to date.
Existing weed invasion within the offset area decreases	A weed survey was conducted in November 21 and weed treatment carried out between December 21, April 22, September 22 and June 23.	OAMP management measures have been effective to date. Declared and priority weed populations have been reduced significantly.

Performance Criteria	Comment	Review of Effectiveness
Greater glider friendly cattle fencing is erected and maintained	Fencing is required 12 months post securing offsets. Fencing contracts have been engaged and all fencelines inspected and repaired. All top barbed-wire strands replaced with barbless wire in all greater glider habitat.	OAMP management measures have been effective to date.
Offset area Habitat Quality score improves by a minimum of 1 point within 10 years	Ongoing. Habitat quality assessments were performed in March 23. Scores have shown slight improvements, but offset management is still the very early stages of development. See Appendix 7.	Ongoing monitoring will be conducted to determine the effectiveness of offset activities.
Fuel loads are managed to limit potential of high intensity bush fires	The first ecological burn was performed in September 22. Further ecological burns will take place in September 23 as per the LFMP, Appendix 8.	Ongoing monitoring will be conducted to determine the effectiveness of offset activities.

Appendix 2 Map Series





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Notes:
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Rev	Description	Drawn	Approved	Date
0	Issued for Use	GO	DJ	26/07/2023
A	Issued for Review	PR	DJ	16/06/2022

FIGURE 1: PROJECT LOCATION

KABAN ANNUAL COMPLIANCE REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
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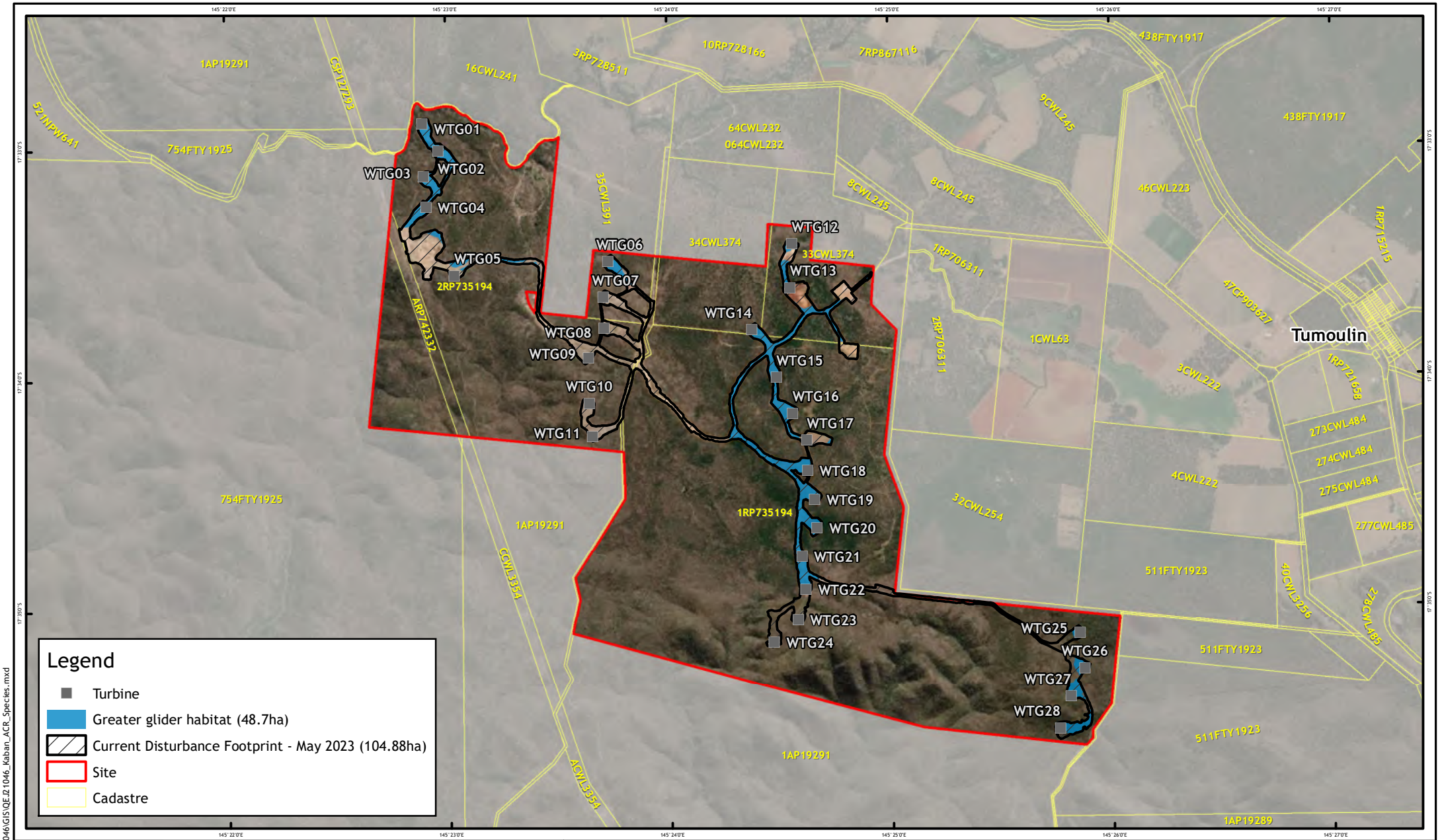

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FIGURE 2A: GREATER GLIDER HABITAT

KABAN ANNUAL COMPLIANCE REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
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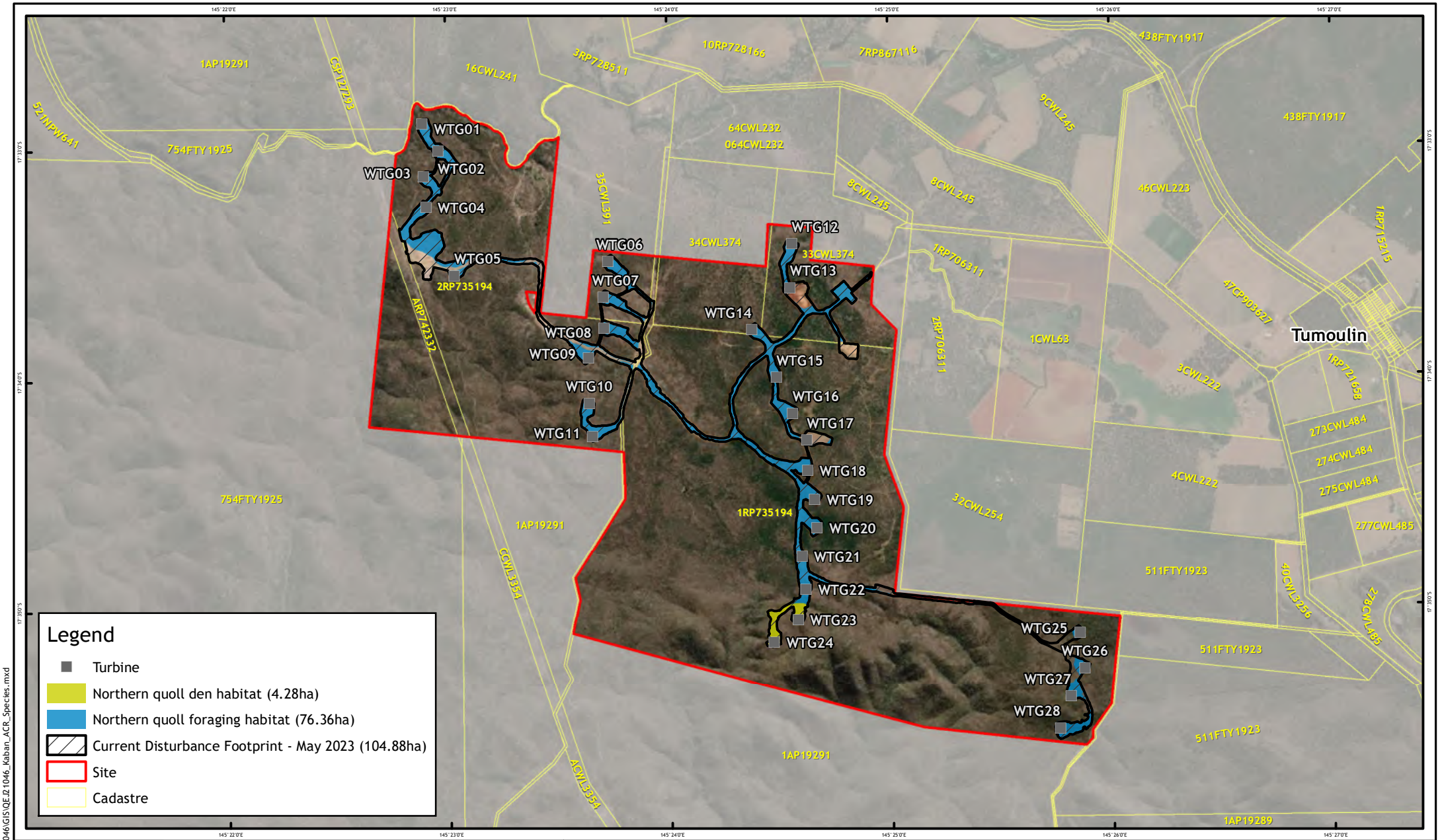

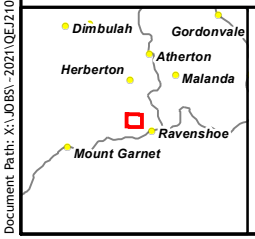

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FIGURE 2B: NORTHERN QUOLL HABITAT

KABAN ANNUAL COMPLIANCE REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
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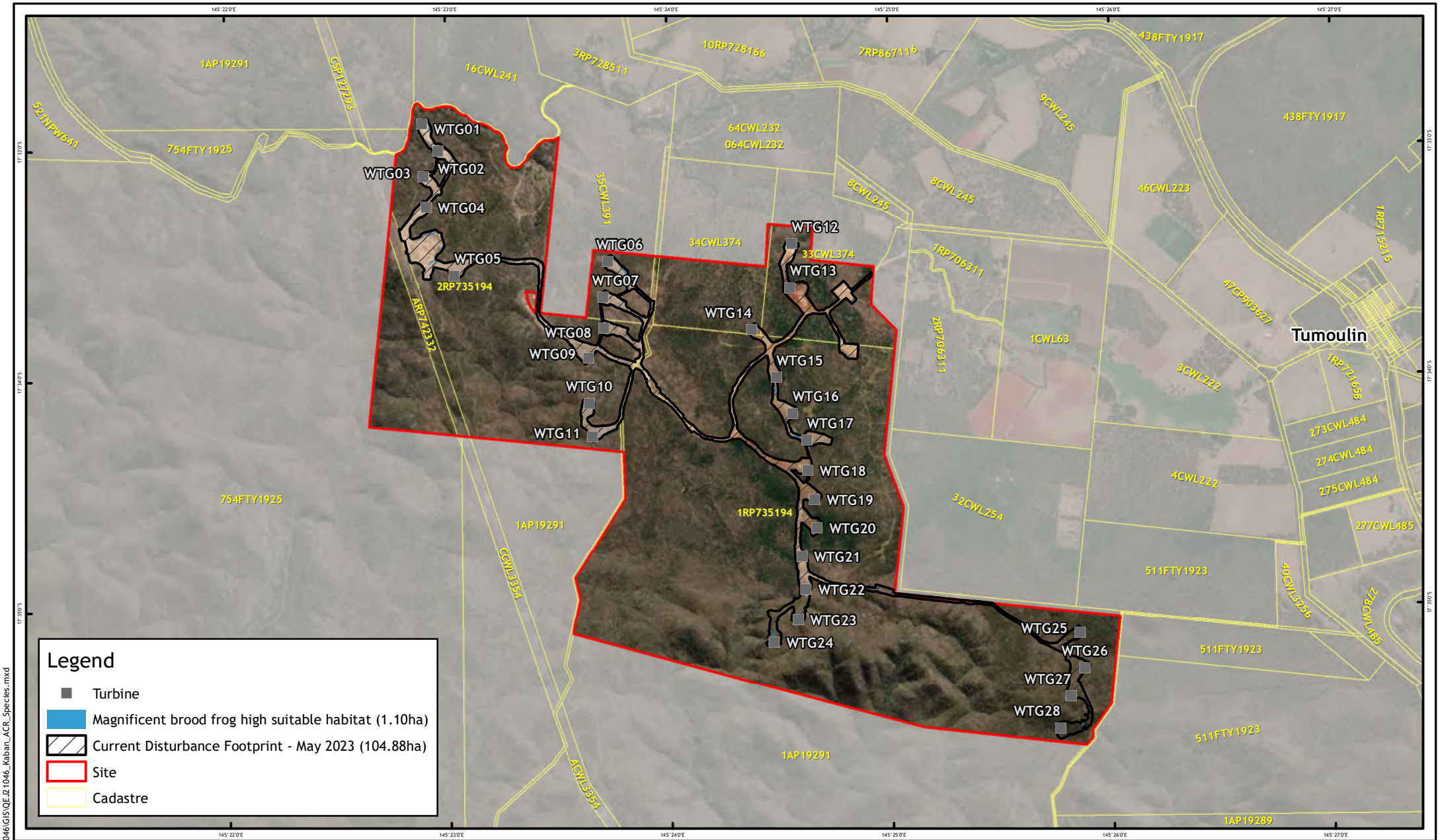

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Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator

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0	Issued for Use	GO	DJ	26/07/2023
A	Issued for Review	PR	DJ	16/06/2022

FIGURE 2C: MAGNIFICENT BROOD FROG HABITAT

KABAN ANNUAL COMPLIANCE REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
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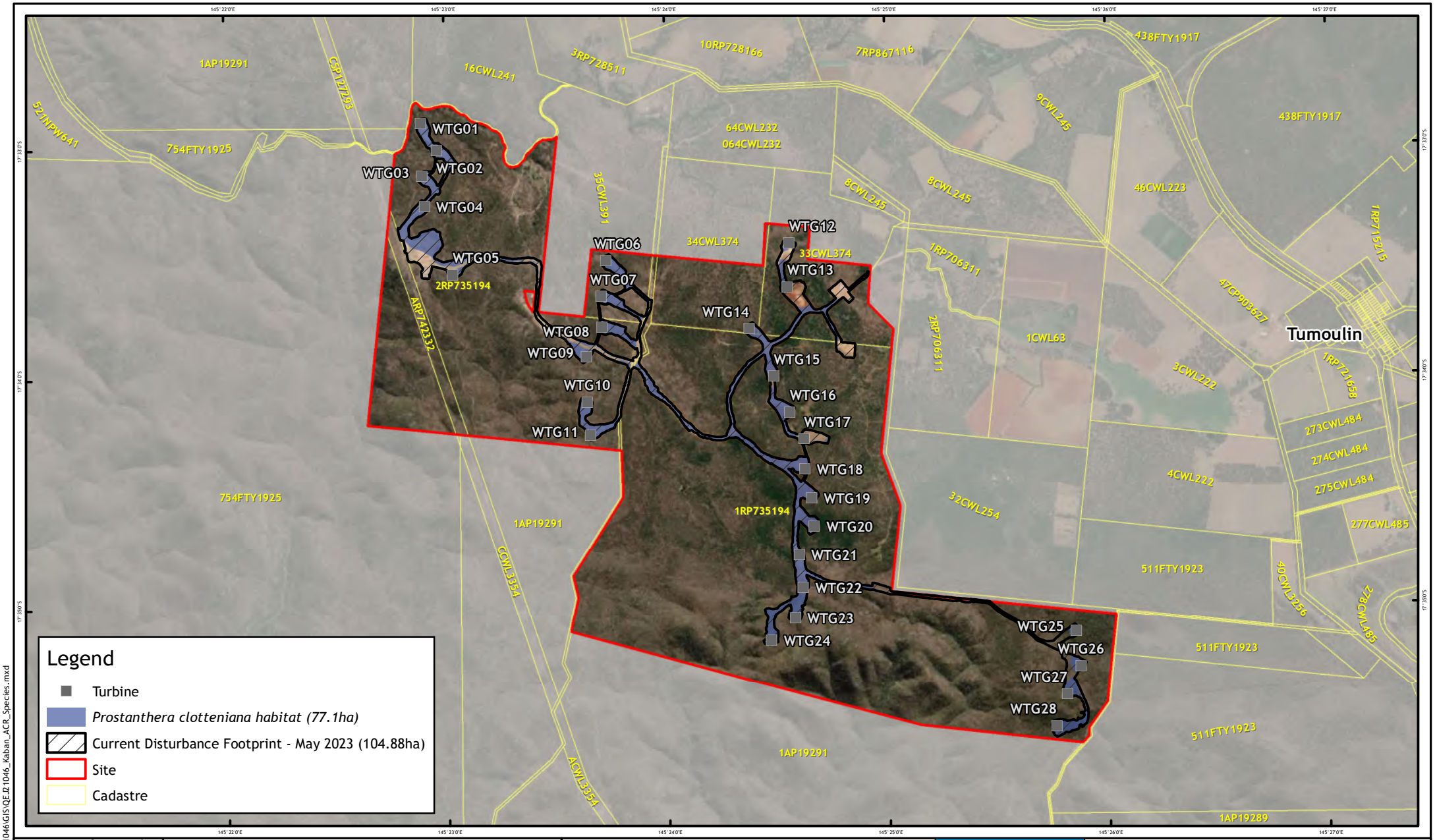

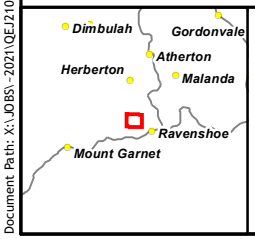

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0	Issued for Use	GO	DJ	26/07/2023
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FIGURE 2D: *PROSTANTHERA CLOTTENIANA*

KABAN ANNUAL COMPLIANCE REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
1 of 1	QEJ21046	0

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Appendix 3 Bird and Bat Utilisation Survey Reports

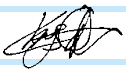
Kaban Green Power Hub: Post-commissioning Bird and Bat Utilisation 2023 Wet Season Monitoring Report

Survey March 2023

Neoen Australia Pty Ltd

Level 10, 227 Elizabeth Street, Sydney 2000

Document Management

Rev.	Issue Date	Description	Author (s)	Approved	Signature
A	6/07/2023	Issued for review	J. Hintz	Dean Jones	
0	13/07/2023	Final	K. Kemp	Chays Ogston	

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Definitions

Term	Definition
The Project	The Kaban Green Power Hub
Rotor Swept Area	The maximum height and width range in which bird and bat species may be susceptible to turbine strike.
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat may include breeding, foraging and shelter resources.
Site	The areas of Lot 1 on RP735194, Lot 33 on CWL374, Lot 35 on CWL391, Lot 2 on RP735194 and Lot 34 on CWL374 which contain proposed turbines.
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered (E), vulnerable (V) or conservation dependent (CD) under the *Environmental Protection and Biodiversity Conservation Act 1999* or extinct in the wild (PE), Endangered, Vulnerable or Near Threatened (EVNT) under the *Nature Conservation Act 1992*.

Abbreviations

Term	Definition
BBUS	Bird and Bat Utilisation Survey
DAWE	Commonwealth Government Department of Agriculture, Water and the Environment
DES	Department of Environment and Science
E2M	E2M Pty Ltd
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
NC Act	*Nature Conservation Act 1992*
Neoen	Neoen Australia Pty Ltd
RSA	Rotor Swept Area
sp.	Singular species. For example, *Eucalyptus* sp. refers to a single species of *Eucalyptus*
spp.	Multiple species. For example, *Eucalyptus* spp. refers to multiple species of *Eucalyptus*

1 Introduction

1.1 Project background

Neoen Australia Pty Ltd (Neoen) are now at the commissioning stage of the Kaban Green Power Hub wind farm (the Project) in north Queensland. The wind farm is located near the township of Tumoulin, Queensland, within the Tablelands Regional Council Local Government Area. The wind farm contains 28 wind turbines located across the following land parcels, herein collectively referred to as the 'Site' (refer to Figure 1):

- Lot 1 on Plan RP735194
- Lot 33 on Plan CWL374
- Lot 35 on Plan CWL391
- Lot 2 on Plan RP735194
- Lot 34 on Plan CWL374 and a section of local road reserve.

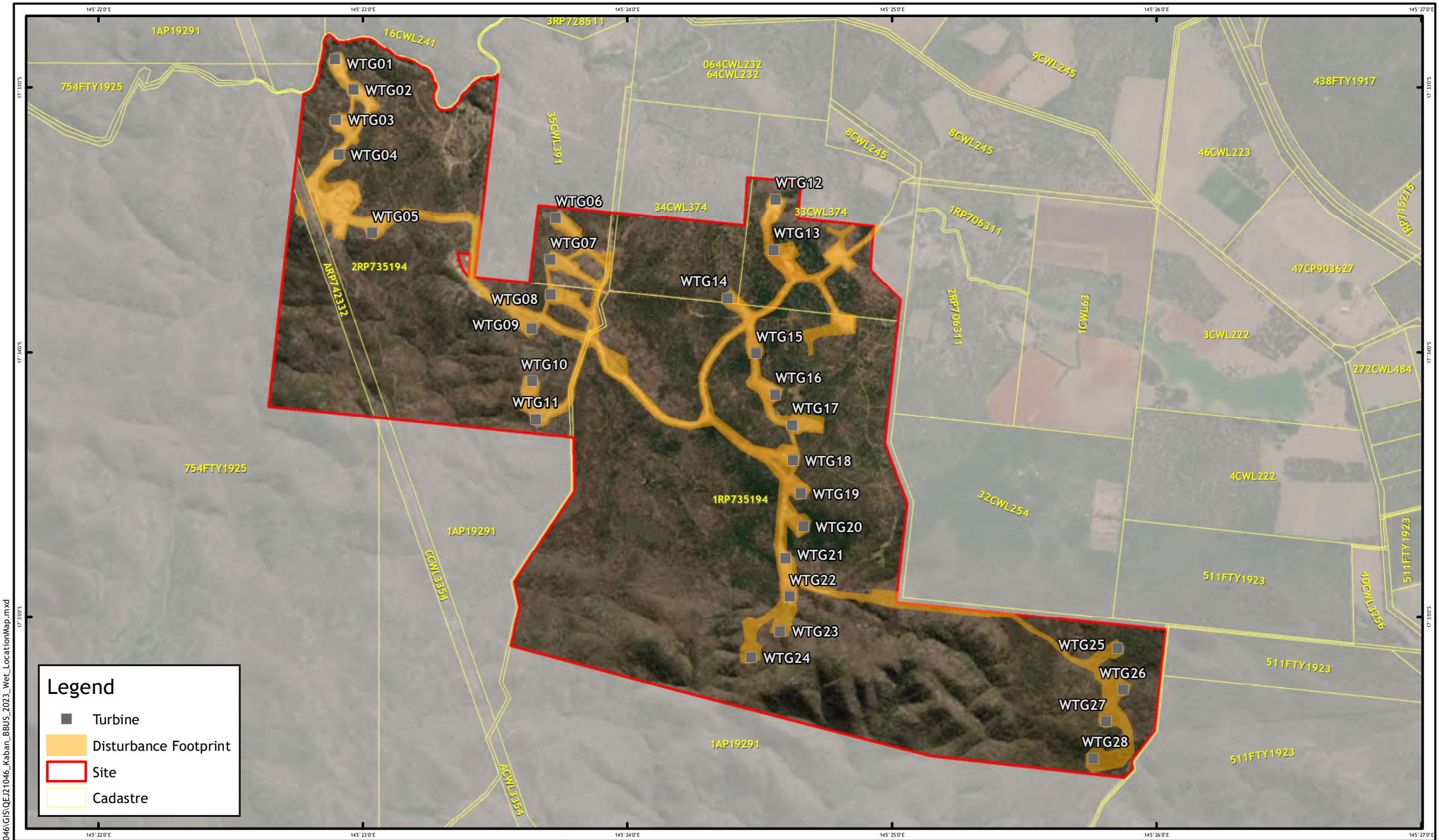
1.2 Scope and objectives

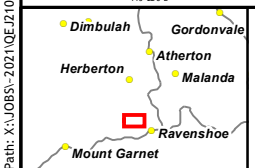
Neoen engaged E2M Consulting Pty Ltd (E2M) to undertake a post-commissioning 2023 Wet Season Bird and Bat Utilisation Survey (BBUS) (herein referred to as 'the survey') at the Kaban Green Power Hub. The survey was undertaken to meet the requirements of Condition 5 to 10 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) Variation of Conditions attached to approval EPBC 2018/8289 received from the Department of Agriculture, Water and the Environment (DAWE) on 28 May 2021.

Specifically, the survey aimed to assess bird and bat utilisation during the wet season with the objectives of determining:

- turbine collision risk of potentially occurring threatened and migratory bird and bat species; and
- a 'risk profile' for each turbine based on the results of the survey.

This survey and others will provide essential information to help develop the Bird and Bat Adaptive Management Plan as per Conditions 5 and 10 of the Approval.





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A	Issued for Review	DL	JHI	23/05/2023

FIGURE 1: PROJECT LOCATION

BIRD AND BAT UTILISATION
2023 WET SEASON MONITORING REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
1 of 1	QEJ21046	0

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2 Methods

2.1 Desktop assessment

A desktop assessment was undertaken to identify potentially occurring species within the Site. This included review of previous ecological reports for the Site, including:

- Kaban Green Power Hub: Pre-commissioning Bird and Bat Utilisation 2022 Wet Season Monitoring Report (E2M Pty Ltd, 2022)
- Kaban Green Power Hub: Pre-commissioning Bird and Bat Utilisation 2022 Wet Season Monitoring Report (E2M Pty Ltd, 2021)
- Kaban Green Power Hub: Bird and Bat Utilisation Survey, Pre-commissioning 2020 Dry Season (E2M Pty Ltd, 2020)
- Kaban Green Power Hub: RFI – Ecological Assessment Report (E2M, 2019b)
- Kaban Green Power Hub: Ecological Gap Analysis (E2M, 2019a)
- Kaban Green Power Hub: Bird and Bat Adaptive Management Plan (E2M, 2021)
- Kaban Green Power Hub: Fauna Technical Report (AECOM, 2017); and
- Kaban Green Power Hub: Bird and Bat Pre-construction Utilisation Survey (Brett Lane & Associates Pty Ltd, 2017)

2.2 Field survey

2.2.1 Survey timing and conditions

The field survey was undertaken by two suitably qualified ecologists, Dean Jones and Chays Ogston, between 20 and 29 March 2023. The weather conditions during the survey were warm and humid, with daily average temperatures ranging from low to mid-twenties, with 21.6 mm of rain recorded (Weather Underground, 2023). Winds ranged from light to moderate breezes (Weather Underground, 2023).

The survey was conducted in March to maximise the potential for migratory species to be present within the Site during the wet season period (Appendix D).

2.2.2 Survey locations

Utilisation surveys were conducted at all 28 wind turbines (WTG01 – WTG28). The coordinates and habitat description of each survey location is detailed in Table 1, with their location presented in Figure 1.

Table 1: Survey locations

Turbine number / location	Ground-truthed Regional Ecosystem / habitat description	Coordinates
WTG01	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.54821-145.381571

Turbine number / location	Ground-truthed Regional Ecosystem / habitat description	Coordinates
WTG02	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.550126-145.38274
WTG03	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.552032-145.38164
WTG04	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.55423-145.381818
WTG05	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.559162, 145.383913
WTG06	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.558235, 145.395489
WTG07	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.560835, 145.395136
WTG08	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.563049, 145.395164
WTG09	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.565181, 145.393968
WTG10	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.568497, 145.393995
WTG11	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.570903, 145.394247
WTG12	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.557055, 145.409347
WTG13	Non-remnant / Non remnant vegetation, including artificial wetlands (dams)	-17.560235, 145.409206
WTG15	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.563257, 145.406316
WTG16	Remnant 7.8.8b / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.566732, 145.408132
WTG17	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.569326, 145.409315
WTG18	Non-remnant / Non remnant vegetation, including artificial wetlands (dams)	-17.571277, 145.410381
WTG19	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.573464, 145.410428
WTG20	Remnant 7.12.27a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.575547, 145.410928
WTG21	Remnant 7.12.27a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.577627, 145.411108

Turbine number / location	Ground-truthed Regional Ecosystem / habitat description	Coordinates
WTG22	Remnant 7.12.27a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.579659, 145.40995
WTG23	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.582056, 145.41024
WTG24	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.584229, 145.409627
WTG25	Remnant 9.12.30a / *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks	-17.585886, 145.407813
WTG26	Remnant 7.12.27c / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.585312, 145.430873
WTG27	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.587917, 145.431218
WTG28	Remnant 7.12.30a / *Corymbia citriodora* and mixed *Eucalypt* open woodland	-17.589915, 145.430164

2.2.3 Bird utilisation survey

2.2.3.1 Fixed-point bird counts

Fixed-point bird counts were used to determine bird utilisation across the Site. This involved an observer recording all birds (species and abundance) within a 200 m radius of the survey point during a 20-minute survey period. Information collected during each survey included:

- Bird species
- Number of birds
- Observation type (seen or heard)
- Bird behaviour (flying or perched)
- Observed within the rotor sweep footprint
- Height at which bird was first observed. Recorded in the following height categories:
  - Below Rotor Swept Area (RSA)
    - 0-10 m
    - 10-20 m
    - 20-30 m
    - 30-40 m
    - 40-50 m
    - 50-60 m
    - 60-80 m
  - RSA Height (80 – 255 m); and
  - Above RSA (>255 m).

Additionally, for threatened species and bird groups at greatest risk of turbine collision (i.e. raptors and waterbirds) the maximum and minimum heights at which the birds were observed was recorded.

Note: Due to inability to determine number of individuals and height based on call alone, only seen individuals were included when assessing bird habitat height utilisation. However, heard species were used when determining species presence and occurrence across the Site.

2.2.3.2 Survey schedule

To identify variations in bird utilisation across different periods of day, each turbine location was assessed six times throughout the day (morning, mid-day and afternoon). A total of 170 surveys were conducted. Table 1Table 2 prescribes the different survey times each turbine location was surveyed during the field survey and Table 3 summarises when surveys were conducted for each turbine location.

2.2.3.3 Incidental observations

In addition to the fixed-point bird counts, incidental observations of threatened species, bird groups at greatest risk of turbine collision and species not previously recorded during fixed-point bird counts were also recorded whilst travelling across the Site .

Table 2: Fixed-point bird count survey schedule

Survey period	Start time	Date				
		21/03/2023	22/03/2023	23/03/2023	24/03/2023	25/03/2023
Morning	7:00 AM	WTG16	WTG06	WTG12, WTG24	WTG28	WTG16
	7:30 AM	-	WTG07, WTG15	WTG13, WTG23	WTG27	-
	8:00 AM	-	WTG08, WTG14	WTG14, WTG17, WTG21, WTG22	WTG01, WTG02, WTG26	-
	8:30 AM	WTG17, WTG20	WTG09	WTG16, WTG20	WTG03, WTG25	WTG17, WTG20
	9:00 AM	WTG18, WTG19, WTG21	WTG10	WTG15, WTG19	WTG04, WTG08	WTG18, WTG19, WTG21
	9:30 AM	WTG22, WTG23	WTG11, WTG12, WTG13, WTG18	WTG06, WTG07	WTG05	WTG22, WTG23
	10:00 AM	WTG24	-	-	-	WTG24
Mid-day	10:30 AM	WTG12, WTG28	WTG17, WTG24	WTG01, WTG11	WTG17	WTG12, WTG28
	11:00 AM	WTG13, WTG27	WTG16, WTG22, WTG23	WTG02, WTG09, WTG10	WTG16, WTG25	WTG13, WTG27
	11:30 AM	WTG14, WTG26	WTG21	WTG03, WTG04, WTG08, WTG15	WTG18, WTG26	WTG14, WTG26
	12:00 PM	WTG15, WTG21, WTG25	WTG14, WTG20	WTG05	WTG06, WTG19, WTG20, WTG27	WTG15, WTG21, WTG25
	12:30 PM	WTG22, WTG24	WTG13, WTG19	WTG07	WTG28	WTG22, WTG24
	1:00 PM	WTG23	WTG12, WTG18	-	-	WTG23
	1:30 PM	-	-	-	-	-
	2:00 PM	WTG01, WTG02, WTG07	WTG15, WTG24, WTG28	WTG10, WTG11, WTG14	WTG21, WTG25, WTG26	WTG01, WTG02, WTG07
Afternoon	2:30 PM	WTG03, WTG06	WTG23, WTG27	WTG09, WTG12	WTG06, WTG27, WTG28	WTG03, WTG06
	3:00 PM	WTG04, WTG05, WTG08	WTG21, WTG22, WTG26	WTG07	WTG13, WTG17, WTG18	WTG04, WTG05, WTG08
	3:30 PM	WTG10, WTG11, WTG13	WTG20, WTG25	WTG05, WTG08	WTG16	WTG10, WTG11, WTG13
	4:00 PM	-	WTG12, WTG19	WTG01, WTG02, WTG04	WTG14, WTG15, WTG22	-
	4:30 PM	-	WTG13	WTG03	-	-
	5:00 PM	-	-	-	-	-
	5:30 PM	-	-	-	-	-

* Heavy earthworks present at time of survey.
+ Heavy earthworks nearby at time of survey
Note: Survey times are rounded to the nearest half hour.

Table 3: Fixed-point bird count survey summary

Turbine number / location	Survey period			Total
	Morning	Mid-day	Afternoon	
WTG01	2	2	2	6
WTG02	2	2	2	6
WTG03	2	2	2	6
WTG04	2	2	2	6
WTG05	2	2	2	6
WTG06	2	2	2	6
WTG07	2	2	2	6
WTG08	2	2	2	6
WTG09	2	2	1	5
WTG10	2	2	2	6
WTG11	2	2	2	6
WTG12	2	2	2	6
WTG13	2	2	3	7
WTG14	2	2	2	6
WTG15	2	3	2	7
WTG16	2	2	2	6
WTG17	2	2	2	6
WTG18	2	2	2	6
WTG19	2	2	2	6
WTG20	2	2	2	6
WTG21	2	2	2	6
WTG22	2	2	2	6
WTG23	2	2	2	6
WTG24	2	3	2	7
WTG25	2	2	2	6
WTG26	2	2	2	6
WTG27	2	2	2	6
WTG28	2	2	2	6

2.2.4 Bat utilisation survey

2.2.4.1 Passive echolocation detection

Bat utilisation was determined through deployment of automated bat detection devices (Anabat Swift Detectors), that record species specific echolocation call signatures of nearby microchiroptera bats (microbats). Detectors were deployed approximately 2 m above the ground at each of the proposed turbine locations, for a period of two nights at all locations, see Table 4. This totals a survey effort of 56 recorder-nights across the Site (Table 4).

Following the field survey, all recordings were sent to a suitably qualified specialist for analysis. Where possible, calls were identified to species level; however, where overlap exists between species, species complexes were recorded (Balance! Environmental, 2023). The full report is included in Appendix C.

Table 4: Echolocation detector survey schedule

Turbine number / location	Date set	Date retrieved	Survey nights
WTG01	23/03/2023	25/03/2023	2
WTG02	23/03/2023	25/03/2023	2
WTG03	23/03/2023	25/03/2023	2
WTG04	23/03/2023	25/03/2023	2
WTG05	23/03/2023	25/03/2023	2
WTG06	23/03/2023	25/03/2023	2
WTG07	23/03/2023	25/03/2023	2
WTG08	23/03/2023	25/03/2023	2
WTG09	25/03/2023	27/03/2023	2
WTG10	27/03/2023	29/03/2023	2
WTG11	27/03/2023	29/03/2023	2
WTG12	27/03/2023	29/03/2023	2
WTG13	27/03/2023	29/03/2023	2
WTG14	21/03/2023	23/03/2023	2
WTG15	21/03/2023	23/03/2023	2
WTG16	21/03/2023	23/03/2023	2
WTG17	21/03/2023	23/03/2023	2
WTG18	21/03/2023	23/03/2023	2
WTG19	21/03/2023	23/03/2023	2
WTG20	21/03/2023	23/03/2023	2
WTG21	21/03/2023	23/03/2023	2
WTG22	25/03/2022	27/03/2022	2

Turbine number / location	Date set	Date retrieved	Survey nights
WTG23	25/03/2022	27/03/2022	2
WTG24	25/03/2022	27/03/2022	2
WTG25	25/03/2022	27/03/2022	2
WTG26	25/03/2022	27/03/2022	2
WTG27	25/03/2022	27/03/2022	2
WTG28	25/03/2022	27/03/2022	2

2.2.4.2 Megabat (flying-fox) nocturnal surveys

Two, 20 minute fixed flying-fox surveys were completed at sites WTG15 to WTG28 and one 20 minute survey was completed turbine locations WTG1 to WTG14, amounting to a total of 42 surveys. A severe electrical thunderstorm prevented surveys on 10 May 2022. Surveys started at dusk when flying-foxes become active. The observer recorded any observations of flying-fox, noting species and numbers. The surveys were completed over three nights with the sessions organised to capture an early evening and later survey period. The megabat survey timetable can be viewed in Table 5.

Table 5: Megabat nocturnal survey schedule

Start time	Date			
	26/03/23	27/03/23	28/03/23	29/03/2023
18.00	WTG01 WTG02	WTG15 WTG16	WTG01 WTG02	WTG15 WTG16
18.30	WTG03 WTG04	WTG17 WTG18	WTG03 WTG04	WTG17 WTG18
19.00	WTG05 WTG06	WTG19 WTG20	WTG05 WTG06	WTG19 WTG20
19.30	WTG07 WTG08	WTG21 WTG22	WTG07 WTG08	WTG21 WTG22
20.00	WTG09 WTG10	WTG23 WTG24	WTG09 WTG10	WTG23 WTG24
20.30	WTG11 WTG12	WTG25 WTG26	WTG11 WTG12	WTG25 WTG26
21.00	WTG13 WTG14	WTG27 WTG28	WTG13 WTG14	WTG27 WTG28

Note: Survey times are rounded to the nearest half hour.

2.2.4.3 Incidental observations

Incidental observations of any megachiroptera bats (flying-foxes) or microbats throughout the Site were also recorded, including information on behaviour (i.e. roosting or flying), height observed and number of individuals.

2.2.5 Survey limitation

While the survey was undertaken during the optimum wet season survey period, to maximise the potential occurrence of potentially occurring migratory species within the Site, migratory patterns of birds vary greatly depending on seasonal weather conditions from year to year. However, the timing of the survey is considered to provide an accurate representation of bird utilisation during the wet season migration period for species potentially occurring within the Site.

An additional limitation is that the use of echolocation detectors does not allow for assessment of bat numbers, only the number of calls. For example, the method is unable to determine whether five calls are from the same individual or five different individuals. As such, it is only possible to determine activity rates, not utilisation rates. Nor does method determine flight height of bats.

Local flowering tree events will also influence the presence and absence of flying-fox in the area. Flowering Eucalypts and other trees tend to attract flying-foxes that feed on nectar. During the survey period there was a low number flowering Eucalyptus present at about half of the turbine locations.

Due to inability to determine number of individuals and height based on call alone, only seen individuals were included when assessing number of individuals. However, heard species were used when determining species presence and occurrence across the Site.

Active heavy earthworks at several turbine locations during the survey period limited ability to detect birds through calls, and potentially limited bird activity during the survey period. Surveys where heavy earthworks were active during the survey period are detailed in Table 2.

2.3 Collision risk assessment

Following the desktop assessment and field survey, a collision risk assessment was undertaken to determine the potential risk of collision for threatened and migratory species considered likely occurrences within the Site. This assessment involved undertaking a likelihood of occurrence assessment to determine species known or likely to occur within the Site, followed by an assessment of their behavioural patterns to determine their potential risk of turbine collision based on the Project's RSA height.

Additionally, this assessment also aimed to identify turbine 'risk profiles' based on the results of the utilisation survey. Specifically, as per Condition 10 of the EPBC Act approval, each turbine will be categorised into one of the following two categories:

- **Low-risk turbines:** A turbine that has not had an EPBC Act and/or *Nature Conservation Act* (NC Act) listed threatened or migratory bird or bat species detected within a 350 m radius; and
- **High-risk turbines:** A turbine that has had an EPBC Act and/or NC Act listed threatened or migratory bird or bat species detected within a 350 m radius.

The purpose of determining turbine risk profiles is to guide turbine monitoring during the operational phase of the Project, with all high-risk turbines requiring monitoring.

3 Results

3.1 Desktop results

Desktop assessment results identified eight bird species and two bat species, listed as threatened or migratory under either the EPBC Act and/or NC Act as likely or known to occur within the Site

Table 6: Known and likely to occur bird and bat species

Fauna species	EPBC Act status[1]	NC Act status[1]	Likelihood of occurrence
Birds			
fork-tailed swift *(Apus pacificus)*	M	SLC	**Likely to occur:** The species has previously been recorded within 12 km of the Site and is likely to utilise airspace above the Site for foraging.
Latham's snipe (*Gallinago hardwickii*)	M	SLC	**Likely to occur:** Suitable habitat occurs within the Site and the species has been previously recorded within 10km of the Site
masked owl - northern (*Tyto novaehollandiae kimberli*)	V	V	**Likely to occur:** Suitable habitat occurs within the Site and the species has been previously recorded within 5km of the Site.
oriental cuckoo *(Cuculus optatus)*	M	SLC	**Likely to occur:** Suitable habitat occurs within the Site and the species has been previously recorded within 12km of the Site
red goshawk (*Erythrotriorchis radiatus*)	V	E	**Likely to occur:** Suitable habitat occurs within the Site and the species has been previously recorded within 11km of the Site
white-throated needletail *(Hirundapus caudacutus)*	M[2]	SLC[2]	**Likely to occur:** The species has previously been recorded within 2.5 km of the Site and is likely to utilise airspace above the Site for foraging.
Bats			
ghost bat *Macroderma gigas*	V	E	**Known to occur:** A single individual has been recorded previously within the Site.
spectacled flying-fox *Pteropus conspicillatus*	V[3]	V[3]	**Known to occur:** Three individuals have been recorded previously within the Site.

[1] : E = Endangered, M = Migratory, SLC = Special Least Concern, V = Vulnerable
[2] : Species is listed as Vulnerable under the EPBC Act as of the 4th July 2019, and NC Act as of 19th September 2019. However, assessment is based on the species status when the Project's EPBC Act referral was submitted. As such, the species has been assessed as a migratory species (EPBC Act) and SLC (NC Act).
[3] : Species is listed as Endangered under the EPBC Act as of the 22nd February 2019, and NC Act as of 19th September 2019. However, assessment is based on the species status when the Project's EPBC Act referral was submitted. As such, the species has been assessed as Vulnerable (EPBC Act/ NC Act).

3.2 Field results

3.2.1 Bat utilisation

3.2.1.1 Microbats

The microbat utilisation survey identified a total of 19,533 individual bat calls, from at least 17 and up to 21 species. About 48% of the calls (9296) were positively identified to 17 unique species (Table 8 and Table 8). (Balance! Environmental, 2022)

The frequency of calls varied greatly between turbine locations with WTG23 containing the highest number of calls (3,918) calls) and WTG24 having the lowest number of calls (58 calls). The diversity of calls also varied greatly between turbine locations with WTG25 containing the greatest diversity (15 distinct calls) and WTG19 and WTG24 having the lowest (5 distinct calls) (Table 8 and Table 8).

The most commonly recorded distinct call made up 25% (2,332 calls) of the total recorded distinct calls and was from the hoary-wattled bat (*Chalinolobus nigrogriseus*). Some species, such as the forest pipistrelle (*Pipistrellus adamsi*) were recorded as little as four times (Table 7 and Table 8).

There were no threatened microbat species recorded at any proposed turbine sites.

3.2.1.2 Flying-foxes

No flying-fox were recorded, either foraging, flying or roosting, from a total of 42 nocturnal surveys (860 minutes) performed within the Site, nor from any other incidental observations during the field trip.

Table 7: Species call records by turbine number / location (WTG01 - WTG14)

Species	Turbine number / location													
	WTG01	WTG02	WTG03	WTG04	WTG05	WTG06	WTG07	WTG08	WTG09	WTG10	WTG11	WTG12	WTG13	WTG14
Positively identified calls														
bare-rumped sheathtail bat (*Saccolaimus saccolaimus*)						3							3	
eastern bentwing bat (*Miniopterus orianae oceanensis*)	41	83	49	53	64	32	68	8	26	14	10	47	97	41
eastern cave bat (*Vespadelus troughtoni*)		3			2					3	2	1		
eastern forest bat (*Vespadelus pumilus*)	2			1	1		1			1			1	2
eastern freetail bat (*Ozimops ridei*)	4	16	3	4	31	3	65	6	3	1	1	34	612	4
eastern horseshoe bat (*Rhinolophus megaphyllus*)	1						8							1
forest pipistrelle (*Pipistrellus adamsi*)		1	1											
Gould's wattled bat (*Chalinolobus gouldii*)	6	6	7	2	4	7	158	2	21	1		11	281	6
greater broad-nosed bat (*Scoteanax rueppellii*)	6	6	2	4	2	1	6		2	2	2		10	6
hoary wattled bat (*Chalinolobus nigrogriseus*)	17	1	7	5	2		35	16	3	2	2	13	142	17
little bentwing bat (*Miniopterus australis*)	5	75	29	61	21	10	38	2	57	9	4	15	89	5

Species	Turbine number / location													
	WTG01	WTG02	WTG03	WTG04	WTG05	WTG06	WTG07	WTG08	WTG09	WTG10	WTG11	WTG12	WTG13	WTG14
little broad-nosed bat (*Scotorepens greyii*)			1	6							4			
northern freetail bat (*Chaerephon jobensis*)	1					4	11			1		20	12	1
northern free-tailed bat (*Ozimops lumsdenae*)												2	2	
Troughton's sheathtail bat (*Taphozous troughtoni*)						6								
white-striped freetail bat (*Austronomus australis*)	26	56	98	41	43	50	72	10	34	40		96	243	26
yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*)				2			14	1		5	2	52	76	
Unresolved calls														
A. australis / C. jobensis												4	1	
C. gouldii / O. ridei	6	9	4	4	4	15	77		1			4	10	1
C. nigrogriseus / Scotorepens sp.	2	70	30	252	36	13	50	112	48	718	722	77	713	10
S. greyii / S. sanborni										10	10		1	
S. sanborni / M. o. oceanensis	1			1	2		2	2					2	1
V. pumilus / M. australis		2												
M. o. oceanensis / P. adamsi	1		2	1		1		2	2			3		
Turbine location total	**125**	**330**	**235**	**438**	**214**	**145**	**605**	**161**	**197**	**807**	**759**	**379**	**2295**	**503**

Table 8: Species call records by turbine number / location (WTG15 - WTG28)

Species	Turbine number / location													
	WTG15	WTG16	WTG17	WTG18	WTG19	WTG20	WTG21	WTG22	WTG23	WTG24	WTG25	WTG26	WTG27	WTG28
Positively identified calls														
bare-rumped sheathtail bat (*Saccolaimus saccolaimus*)											1			
eastern bentwing bat (*Miniopterus orianae oceanensis*)	136	25	80	30	10	17	36	43	10	5	48	16	7	11
eastern cave bat (*Vespadelus troughtoni*)											1	1		
eastern forest bat (*Vespadelus pumilus*)	3							1			19	5	4	
eastern freetail bat (*Ozimops ridei*)	29	39	10	4	10	228	16	35	282		2	11	7	12
eastern horseshoe bat (*Rhinolophus megaphyllus*)						6	1				1			
forest pipistrelle (*Pipistrellus adamsi*)		2												
Gould's wattled bat (*Chalinolobus gouldii*)	13	1	9	4			1	6	3	1	3	8	4	2
greater broad-nosed bat (*Scoteanax rueppellii*)	35	4	2			10		10	1		3	11	3	
hoary wattled bat (*Chalinolobus nigrogriseus*)	27	6	15	61	77	139	23	13	1636	5	12	4	30	6
little bentwing bat (*Miniopterus australis*)	251	44	117	288	13	379	9	53	7	2	126	138	13	27

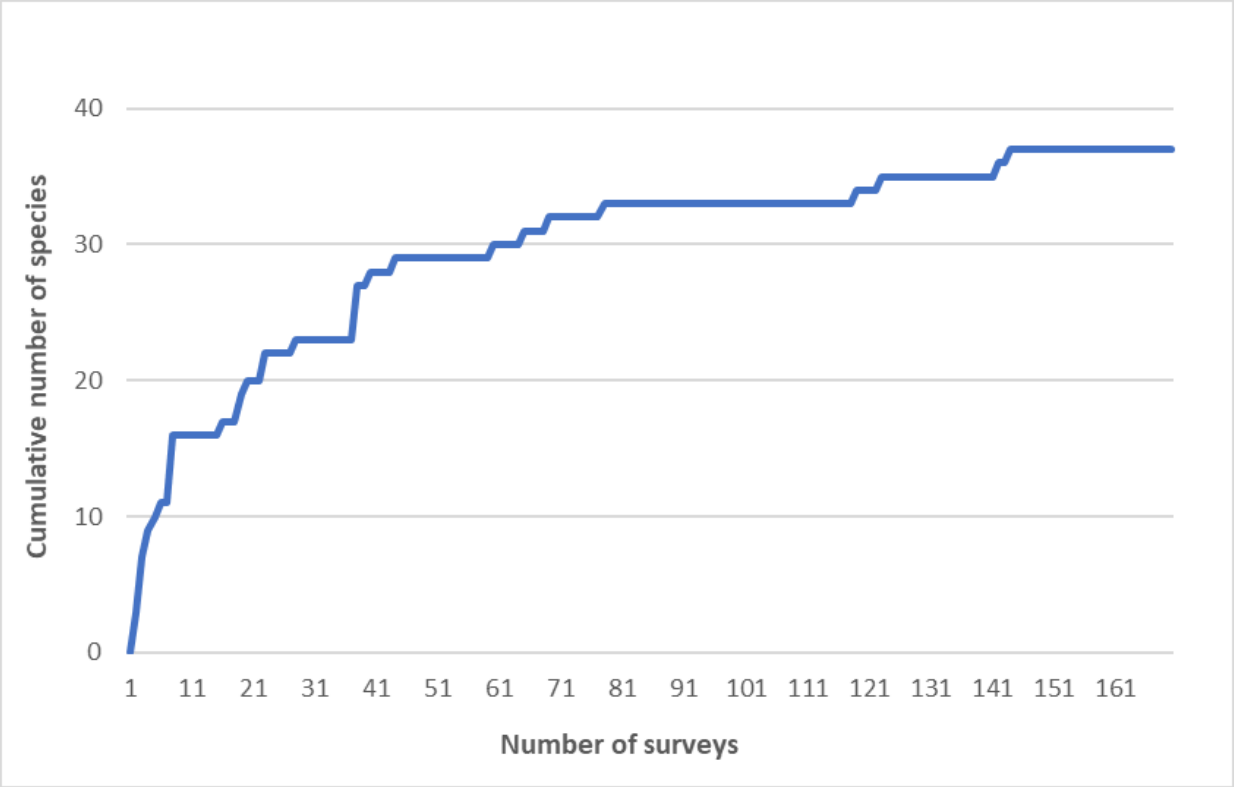
Species	Turbine number / location													
	WTG15	WTG16	WTG17	WTG18	WTG19	WTG20	WTG21	WTG22	WTG23	WTG24	WTG25	WTG26	WTG27	WTG28
little broad-nosed bat (*Scotorepens greyii*)	30			1		33			7		2	17	1	
northern freetail bat (*Chaerephon jobensis*)											1			
northern free-tailed bat (*Ozimops lumsdenae*)							1							
white-striped freetail bat (*Austronomus australis*)	6	18	34	14	20	1	9	32	8	13	23	1	29	73
yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*)											1			1
Unresolved calls														
A. australis / C. jobensis	4		6	3			1		1					
C. gouldii / O. ridei	852	88	55	161	390	2688	38	81	1952	32	222	426	18	10
C. nigrogriseus / Scotorepens sp.	4	1				27			9		4	1		
S. sanborni / M. o. oceanensis						2					2	1		
V. pumilus / M. australis			1			5		5				2		1
M. o. oceanensis / P. adamsi	4		6	3			1		1					
Turbine location total	**1392**	**229**	**330**	**566**	**520**	**3535**	**137**	**279**	**3918**	**58**	**473**	**642**	**118**	**143**

3.2.2 Bird utilisation

3.2.2.1 Survey effort

The survey effort undertaken is considered adequate to determine the majority of species occurring within the Site, with Figure 2 demonstrating that the number of species observed flattened out after approximately 150 fixed-point surveys.

Figure 2: Bird species accumulation curve



3.2.2.2 Bird diversity, abundance and distribution

A total of 39 bird species were observed across the Site during the field survey, 37 species were observed during fixed-point surveys and 2 additional species during incidental observations (Appendix A). Of the 37 species observed, 8 species were recorded at more than 10% of the fixed-point surveys (Table 9).

Table 9: Bird species recorded at highest frequencies across fixed point surveys

Common name	Scientific name	Number of surveys recorded	Percent of surveys recorded
white-throated honeyeater	*Melithreptus albogularis*	43	25 %

Common name	Scientific name	Number of surveys recorded	Percent of surveys recorded
red-backed fairy-wren	*Malurus melanocephalus*	27	16 %
pale-headed rosella	*Platycercus adscitus*	25	15 %
yellow-faced honeyeater	*Lichenostomus chrysops*	24	14 %
peaceful dove	*Geopelia placida*	21	12 %
Australian magpie	*Gymnorhina tibicen*	18	11 %
noisy miner	*Manorina melanocephala*	18	11 %
spotted pardalote	*Pardalotus punctatus*	17	10 %

There were 4 species recorded at over 50% of turbine locations. The white-throated honeyeater was the most widely distributed species, observed at 23 of the 28 (82%) turbine locations. The top ten most widely distributed bird species can be viewed in Table 10.

The diversity of species recorded was also similar between surveys with 37 of 39 bird species recorded during this survey also recorded during previous surveys.

Table 10: Most widely distributed birds across the Site including threatened and migratory bird distribution

Common name	Scientific name	Observations at different turbine locations	Percent of total turbine locations
white-throated honeyeater	*Melithreptus albogularis*	23	82 %
yellow-faced honeyeater	*Lichenostomus chrysops*	18	64 %
Red-backed fairywren	*Malurus melanocephalus*	17	61 %
pale headed rosella	*Platycercus adscitus*	14	50 %
spotted pardalote	*Pardalotus punctatus*	12	43 %
australian magpie	*Cracticus tibicen*	11	39 %
noisy miner	*Manorina melanocephala*	11	39 %
peaceful dove	*Geopelia striata*	11	39 %
grey fantail	*Rhipidura albiscapa*	10	36 %
laughing kookaburra	*Dacelo novaeguineae*	10	36 %

3.2.2.2.1 Threatened and migratory species

While no migratory species were recorded during point surveys, one white-throated needletail (*Hirundapus caudacutus)* was found dead between turbines 16 and 17.

3.2.2.3 Flight heights

Approximately 99% of the unique bird observations occurred below the RSA height (Table 11). The wedge-tailed eagle was the only species recorded at or above the RSA (Table 12). However, this species observed showed a high risk of turbine collision, being recorded within or above the RSA height 50% of the time.

A full summary of the number and height of birds recorded across the Site is provided in Table 11.

Table 11 Number of birds recorded per height class

Flight Height	Number of observations	Percent of total observations
0-10m	256	45 %
10-20m	231	40 %
20-30m	67	12 %
30-40m	4	1 %
40-50m	2	0 %
50-60m	0	0 %
60-80m	6	1 %
80-255m (RSA)	2	0.3 %
>255m	6	1 %

Table 12: Species recorded within or above RSA

Common name	Scientific name	# of Survey Periods Observed	Number of birds observed	# within RSA	Percent of species total individuals
wedge-tailed eagle	*Aquila audax*	4	8	4	50%

3.2.2.4 Historical Observations

There have been four BBUS investigations performed since 2020:

1. September 2020, Dry Season
2. October 2021, Dry Season
3. March 2022, Wet Season, and
4. March 2023, Wet Season

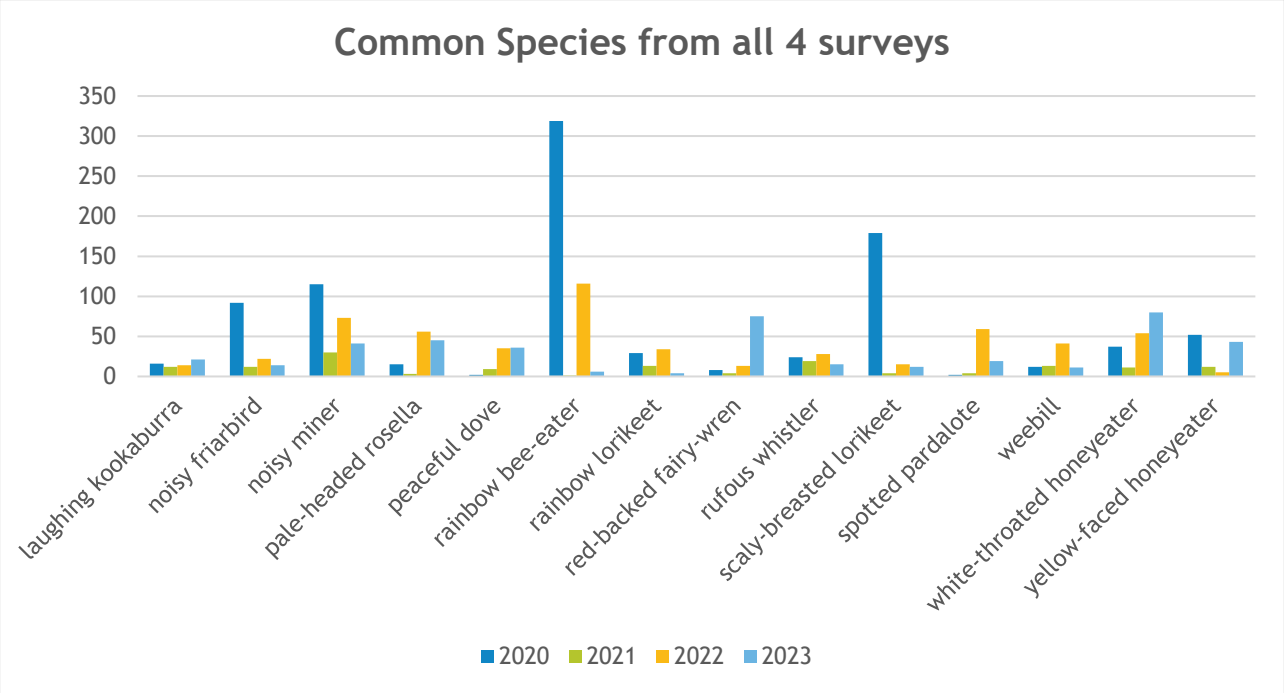
The number of bird species recorded during fixed point surveys for each BBUS is detailed in Table 13.

Table 13: Total bird species recorded during each BBUS.

BBUS	2020 Dry Season	2021 Dry Season	2022 Wet Season	2023 Wet Season
# of Species	58	38	49	39

The fourteen most common species recorded during each BBUS events is represented in Figure 3. The results suggest that the species record numbers are increasing for six species, decreasing for 5 species and maintained for 3 species. However, comparative analysis and drawing conclusions is difficult with only four surveys spread across two seasons.

Figure 3. Species observations in the last 4 surveys



3.3 Turbine collision risk assessment

3.3.1 Bird Survey

3.3.1.1 Threatened species

While no threatened bird species have been recorded within the Site, two species, red goshawk (*Erythrotriorchis radiatus*) and masked owl (*Tyto novaehollandiae kimberli*) are considered likely to occur (Table 6). Assessment of the turbine collision risk of these species identified that both species have a low collision risk due to their flight behaviour and/or likely frequency of occurrence within the Site (Table 14).

3.3.1.2 Migratory species

During this survey, no migratory bird species were recorded within Site during the 171 point surveys However, the white-throated needletail has been observed during previous utilisation surveys and one was found dead between turbines 16 & 17 during this survey period. There are four species considered likely to occur, including:

- white-throated needletail (*Hirundapus caudacutus*)
- fork-tailed swift (*Apus pacificus*)
- Latham's snipe (*Gallinago hardwickii*); and
- oriental cuckoo (*Cuculus optatus*).

Assessment of the turbine collision risk of these species determined that based on their flight behaviour and/or likely frequency of occurrence within the Site, the:

- fork-tailed swift and white-throated needletail have a high risk of turbine collision though the likely number of individuals impacted will be negligible to the species total population
- Latham's snipe has a moderate risk of collision, given the potential risk of turbine strike during dispersal and migration but a low frequency at which the species is likely to utilise the Site; and
- oriental cuckoo has a low risk of collision based on its flight behaviour (Table 14).

3.3.2 Bat Survey

3.3.2.1 Microbats

While no threatened microbat species were recorded during the survey, ghost bat (*Macroderma gigas*) was recorded within the Site during the baseline survey (Brett Lane & Associates Pty Ltd, 2017). No other microbats are considered likely occurrences within the Site (Table 6). Assessment of the turbine collision risk of ghost bat identified that the species has a low collision risk due to their flight behaviour and likely low frequency of occurrence within the Site (Table 14).

3.3.2.2 Flying-foxes

While no threatened flying-fox species were recorded during the survey, spectacled flying-fox (*Pteropus conspicillatus*) has been previously recorded within the Site during previous surveys. No other flying foxes are considered likely to occur within the Site (Table 6). Assessment of the turbine collision risk of spectacled flying-fox determine a moderate risk overall, with its flight behaviour being high and its frequency and abundance within the Site being low (Table 14).

Table 14: Turbine collision assessment for known and likely occurring threatened and migratory species

Species	Conservation status[1]		Habitat and occurrence	Flight behaviour	Risk of collision
	EPBC Act	NC Act			
Threatened species					
masked owl (*Tyto novaehollandiae kimberli*)	V	V	The species is known to occur in riparian forest, rainforest, open forest and Melaleuca swamps and the edges of mangroves, as well as along margins of sugar cane fields (DAWE, 2021). While the species has previously recorded within 10km of the Site, records of the species across the Atherton Tablelands are scattered, infrequent and at low densities, reducing the risk of collision.	The species holds permanent large home ranges and hunts primarily on the ground or within the canopy, taking small mammals (Curtis & Dennis 2012, DAWE, 2021). It typically glides from perches in trees to prey (Brett Lane & Associates Pty Ltd, 2017). These flight behaviours make the species unlikely to occur within the RSA, and therefore have a low risk of turbine collision.	**Low risk:** While the species is considered likely to occur within the Site, the species flight behaviour makes it a low risk of collision.
red goshawk (*Erythrotriorchis radiatus*)	V	V	The species is known to have a large home range covering between 50 and 220 square kilometres. The species prefers a mix of vegetation types including tall open forest, woodland, lightly treed savannah and the edge of rainforest (DES 2021). While the species has previously recorded within 10km of the Site, records of the species across the Atherton Tablelands are scattered, infrequent and at low densities, reducing the risk of collision.	Typical flight behaviour is to perch and hunt in the canopy but it is known to undertake fast agile flights 10-50m above the tree canopy and soar 200-300 m above its territory (Brett Lane & Associates Pty Ltd, 2017). These flight behaviours make the species at risk of turbine collision.	**Low risk:** While the species flight behaviour makes it susceptible to turbine collision, the large home range and low number of occurrences of the species in the Project region makes it a low risk of collision.

Species	Conservation status[1]		Habitat and occurrence	Flight behaviour	Risk of collision
	EPBC Act	NC Act			
Migratory species					
fork-tailed swift (*Apus pacificus*)	M	SLC	In Australia, this species mostly occurs over inland plains but sometimes above foothills or in coastal areas. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh (DAWE, 2021). They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes (DAWE, 2021). The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (DAWE, 2021). The species has been previously recorded within 10km of the Site and is predicted to intermittently forage within the airspace above the Site.	The fork-tailed swift is an aerial forager spending large periods of within RSA heights foraging on insect prey (Higgins, 1999).	**High risk:** The species flight behaviour makes it highly susceptible to collision, however the occurrence and abundance of individuals occurring within the Site is likely to be highly variable, with the proportion of likely impacted individuals considered to be negligible compared to the total population size.
Latham's snipe (Gallinago hardwickii)	M	SLC	Latham's snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia (DAWE, 2021). In Australia, Latham's snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (DAWE, 2021). Historical records show the species has previously recorded within the Site.	While the species primarily forages on the ground, it is possible that the species may occur within the RSA height during migration and dispersal. However, the species is unlikely to frequent the Site in large numbers given the lack of extensive wetland habitat.	**Moderate risk:** The species may occur within the RSA during migration and dispersal. However, it is only likely to occur infrequently and in low numbers due to the lack of extensive wetland habitat within the Site.

Species	Conservation status[1]		Habitat and occurrence	Flight behaviour	Risk of collision
	EPBC Act	NC Act			
oriental cuckoo (*Cuculus optatus*)	M	SLC	In Australia this species is found in monsoon forest, rainforest edges, leafy trees in paddocks, river flats, roadsides, mangroves and islands (Pizzey & Knight, 2007). Important habitat for this species is identified as monsoonal rainforest, vine thickets, wet sclerophyll forest or open *Casuarina*, *Acacia* or *Eucalyptus* woodlands. The species has been previously recorded within 12km of the Site and may utilise the Site for foraging when present in Australia (November to May).	The species is primarily restricted to the canopy layer where it forages on a variety of small invertebrates (Brett Lane & Associates Pty Ltd, 2017). These flight behaviours means the species is unlikely to frequently occur at RSA height.	**Low risk:** While the species is considered likely to occur within the Site, the species flight behaviour makes it a low risk of collision.
white-throated needletail (*Hirundapus caudacutus*)	M	SLC	In Australia, the white-throated needletail is almost exclusively aerial (DAWE, 2021). Because they are aerial, it is suggested that conventional habitat descriptions are inapplicable (DAWE, 2021). However, DAWE (2021) identifies the species is most commonly recorded over wooded areas, including open forest, rainforest, heathland, plantations, the edge of paddocks and less often over treeless areas such as grassland or swamps (DAWE, 2021). The species was recorded on two separate occasions during the 2021 survey, including one observation of 13 individuals at turbine WTG08 and one observation of three individuals at turbine WTG19.	The white-throated needletail is an aerial forager spending large periods of within RSA heights foraging on insect prey (Higgins, 1999).	**High risk:** The species flight behaviour makes it highly susceptible to collision, however the occurrence and abundance of individuals occurring within the Site is likely to be highly variable, with the proportion of likely impacted individuals considered to be negligible compared to the total population size.

Species	Conservation status[1]		Habitat and occurrence	Flight behaviour	Risk of collision
	EPBC Act	NC Act			
Microbats					
ghost bat (*Macroderma gigas*)	V	E	In Queensland the species occurs along the central and northern coast, from Rockhampton to Cape York (DES 2021). The species occurs in a wide range of habitats from rainforest, monsoon and vine scrub, to open woodlands in arid areas. These habitats are used for foraging while roost habitat is more specific and includes undisturbed caves or mineshafts which have several openings (DES 2021). A single individual has been recorded within the Site during previous surveys.	The species roosts in caves or undisturbed mineshafts, of which non are known to occur within the Site. Foraging typically occurs within 2km of the roost and consist of flying within the lower half of the canopy, between 1-8m. This behaviour makes it unlikely the species would occur within the RSA.	**Low risk**: While the species is known to occur within the Site, the species flight behaviour makes it a low risk of collision.
Flying-foxes					
spectacled flying-fox (*Pteropus conspicillatus*)	V	V	The species is known to occur in north-eastern Queensland, between Ingham and Cooktown, and between the McIlwraith and Iron Ranges of Cape York (DAWE, 2021). Spectacled flying foxes have long been considered to be primarily frugivorous and dependent on rainforest for foraging resources (DERM 2010). However, recent research suggests that this is not the case with satellite telemetry studies showing some individuals spend a significant proportion of the time in non-rainforest habitats. Many of these records were obtained from locations tens of kilometres from rainforest and included a range of wet and dry Eucalyptus, and Melaleuca vegetation types (DERM 2010). The species has been recorded within the Site on multiple occasions, though only ever in low numbers (1-2 individuals). The nearest known roost is approximately 25km from the Site.	While the species forages primarily within the canopy, the species would be susceptible to turbine collision during dispersal. However, given the Site is 25km from the nearest known roost it is considered unlikely that the Site would be utilised frequently and by large numbers of individuals.	**Moderate risk:** The species flight behaviour makes it a high risk of turbine collision, however, the distance to the nearest roosts makes it unlikely that the site would be utilised frequently and by large numbers of individuals.

[1]: E = Endangered, M = Migratory, SLC = Special Least Concern, V = Vulnerable

3.3.3 Post-Operation: Incidental Bird and Bat Observations

The first turbine was energised in late September 2022. Since operation, there have been several records of possible turbine strike deaths, of migratory birds and spectacle flying-foxes. The records of these observations are detailed in Table 15.

Table 15: Incidental bird and bat finds post operation.

Common Name	Species Name	Date Found	# Individuals Found	Found at Turbine Number/s
Migratory Birds				
Fork-tailed swift	*Apus pacificus*	January 2023	2	2 & 11
White-throated needletail	*Hirundapus caudacutus*	March 2023	1	Between 16 & 17
Rufous fantail[1]	*Rhipidura rufifrons*	March 2023	1	Between 16 & 17
Black-faced Monarch[1]	*Monarcha melanopsis*	February 23	1	4
Flying-foxes				
Spectacled flying-fox	*Pteropus conspicillatus*	January 2023	1	16
		February 2023	1	1

[1] While these migratory birds are unlikely to be found onsite, they are potentially using the airspace above the windfarm for migration.

3.3.4 Turbine risk profiles

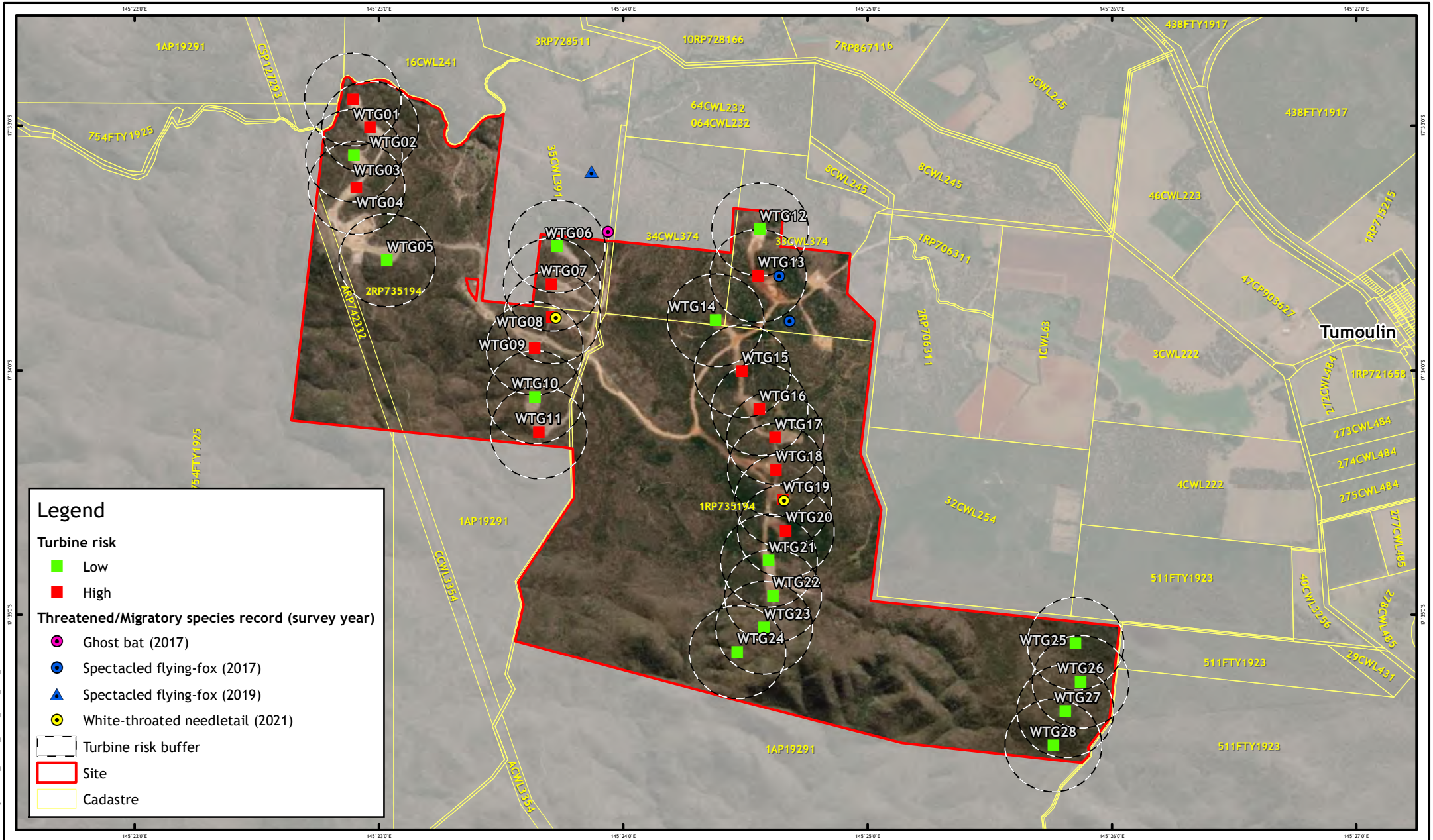
As per Condition 10 of the EPBC Act approval, risk profiles were assigned based on the categories detailed in Section 2.3. Of the 28 turbines, seven turbines are considered high-risk turbines, based on records of spectacled flying fox and white-throated needletail within the vicinity of the turbine from two BBUS' conducted in the dry season of 2020 and 2021 (Table 16 and Figure 4).While neither of these species were observed during the 2022 and 2023 wet season survey, there were additional Incidental[2] observations made of these species along with observations of the black-faced monarch and rufous fantail as detailed in Table 15. These observations have been included in Table 16 for the determination of the turbine risk profiles.

Table 16: Turbine risk profiles

Turbine	Risk profile	Turbine	Risk profile
1	High[A]	15	High[A]
2	High[A]	16	High[A]
3	Low	17	High[A]
4	High[A]	18	High[B]
5	Low	19	High[B]
6	Low	20	High[B]
7	High[B]	21	Low
8	High[B]	22	Low
9	High[B]	23	Low
10	Low	24	Low
11	High[A]	25	Low
12	Low	26	Low
13	High[C]	27	Low
14	Low	28	Low

[A] Carcass found at this location during incidental searches post operation. Please refer to Table 15 for details.
[B] White-throated needletail observed within 350m of turbines during the 2021 dry-season BBUS.
[C] A spectacled flying-fox observation recorded in the 2020 dry-season BBUS.

[2] In late September 2022 the first turbine was energised. By March 2023, turbines 1 to 17 were in operation. During this time, Incidental observations of bird and bat carcasses were noted, resulting in additional records of migratory bird species and spectacled flying-foxes.



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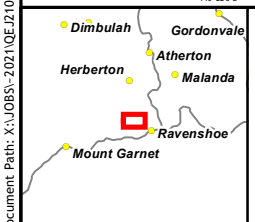

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Kilometres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: © ESRI 2020
Cadastre: © DNRME 2020

Rev	Description	Drawn	Approved	Date
0	Issued for Use	PR	CO	13/07/2023
A	Issued for Review	PR	EA	07/07/2023

FIGURE 3: TURBINE RISK PROFILES

BIRD AND BAT UTILISATION
2023 WET SEASON MONITORING REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
1 of 1	QEJ21046	0

4 Conclusion

Neoen engaged E2M to undertake the 2023 post-commissioning Wet Season BBUS at the Kaban Green Power Hub. The survey was undertaken to meet the requirements of Condition 5 to 10 of the EPBC Act Approval EPBC 2018/8289 received from DAWE on 28 May 2021.

Specifically, the survey aimed to assess bird and bat utilisation during the wet season with the objectives of determining:

- turbine collision risk of potentially occurring threatened and migratory bird and bat species; and
- a 'risk profile' for each turbine based on the results of the bird and bat utilisation.

Key findings from the assessment included:

- Bird utilisation
  - No threatened bird species or migratory bird species were observed during this survey.
  - A total of 39 bird species were recorded across the Site during the survey, including 37 observed during fixed-point surveys.
  - Bird species were primarily limited to typical woodland species, with white-throated honeyeater and red-backed fairy-wren being the two most frequently recorded species.
  - Approximately 99% of birds observed occurred below the RSA height, with only 8 observations, from one species (wedge-tailed eagle), recorded at or above the RSA height.
  - Previous BBUS surveys have identified the white-throated needletail utilising the airspace at rotor sweep height.
  - Post operation, incidental observations have also recorded one carcass of the white-throated needletail.
  - Incidental observation of migratory bird carcasses, post operation, have identified that the fork-tailed swift, rufous fantail and the black-faced monarch are potentially using the airspace within the windfarm.
  - For the fourteen most common species recorded during all 4 BBUS surveys there has been an increase in records for 6 species, a decrease for 5 species and maintained records for 3 species. However, it must be noted that there is limiting information to draw any conclusions re records for each species because there have only been 4 surveys that are spread across two seasons. There are many variables that can be influencing bird numbers at any one time. Some include, temperature, wind intensity, rainfall, floristic flowering and fruiting events, the proximity of heavy plant working, is to name a few.

- Bat utilisation
  - No threatened bat species were recorded during the survey,
  - Seventeen distinct calls from at least 17 and up to 21 different species were recorded across the Site
  - The most commonly recorded distinct call made up 25% (2,332 calls) of the total recorded distinct calls and was from the hoary-wattled bat (*Chalinolobus nigrogriseus*)

- Previous surveys have identified spectacled flying-fox and one record of ghost bat within the Site. However, the ghost bat was considered to have a low risk of turbine collision based on its flight behaviour.
- No other threatened species were considered likely to occur.
- Spectacled flying-fox was considered to have a moderate risk of turbine collision, with high risk flight behaviours but low likelihood of frequent occurrence and large numbers within the Site.

- Incidental bird and bat observations since wind farm operation
  - Since operation there have been four migratory bird species (black-faced monarch, rufous fantail, white-throated needletail and fork-tailed swift) and spectacled flying-fox noted as potential death resulting from turbine strikes.
  - The above migratory bird and spectacled flying-fox observations occurred within 350 metres of turbines 1, 2, 4, 11, 15, 16 and 17. These turbines have now been profiled as 'High' risk.
- High risk turbine profiling
  - From all BBUS and incidental observations there are fourteen (14) turbines considered as 'High' risk as detailed within Table 16.

5 Recommendations

One purpose of the BBUS is to help assign ‘High' risk profiles to turbines for the assessment of annual mortality of bird and bats. The mortality results will then help interpret any trigger events for migratory birds and threatened bat species. However, current design is a non-randomised design that introduces sample bias when there is the introduction of new ‘High’ risk turbines. The initial number of turbines nominally assigned for monthly carcass searches was fifteen. This number then increased to 19 turbines after four high risk turbines were added during the March 2022 BBUS survey. The number has again increased to a total of 24 turbines, from the recent incidental turbine strike observations. With this current design there is no standardisation or consistency with sample effort from month to month. It is recommended, that there is a re-design that assigns turbines randomly for monthly carcass searches, thereby removing bias for annual mortality assessments. It is recommended that the re-design for mortality assessment is, provided by and approved by an independent and qualified statistician.

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Appendix A Species list

Common name	Scientific name	BLA 2018	E2M 2020	E2M 2021	E2M 2022	E2M 2023
Birds						
Australasian pipit	*Canthus novaeseelandiae*	✓				
Australian Bustard	*Ardeotis australis*	✓				
Australian king-parrot	*Alisterus scapularis*		✓			
Australian magpie	*Cracticus tibicen*	✓	✓	✓	✓	✓
Australian owlet-nightjar	*Aegotheles cristatus*				✓	
Australian pelican	*Pelecanus conspicillatus*		✓			
Australian wood duck	*Chenonetta jubata*		✓			
banded honeyeater	*Certhionyx pectoralis*	✓	✓			
barking owl	*Ninox connivens*			✓		
bar-shouldered dove	*Geopelia humeralis*		✓			
barn owl	*Tyto alba*	✓				
black-breasted buzzard	*Hamirostra melanosternon*	✓				
black butcherbird	*Cracticus quoyi*	✓				
black kite	*Milvus migrans*		✓	✓		
black-chinned honeyeater	*Melithreptus gularis*		✓			
black-faced cuckoo-shrike	*Coracina novaehollandiae*	✓	✓	✓	✓	✓
black-faced monarch	*Monarcha melanopsis*		✓			
blue-faced honeyeater	*Entomyzon cyanotis*		✓			
blue-winged kookaburra	*Dacelo leachii*	✓	✓	✓		
brolga	*Grus rubicunda*	✓	✓	✓		
brown cuckoo dove	*Macropygia amboinensis*	✓				
brown falcon	*Falco berigora*	✓	✓			✓
brown goshawk	*Accipiter fasciatus*			✓		✓
brown honeyeater	*Lichmera indistincta*		✓	✓	✓	✓
brown quail	*Coturnix ypsilophora*		✓	✓	✓	

Common name	Scientific name	BLA 2018	E2M 2020	E2M 2021	E2M 2022	E2M 2023
brush cuckoo	*Cacomantis variolosus*				✓	
buff-rumped thornbill	*Acanthiza reguloides*		✓	✓	✓	✓
bush stone-curlew	*Burhinus grallarius*	✓	✓	✓	✓	✓
cicadabird	*Coracina tenuirostris*	✓		✓	✓	
collared sparrowhawk	*Accipiter cirrocephalus*		✓			
common bronzewing	*Phaps chalcoptera*		✓			
common myna	*Acridotheres tristis*	✓				
crested pigeon	*Ocyphaps lophotes*	✓				
dollarbird	*Eurystomus orientalis*	✓				
eastern spinebill	*Acanthorhynchus tenuirostris*	✓				
eastern whipbird	*Psophodes olivaceus*		✓	✓		
eastern yellow robin	*Eopsaltria australis*	✓	✓	✓		
forest kingfisher	*Todiramphus macleayii*	✓	✓	✓		
fuscous honeyeater	*Lichenostomus fuscus*				✓	
golden whistler	*Pachycephala pectoralis*	✓				
great cormorant	*Phalacrocorax carbo*				✓	
grey butcherbird	*Cracticus torquatus*	✓	✓	✓	✓	
grey fantail	*Rhipidura albiscapa*	✓	✓	✓	✓	✓
grey shrike-thrush	*Colluricincla harmonica*	✓	✓	✓	✓	✓
hardhead	*Aythya australis*	✓	✓			
Horsfield's bronze-cuckoo	*Chrysococcyx basalis*		✓			
jacky winter	*Microeca fascinans*	✓	✓			
laughing kookaburra	*Dacelo novaeguineae*	✓	✓	✓	✓	✓
leaden flytcatcher	*Myiagra rubecula*			✓	✓	✓
Lewin's honeyeater	*Meliphaga lewinii*	✓	✓			✓
little bronze-cuckoo	*Chrysococcyx minutillus*			✓		
little friarbird	*Philemon citreogularis*		✓	✓		
little kingfisher	*Alcedo pusilla*	✓				
little lorikeet	*Parvipsitta pusilla*		✓	✓	✓	

Common name	Scientific name	BLA 2018	E2M 2020	E2M 2021	E2M 2022	E2M 2023
little pied cormorant	*Microcarbo melanoleucos*	✓	✓			
magpie-lark	*Grallina cyanoleuca*	✓	✓		✓	✓
masked lapwing	*Vanellus miles*	✓				
mistletoebird	*Dicaeum hirundinaceum*		✓	✓	✓	
nankeen kestrel	*Falco cenchroides*	✓		✓	✓	
noisy friarbird	*Philemon corniculatus*	✓	✓	✓	✓	✓
noisy miner	*Manorina melanocephala*	✓	✓	✓	✓	✓
olive-backed oriole	*Oriolus sagittatus*	✓	✓		✓	
Pacific black duck	*Anas superciliosa*	✓	✓		✓	
pale-headed rosella	*Platycercus adscitus*	✓	✓	✓	✓	✓
pallid cuckoo	*Cacomantis pallidus*	✓				
peaceful dove	*Geopelia striata*	✓	✓	✓	✓	✓
pheasant coucal	*Centropus phasianinus*	✓	✓	✓	✓	✓
pied butcherbird	*Cracticus nigrogularis*	✓	✓	✓	✓	
pied currawong	*Strepera graculina*	✓	✓	✓	✓	✓
purple swamphen	*Porphyrio porphyrio*	✓				
rainbow bee-eater	*Merops ornatus*	✓	✓	✓	✓	✓
rainbow lorikeet	*Trichoglossus haematodus moluccanus*	✓	✓	✓	✓	✓
red-backed button-quail	*Turnix maculosus*		✓		✓	
red-backed fairy-wren	*Malurus melanocephalus*	✓	✓	✓	✓	✓
red-browed finch	*Neochmia temporalis*	✓	✓	✓		✓
red-tailed black-cockatoo	*Calyptorhynchus banksii*	✓	✓	✓		
rufous whistler	*Pachycephala rufiventris*		✓	✓	✓	✓
sacred kingfisher	*Todiramphus sanctus*	✓	✓			
sarus crane	*Antigone antigone*			✓		
scaly-breasted lorikeet	*Trichoglossus chlorolepidotus*	✓	✓	✓	✓	✓
scarlet honeyeater	*Myzomela sanguinolenta*	✓	✓	✓	✓	

Common name	Scientific name	BLA 2018	E2M 2020	E2M 2021	E2M 2022	E2M 2023
southern bookbook	*Ninox novaeseelandiae*			✓		
spangled drongo	*Dicrurus bracteatus*		✓	✓	✓	
spotted pardalote	*Pardalotus punctatus*	✓	✓	✓	✓	✓
squatter pigeon (northern subspecies)	*Geophaps scripta peninsulae*	✓	✓	✓	✓	✓
striated pardalote	*Pardalotus striatus*	✓	✓	✓	✓	✓
sulphur-crested cockatoo	*Cacatua galerita*	✓				
tawny frogmouth	*Podargus strigoides*	✓		✓		✓
Torresian crow	*Corvus orru*	✓	✓	✓		✓
varied sittella	*Daphoenositta chrysoptera*	✓		✓	✓	✓
varied triller	*Lalage leucomela*	✓				
wedge-tailed eagle	*Aquila audax*	✓	✓	✓	✓	✓
weebill	*Smicrornis brevirostris*	✓	✓	✓	✓	✓
whistling kite	*Haliastur sphenurus*		✓	✓	✓	
white-bellied cuckoo-shrike	*Coracina papuensis*	✓	✓	✓	✓	✓
white-browed scrubwren	*Sericornis frontalis*	✓		✓		
white-faced heron	*Egretta novaehollandiae*		✓	✓		
white-naped honeyeater	*Melithreptus lunatus*	✓				
white-necked heron	*Ardea pacifica*		✓			
white-throated gerygone	*Gerygone olivacea*		✓	✓	✓	
white-throated honeyeater	*Melithreptus albogularis*		✓	✓	✓	✓
white-throated needletail	*Hirundapus caudacutus*			✓		
white-throated nightjar	*Eurostopodus mystacalis*				✓	
white-throated treecreeper	*Cormobates leucophaea*		✓			✓
white-winged triller	*Lalage sueurii*	✓				

Common name	Scientific name	BLA 2018	E2M 2020	E2M 2021	E2M 2022	E2M 2023
willie wagtail	*Rhipidura leucophrys*	✓	✓		✓	✓
yellow thornbill	*Acanthiza nana*					✓
yellow-faced honeyeater	*Caligavis chrysops*	✓	✓	✓	✓	✓
Microbats						
bare-rumped sheathtail bat	*Saccolaimus saccolaimus*					✓
eastern bentwing bat	*Miniopterus orianae oceanensis*	✓	✓	✓	✓	✓
eastern cave bat	*Vespadelus troughtoni*				✓	✓
vastern forest bat	*Vespadelus pumilus*					✓
eastern freetail bat	*Ozimops ridei*	✓	✓	✓	✓	✓
eastern horseshoe bat	*Rhinolophus megaphyllus*	✓	✓	✓	✓	✓
forest pipistrelle	*Pipistrellus adamsi*					✓
ghost bat	*Pteropus conspicillatus*	✓				
Gould's wattled bat	*Chalinolobus gouldii*	✓	✓	✓	✓	✓
greater broad-nosed bat	*Scoteanax rueppellii*			✓	✓	✓
hoary wattled bat	*Chalinolobus nigrogriseus*	✓	✓	✓	✓	✓
inland broad-nosed bat	*Scotorepens balstoni*				✓	
little bentwing bat	*Miniopterus australis*	✓	✓	✓	✓	✓
little broad-nosed bat	*Scotorepens greyii*				✓	✓
northern broad-nosed bat	*Scotorepens sanborni*				✓	
northern freetail bat	*Chaerephon jobensis*		✓	✓	✓	✓
northern free-tailed bat	*Ozimops lumsdenae*			✓	✓	
south-eastern broad-nosed bat	*Scotorepens orion*				✓	
Troughton's sheathtail bat	*Taphozous troughtoni*				✓	✓
white-striped freetail bat	*Austronomus australis*	✓	✓	✓	✓	✓

Common name	Scientific name	BLA 2018	E2M 2020	E2M 2021	E2M 2022	E2M 2023
yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*		✓	✓	✓	✓
-	*Austronomus australis / Chaerephon jobensis*				✓	✓
-	*Chalinolobus gouldii* or *Ozimops ridei*			✓		✓
-	*Chalinolobus gouldii / Scotorepens balstoni*				✓	
-	*Chalinolobus nigrogriseus / Scotorepens greyii*				✓	✓
-	*Chalinolobus nigrogriseus / Scotorepens spp.*		✓	✓		✓
-	*Miniopterus australis / Vespadelus pumilus*				✓	
-	*M. o. oceanensis / P. adamsi*					✓
-	*Nyctophilus sp.*		✓	✓		
-	*Nyctophilus sp. / Myotis macropus*	✓	✓		✓	
-	*Ozimops lumsdenae / Taphozous troughtoni*				✓	
-	*Ozimops ridei* and *Chalinolobus nigrogriseus*			✓		
-	*Ozimops ridei / Scoteanax rueppellii*				✓	
-	*Scotorepens greyii / Scotorepens sanborni*	✓	✓	✓	✓	✓
	S. sanborni / M. o. oceanensis					✓
-	*Scotorepens orion / Scoteanax rueppellii*	✓				
-	*V. pumilus / M. australis*					✓
-	*Vespadelus troughtoni / Chalinolobus morio*		✓			
Flying-foxes						
spectacled flying-fox	*Pteropus conspicillatus*	✓				

Appendix B Fixed-point survey results

	Turbine									
SPECIES	WTG01	WTG02	WTG03	WTG04	WTG05	WTG06	WTG07	WTG08	WTG09	WTG10
Australian magpie	1	1		2	4	6	1	1		
black-faced cuckoo-shrike	1		3	1		1				
brown falcon				1						
grey fantail		1			1			1		
grey shrike-thrush								1	1	
laughing kookaburra						1			1	
leaden flycatcher									1	
noisy friarbird	1				1					
noisy miner		6		6		10	2			
pale-headed rosella	1	1	1			6	1		1	
peaceful dove	3				4	8			4	
pied currawong			1							
rainbow bee-eater									3	
rainbow lorikeet						1				
red-backed fairy-wren	6					5	1		3	
red-browed finch						3				
rufous whistler		1						3		

scaly-breasted lorikeet		4								
spotted pardalote	3			1	1					
squatter pigeon (northern subspecies)			1		2	9	2			
striated pardalote		1					1			2
Torresian crow							1			
wedge-tailed eagle										2
weebill			3		1				3	
white-bellied cuckoo-shrike					1					
white-throated honeyeater	1		1	2	2		4	2	8	
willie wagtail						1				
yellow-faced honeyeater		3	2			1			4	3
Grand Total	**17**	**18**	**12**	**13**	**17**	**52**	**13**	**8**	**29**	**7**

	Turbine									
Species	**WTG11**	**WTG12**	**WTG13**	**WTG14**	**WTG15**	**WTG16**	**WTG17**	**WTG18**	**WTG19**	**WTG20**
Australian magpie			3		2					
black-faced cuckoo-shrike					1		1			
buff-rumped thornbill	4							1		
grey fantail							1			4
laughing kookaburra		1	2	1	2					2
Lewin's honeyeater									1	1
magpie-lark								2		
noisy friarbird										2
noisy miner			1	1	1		3		3	2
pale-headed rosella	2		10				2			3
peaceful dove		4		2		3	1			
pied currawong	1									3
rainbow lorikeet							3			
red-backed fairy-wren		1	4	10	1	5	10	4	3	2
rufous whistler							1	2		
scaly-breasted lorikeet		1	2							
spotted pardalote			1		1		1			
striated pardalote	1									
varied sittella				8			6			
wedge-tailed eagle	2						2			
weebill			1	3						
white-throated honeyeater	5	2		8	2	1	3	4	5	2
white-throated treecreeper							1		1	

willie wagtail				3	4					
yellow-faced honeyeater	2			1		2	1	3		6
Grand Total	**17**	**9**	**24**	**37**	**14**	**11**	**36**	**16**	**13**	**27**

	Turbine							
Species	**WTG21**	**WTG22**	**WTG23**	**WTG24**	**WTG25**	**WTG26**	**WTG27**	**WTG28**
Australian magpie				2				1
black-faced cuckoo-shrike				3				
brown goshawk								1
brown honeyeater	1				2			
buff-rumped thornbill		5						
grey fantail	1	2			5	1		1
grey shrike-thrush								1
laughing kookaburra		2			2		7	
leaden flycatcher					1			
noisy friarbird			1		2	1	5	1
noisy miner								6
pale-headed rosella		4	1	8				4
peaceful dove		2				3	2	
pheasant coucal						1		
pied currawong					2			1
rainbow bee-eater				3				
red-backed fairy-wren		6	7		5	2		
rufous whistler				2	3	2	1	
scaly-breasted lorikeet						5		

spotted pardalote		1		2	3	1	2	2
striated pardalote	2					1		2
wedge-tailed eagle				2				
white-bellied cuckoo-shrike							1	
white-throated honeyeater	1	3	2		5	2	8	7
yellow thornbill		2						
yellow-faced honeyeater		4	1	1	1	1	4	3
Grand Total	**5**	**31**	**12**	**23**	**31**	**20**	**30**	**30**

Appendix C Bat call analysis

Microbat Call Identification Report

Prepared for ("Client"):	E2M Pty Ltd
Survey location/project name:	Kaban Wind Farm, NE Qld
Survey dates:	March-April 2023
Client project reference:	
Job no.:	E2M-2301
Report date:	24 June 2023

Methods

Data received

Balance! Environmental received 73,057 full-spectrum ultrasonic acoustic files (WAV files), recorded at 28 sites using eight Anabat Swift detectors (Titley Scientific, Brisbane). All sites were sampled for two consecutive nights with a single detector, except for WTG10, which had two detectors deployed for the same two nights.

Table 1 shows detector deployment details, including the coordinates recorded by the on-board GPS and dates of deployment at those locations, as well as the deployment details (turbine numbers, positions and survey dates) supplied by E2M when the data was submitted for analysis.

Bat-call analysis

Analyses were performed in several steps with *Anabat Insight* (Version 2.0.7; Titley Scientific).

1. All WAV files were processed with a generic noise filter to exclude files containing only non-bat noise.
2. Files that passed the filter (i.e., contained bat calls) were then processed as follows:
    a. All WAV files were processed through a Decision Tree Analysis to group and label files according to the average zero-crossing metrics of calls within each file. Separation was based primarily on the characteristic frequency (Fc) metric, but metrics such as pulse duration (Dur), slope of characteristic section (Sc) and time between pulses (TBC) were included to further refine calls recognition by the Decision Tree.
    b. Species present within each Decision Tree group were then confirmed using a combination of further species-specific metric-based filters and manual review of the call spectrograms. Due to the large number of files included in the analysis, the species confirmation process continued only until all potential constituent species within each group were identified for each site. The remaining calls in each group retained a multi-species label and appear withing the “unresolved” calls section of the results tables.
    c. For each site, at least 100 (if available) of the WAV files that passed the noise filter were reviewed to search for Ghost Bat (*Macroderma gigas*) calls in the spectrograms. The species’ calls are not often recorded and tend to be lost in the ZC conversion process. It is also difficult to detect *M. gigas* calls using the ZC-metric-based filters

Manual species confirmation was based on comparing visual properties of call spectrograms and derived metrics with those of reference calls from northern Queensland and/or with published call descriptions (e.g., Armstrong *et al.* 2021, McKenzie *et al.* 2018, Milne 2004, Reinhold et al. 2001,). The likelihood of species’ occurrence on site was confirmed by referring to published distributional information (e.g., Australasian Bat Society 2021, (Churchill 2008; Baker & Gynther 2023).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at http://www.ausbats.org.au/.

Species nomenclature follows Armstrong *et al.* (2020).

Table 1 Bat detector deployment schedule for the Kaban Wind Farm survey, March-April 2023.

Site	Detector_name	Detector_serial	Latitude	Longitude	First-night	Last-night
WTG01	E2M03	583143	-17.5486	145.3813	24-Mar	25-Mar
WTG02	E2M02	575971	-17.5500	145.3834	24-Mar	25-Mar
WTG03	E2M04	567989	-17.5519	145.3815	24-Mar	25-Mar
WTG04	E2M01	583092	-17.5545	145.3821	24-Mar	25-Mar
WTG05	E2M05	636657	-17.5591	145.3837	24-Mar	25-Mar
WTG06	E2M07	636656	-17.5587	145.3953	19-Apr	20-Apr
WTG07	E2M01	583092	-17.5614	145.3954	28-Mar	29-Mar
WTG08	E2M08	636672	-17.5635	145.3953	24-Mar	25-Mar
WTG09	E2M05	636657	-17.5652	145.3945	26-Mar	27-Mar
WTG10	E2M05	636657	-17.5689	145.3944	28-Mar	29-Mar
	E2M07	636656	-17.5691	145.3945	28-Mar	29-Mar
WTG11	E2M04	567989	-17.5710	145.3940	28-Mar	29-Mar
WTG12	E2M02	575971	-17.5570	145.4090	28-Mar	29-Mar
WTG13	E2M03	583143	-17.5600	145.4093	28-Mar	29-Mar
WTG14	E2M02	575971	-17.5637	145.4067	22-Mar	23-Mar
WTG15	E2M03	583143	-17.5659	145.4081	22-Mar	23-Mar
WTG16	E2M04	567989	-17.5697	145.4094	22-Mar	23-Mar
WTG17	E2M01	583092	-17.5710	145.4101	22-Mar	23-Mar
WTG18	E2M05	636657	-17.5736	145.4107	22-Mar	23-Mar
WTG19	E2M06	636671	-17.5757	145.4107	22-Mar	23-Mar
WTG20	E2M07	636656	-17.5775	145.4114	22-Mar	23-Mar
WTG21	E2M08	636672	-17.5796	145.4095	22-Mar	23-Mar
WTG22	E2M03	583143	-17.5822	145.4099	26-Mar	27-Mar
WTG23	E2M02	575971	-17.5845	145.4098	26-Mar	27-Mar
WTG24	E2M04	567989	-17.5859	145.4082	26-Mar	27-Mar
WTG25	E2M08	636672	-17.5858	145.4307	19-Apr	20-Apr
WTG26	E2M07	636656	-17.5879	145.4316	26-Mar	27-Mar
WTG27	E2M08	636672	-17.5904	145.4303	26-Mar	27-Mar
WTG28	E2M01	583092	-17.5925	145.4288	26-Mar	27-Mar

Results & Discussion

No bat calls were recorded at site WTG14 because the detector was running in acoustic sound recording mode, with the sample rate set to 32 kHz. All other sites had detectors set with sampling rate at 500 kHz.

The noise-filtering process excluded 59,179 WAV files from further analysis. A total of 19,533 individual bat calls were identified within the remaining 13,878 WAV files.

Some 48% (9296) of the calls were positively identified to 18 distinct taxa, including:

- *Rhinolophus megaphyllus*
- *Chalinolobus gouldii*
- *Chalinolobus nigrogriseus*
- *Nyctophilus* sp. (could be any or all of *N. bifax, N. geoffroyi, N. gouldi*)
- *Pipistrellus adamsi*
- *Scoteanax rueppellii*
- *Scotorepens greyii*
- *Vespadelus pumilus*
- *Vespadelus troughtoni*
- *Miniopterus australis*
- *Miniopterus orianae oceanensis*
- *Austronomus australis*
- *Chaerephon jobensis*
- *Ozimops lumsdenae*
- *Ozimops ridei*
- *Saccolaimus flaviventris*
- *Saccolaimus saccolaimus*
- *Taphozous troughtoni*

The other 10,237 “unresolved” calls included 10,020 that belonged to either *Chalinolobus nigrogriseus, Scotorepens greyii,* or *Scotorepens sanborni*. While the latter species was not reliably identified in the dataset, it is highly probable that many of the calls in this unresolved group belonged to *S. sanborni*. The other unresolved calls all represented species that were otherwise positively identified.

Appendix 1 lists the species detected at each survey location and the number of calls recorded from each species. Sample call sonograms for each identified species are presented in **Appendix 2**.

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Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

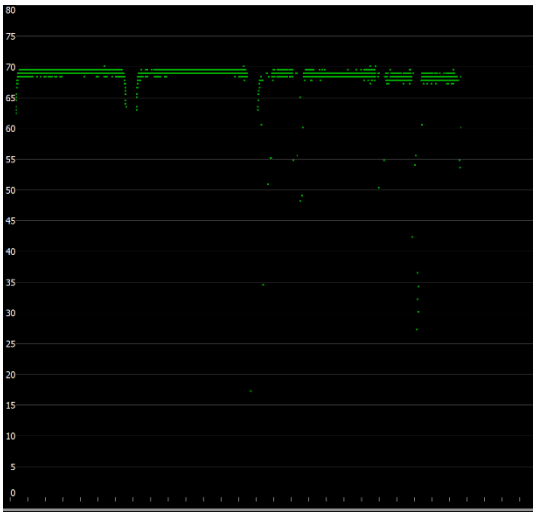
Appendix 1 Microbat species recorded during the Kaban wind farm survey, March-April 2023; Sites WTG01-WTG13. Number of calls identified per species and unresolved species group per site.

Site-code	WTG01	WTG02	WTG03	WTG04	WTG05	WTG06	WTG07	WTG08	WTG09	WTG10	WTG10	WTG11	WTG12	WTG13
Detector-no.	E2M03	E2M02	E2M04	E2M01	E2M05	E2M07	E2M01	E2M08	E2M05	E2M05	E2M07	E2M04	E2M02	E2M03
Detector-type						Omni.				Dir.	Omni.			
Positively identified calls														
Rhinolophus megaphyllus	1						8							
Chalinolobus gouldii	6	6	7	2	4	7	158	2	21	1		11	281	15
Chalinolobus nigrogriseus	17	1	7	5	2		35	16	3	2	2	13	142	33
Nyctophilus sp.	6	2	2	1	2									
Pipistrellus adamsi		1	1											
Scoteanax rueppellii	6	6	2	4	2	1	6		2	2	2		10	12
Scotorepens greyii			1	6							4			2
Vespadelus pumilus	2			1	1		1			1			1	
Vespadelus troughtoni		3			2					3	2	1		
Miniopterus australis	5	75	29	61	21	10	38	2	57	9	4	15	89	19
Miniopterus orianae oceanensis	41	83	49	53	64	32	68	8	26	14	10	47	97	46
Austronomus australis	26	56	98	41	43	50	72	10	34	40		96	243	72
Chaerephon jobensis	1					4	11			1		20	12	10
Ozimops lumsdenae												2	2	2
Ozimops ridei	4	16	3	4	31	3	65	6	3	1	1	34	612	163
Saccolaimus flaviventris				2			14	1		5	2	52	76	12
Saccolaimus saccolaimus						3							3	
Taphozous troughtoni						6								
Unresolved calls														
A. australis / C. jobensis												4	1	
C. gouldii / O. ridei	6	9	4	4	4	15	77		1			4	10	20
C. nigrogriseus / Scotorepens sp.	2	70	30	252	36	13	50	112	48	718	722	77	713	97
S. greyii / S. sanborni										10	10		1	
S. sanborni / M. o. oceanensis	1			1	2		2	2					2	
V. pumilus / M. australis		2												
M. o. oceanensis / P. adamsi	1		2	1		1		2	2			3		
Site Total	125	330	235	438	214	145	605	161	197	807	759	379	2295	503

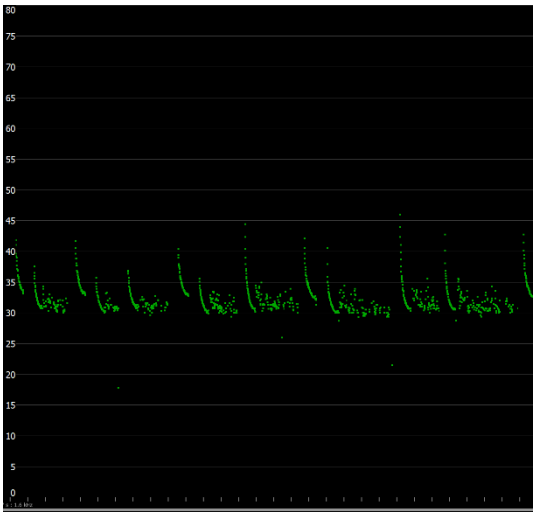
Appendix 1 Microbat species recorded during the Kaban wind farm survey, March-April 2023; Sites WTG15-WTG28
Number of calls identified per species and unresolved species group per site.

Site-code	WTG15	WTG16	WTG17	WTG18	WTG19	WTG20	WTG21	WTG22	WTG23	WTG24	WTG25	WTG26	WTG27	WTG28
Detector-no.	E2M03	E2M04	E2M01	E2M05	E2M06	E2M07	E2M08	E2M03	E2M02	E2M04	E2M08	E2M07	E2M08	E2M01
Detector-type														
Positively identified calls														
Rhinolophus megaphyllus						6	1				1			
Chalinolobus gouldii	13	1	9	4			1	6	3	1	3	8	4	2
Chalinolobus nigrogriseus	27	6	15	61	77	139	23	13	1636	5	12	4	30	6
Nyctophilus sp.	2	1	1				2		2		2		2	
Pipistrellus adamsi		2												
Scoteanax rueppellii	35	4	2			10		10	1		3	11	3	
Scotorepens greyii	30			1		33			7		2	17	1	
Vespadelus pumilus	3							1			19	5	4	
Vespadelus troughtoni											1	1		
Miniopterus australis	251	44	117	288	13	379	9	53	7	2	126	138	13	27
Miniopterus orianae oceanensis	136	25	80	30	10	17	36	43	10	5	48	16	7	11
Austronomus australis	6	18	34	14	20	1	9	32	8	13	23	1	29	73
Chaerephon jobensis											1			
Ozimops lumsdenae							1							
Ozimops ridei	29	39	10	4	10	228	16	35	282		2	11	7	12
Saccolaimus flaviventris											1			1
Saccolaimus saccolaimus											1			
Taphozous troughtoni														
Unresolved calls														
A. australis / C. jobensis														
C. gouldii / O. ridei	4		6	3			1		1					
C. nigrogriseus / Scotorepens sp.	852	88	55	161	390	2688	38	81	1952	32	222	426	18	10
S. greyii / S. sanborni	4	1				27			9		4	1		
S. sanborni / M. o. oceanensis														
V. pumilus / M. australis						2					2	1		
M. o. oceanensis / P. adamsi			1			5		5				2		1
Site Total	1392	229	330	566	520	3535	137	279	3918	58	473	642	118	143

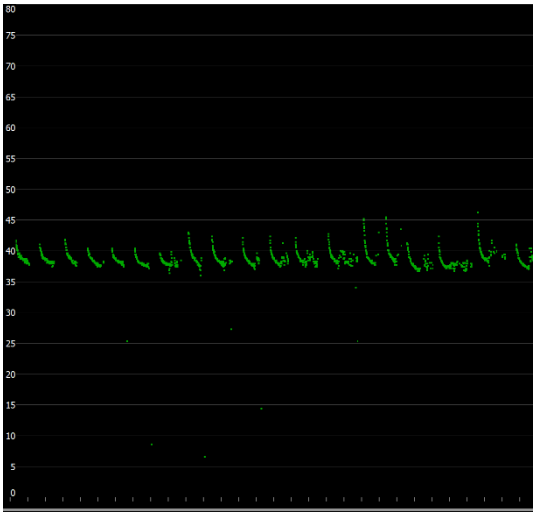
Appendix 2 Representative call sequences from the Kaban wind farm survey, March-April 2023.
x-axis = 10 ms per tick-mark; time between pulses removed ("compressed")



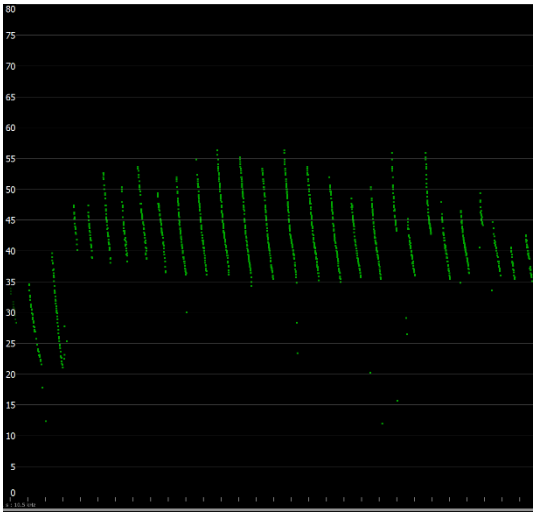
Rhinolophus megaphyllus



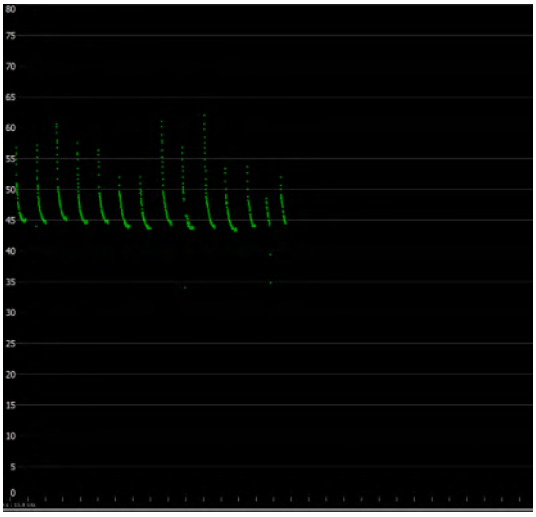
Chalinolobus gouldii



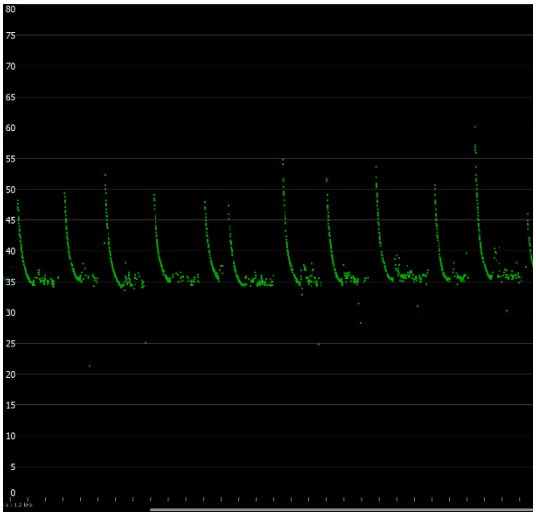
Chalinolobus nigrogriseus



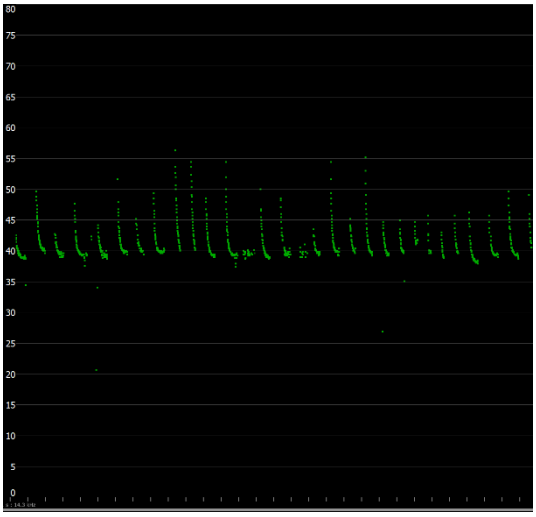
Nyctophilus sp.



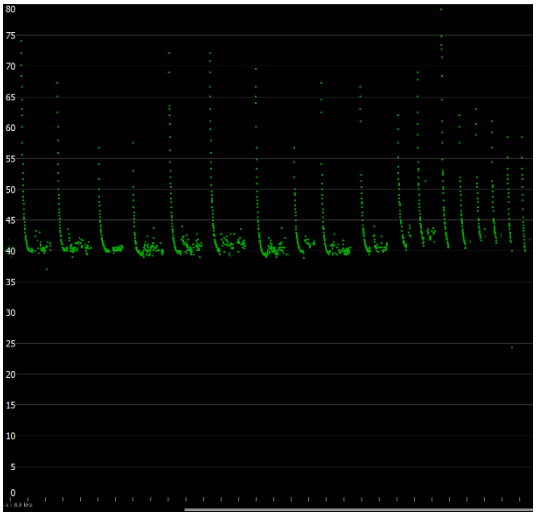
Pipistrellus adamsi



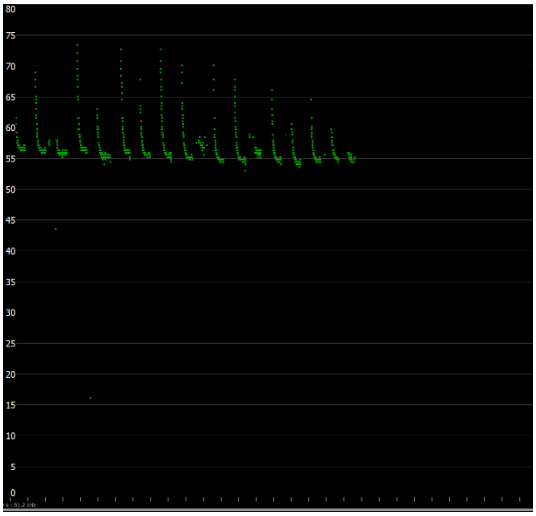
Scoteanax rueppellii



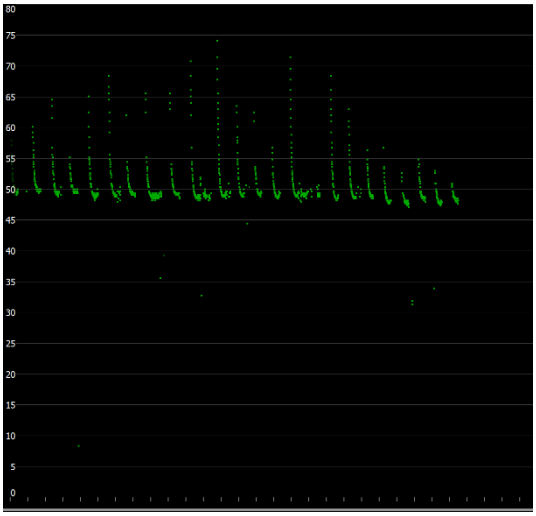
Scotorepens greyii



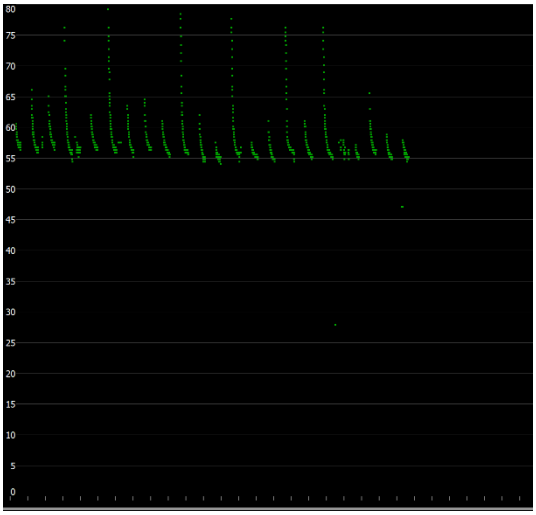
Probably *Scotorepens sanborni*



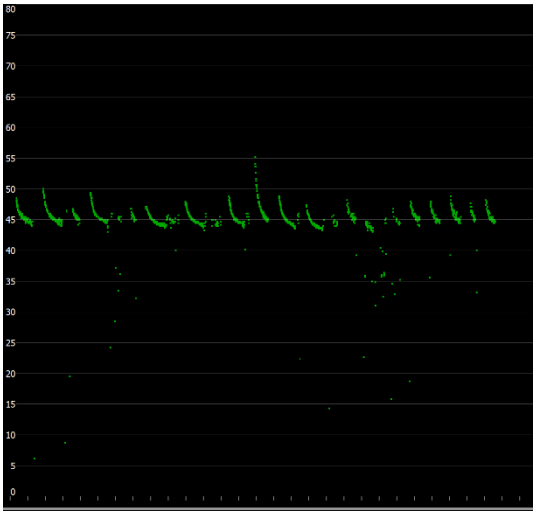
Vespadelus pumilus



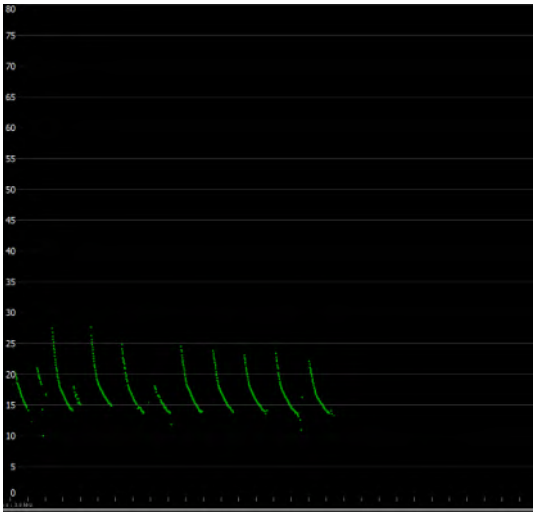
Vespadelus troughtoni



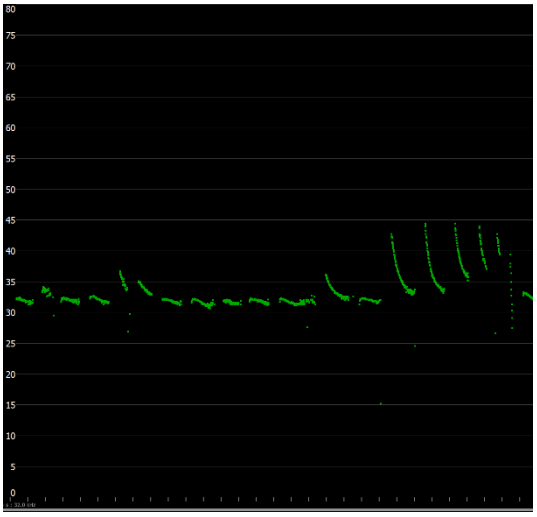
Miniopterus australis



Miniopterus orianae oceanensis

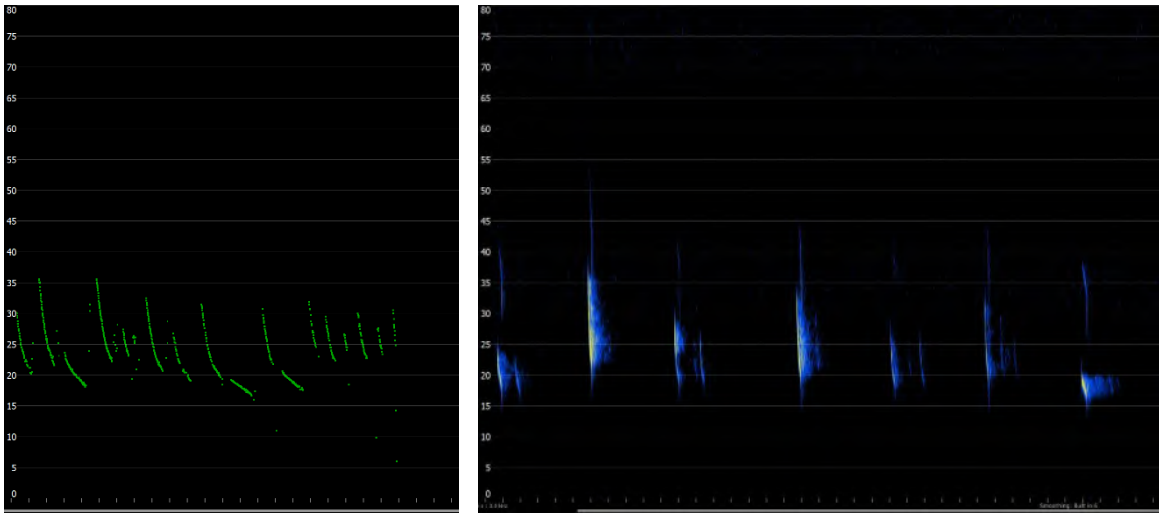


Austronomus australis

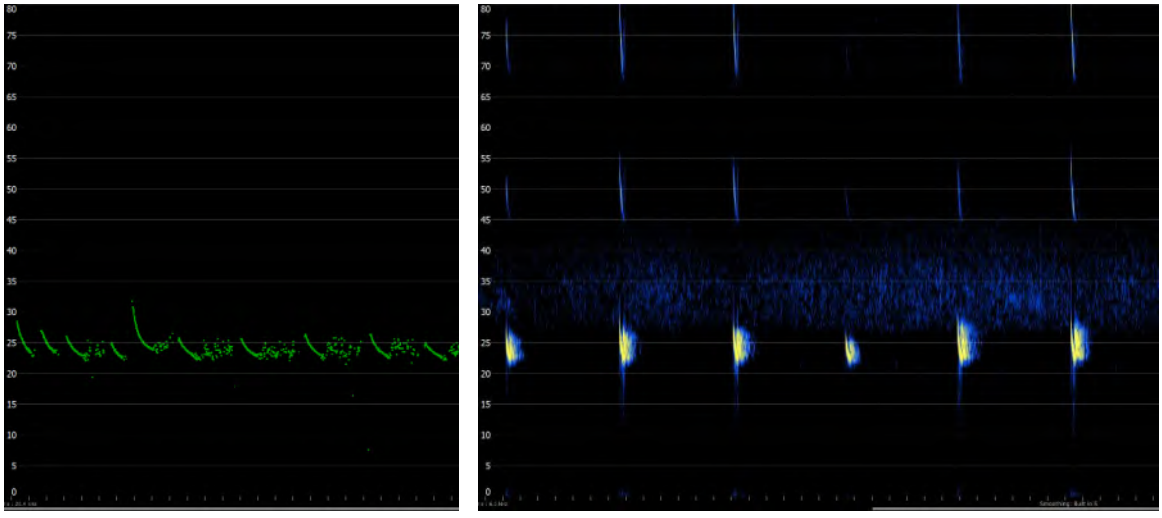


Ozimops ridei

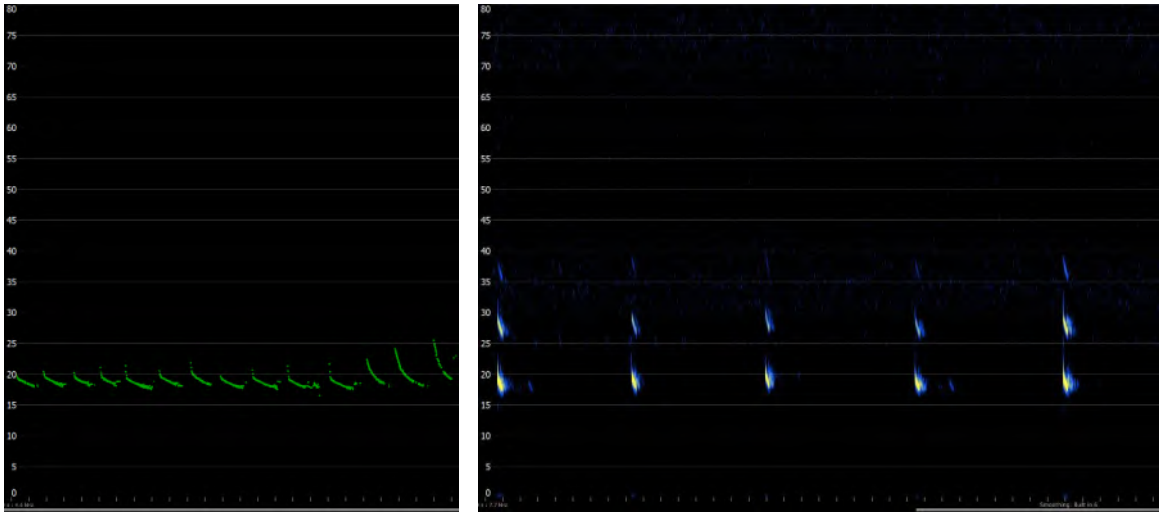
The following species have overlapping call frequencies so both zero-crossing sonograms and spectrograms are presented to demonstrate diagnostic differences between species. Spectrograms have time-scale of 50ms per tick-mark, with time between pulses not compressed. ZC sonograms are 10ms per tick-mark with time between pulses compressed.



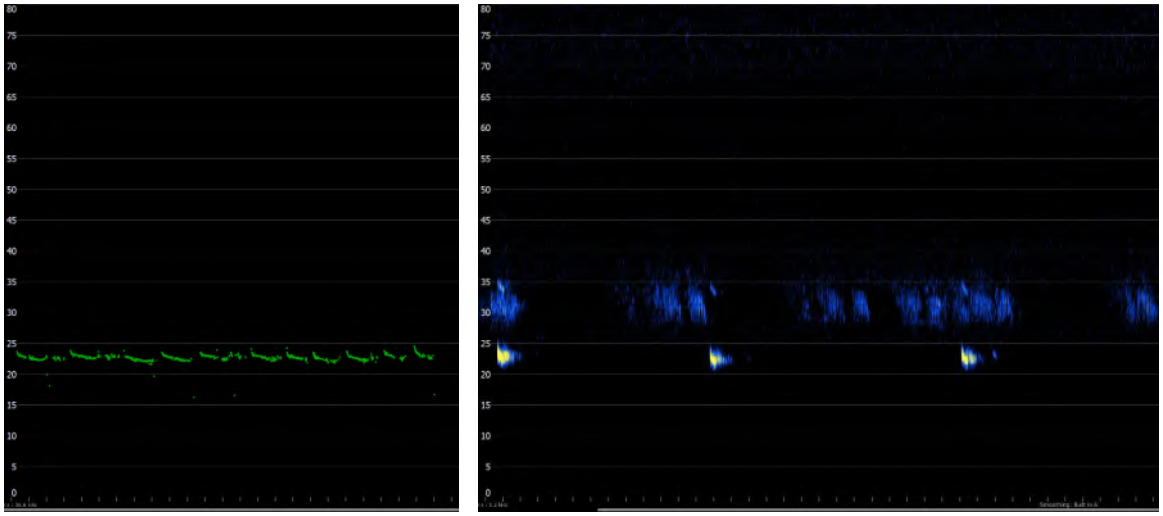
Chaerephon jobensis



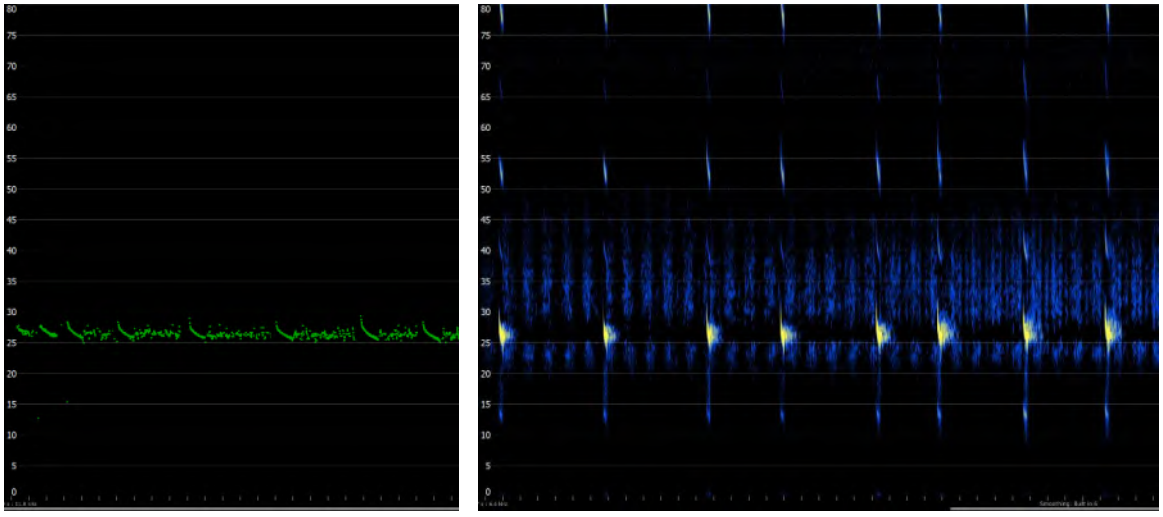
Ozimops lumsdenae



Saccolaimus flaviventris



Saccolaimus saccolaimus



Taphozous troughtoni

Appendix D Migratory species predicted time of occurrence within Site

Species	Wet Season						Dry Season					
	November	December	January	February	March	April	May	June	July	August	September	October
Fork-tailed swift (*Apus pacificus*)												
Latham's snipe (*Gallinago hardwickii*)												
oriental cuckoo (*Cuculus optatus*)												
rufous fantail (*Rhipidura rufifrons*)												
satin flycatcher (*Myiagra cyanoleuca*)												
white-throated needletail (*Hirundapus caudacutus*)												

= Optimum survey timing

Data Sources:

- Species Profile and Threats Database (DAWE 2020)
- The Field Guide to the Birds of Australia (Pizzey & Knight 2007)
- Handbook of Australian, New Zealand and Antarctic Birds (Higgins 1999)

Appendix 4 Photographs

Topsoil re-instated after cable trenching along roadside. Rehabilitation underway as indicated by new grass shoots.

Rock-filled roadside drainage and large rock filled sediment traps

Rock-filled roadside drainage and huge sediment traps and level spreader to improve water discharge to magnificent brood frog habitat.

Appendix 5 Annual Relative Abundance Reports for Greater Gliders and Magnificent Brood Frogs

Magnificent Brood Frog - Third Annual Abundance Monitoring Report

January 2023

Neoen Australia Pty Ltd
227 Elizabeth Street, Sydney, NSW 2000

Document Management

Rev.	Issue Date	Description	Author (s)	Approved	Signature
A	3/02/2023	Issued for review	Jessica Hogg	Dean Jones	

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Definitions

Term	Definitions
Disturbance footprint	The area approved to be impacted by the Project.
Disturbance intercept	The point where the disturbance area intercepts the undisturbed magnificent brood frog creekline.
Hydrocarbons	An organic compound
Habitat	MBF habitat is characterised as low stream order drainage lines.
Monitoring site / transects	Eleven survey sites, each consisting of a 200m transect, were established for ongoing monitoring.
Sedimentation	The deposition of accumulation of sediment in a body of water.
The Project	Kaban Green Power Hub
The Project Site	The KGPH is located within 1,347 ha of freehold land composed of five lots (collectively referred to as 'the Project Site').
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered €, vulnerable (V) or conservation dependent (CD) under the *Environmental Protection and Biodiversity Conservation Act 1999* or extinct in the wild (PE), Endangered, Vulnerable or Near Threatened (EVNT) under the *Nature Conservation Act 1992*.

Abbreviations

Abbreviation	Description
DAWE	Department of Agriculture, Water and the Environment
DNRME	Department of Natural Resources, Mines and Energy
E2M	E2M Pty Ltd
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FMP	Fauna Management Plan
KGPH	KGPH
MBF	Magnificent Brood Frog
MKA	Minimum Known Alive
NATA	National Association Testing Authorities
Neoen	Neoen Australia Pty Ltd
NEPM	*National Environmental Protection (Assessment of Site Contamination) Measure 1999*
PMP	Photo Monitoring Point

1 Introduction

1.1 Project overview

Neoen Australia Pty Ltd (Neoen) are constructing the Kaban Green Power Hub (KGPH) located approximately 6 km north of Ravenshoe in the Atherton Tablelands, see Figure 1 (also referred to as 'the Project'). The Project was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in 2018 based on a suite of technical reports and later supplemented by a series of environmental management plans before receiving approval by the Department of Agriculture, Water and the Environment (DAWE) in April 2020 (EPBC Number 2018/8289). Variation to the conditions was approved by DAWE in August 2020.

The Project approval (EPBC 2018/8289) was contingent upon the implementation of a *Fauna Management Plan* (FMP) (Part A, Condition 2). The FMP (E2M, 2021a) prescribes a Magnificent Brood Frog (MBF) Monitoring Program which includes the requirement to complete annual monitoring throughout construction. A baseline MBF survey was completed by E2M Pty Ltd (E2M) during the wet season (1-7 February 2021) prior to construction (E2M, 2021b) and a second annual monitoring survey was completed from 10 to 16 January 2022 (E2M, 2022). This report comprises the third annual monitoring survey completed from 17 to 26 January 2023.

Supporting documents: During the January 2023 survey period, assessments were also completed for magnificent brood frog (MBF) monthly microhabitat and disturbance intercept monitoring. The details of these surveys can be found respectively in the: Magnificent Brood Frog - Monthly Disturbance Intercept Photo Monitoring Report – January 2023 (E2M 2023a) and the Magnificent Brood Frog Monthly Microhabitat Monitoring Report—January 2023 (E2M 2023b).

1.2 Scope and objectives

E2M was commissioned by Neoen to conduct the annual MBF monitoring survey in accordance with the FMP and the *Revised Magnificent Brood Frog Monitoring Program – Construction Phase only* (E2M, 2021). The objective of the monitoring survey is to monitor the quality of MBF habitat and response of the population to the potential impacts from KGPH construction activities. To achieve the objective, the scope of works for the third annual monitoring survey involved:

1. MBF target surveys
2. microhabitat assessment, specifically for the presence of:
    a. sedimentation
    b. hydrocarbons
3. disturbance footprint photo monitoring.

This document will report on the assessment of Item 1, while Items 2a, 2b and 3 are evaluated in separate reports. In the second annual report pH testing was include in the scope of work for the survey, however, this has since been removed after a trial period assessing the validity and relevance of the results obtained in reference to MBF presence.

The annual monitoring survey dataset, along with the baseline monitoring dataset, will be used to study the impact of the Project on the MBF population as well as guide the effectiveness of the applied mitigation and management measures detailed in the FMP.

1.3 Project site description

The KGPH is located within 1,347 ha of freehold land composed of five lots[1] (collectively referred to as 'the Project Site'). The disturbance footprint within the Project Site is 129 ha and largely characterised by remnant eucalypt woodland on basalt and granite rocky outcrops, hills and gullies. The vegetation and landscape support a range of different habitat types for an assemblage of flora and fauna species. Prior to the commencement of construction, vegetation was largely contiguous throughout the Project Site and cleared only for access tracks, a residential dwelling and a small timber mill. Historically, the Project site supported a sizeable military presence including a camp and a weapons training area. Most recently, the main land use was low-density livestock grazing in localised areas.

The Project Site contains many small order Department of Natural Resources, Mines and Energy (DNRME) mapped drainages (Stream Order 1 and 2), many of which support MBF habitat. This habitat comprises particularly the slow-flowing drainage lines within open eucalypt woodland with native grass, particularly *Themeda triandra*, in the ground layer.

The Project Site shares property boundaries with a number of protected areas, including Ravenshoe State Forest 3, see Figure 1.

[1] Lot 1 on RP734194, Lot 2 on RP735194, Lot 33 on CWL374, Lot 35 on CWL391, Lot 34 on CWL374 and a section of location road reserves

FIGURE 1 REMOVED. CONTAINS
SENSITIVE ECOLOGICAL RECORDS

2 Methods

2.1 Survey timing and conditions

The third annual MBF monitoring survey was conducted during the wet season (17-26 January 2023) by two fauna ecologists. The weather conditions during the ten-day period were suitable for amphibian survey. Night-time temperatures, during survey, ranged between 18˚C and 22˚C, humidity was high (78-97%) and wind was light (Ravenshoe Station (IRAVEN61)) (Weather Underground, 2023a). There were rainfall events on the first two days of the survey (January 17 and 18) equating to a total of 101.09 mm (Tumoulin Station (ITUMOU1)) (Weather Underground, 2023b) at the impact sites and on-site controls, and 51.82 mm (Ravenshoe Station (IRAVEN61)) (Weather Underground, 2023a) at the off-site controls.

In addition, the region had received significant rainfall over the preceding month. The late December/early January rain events (two weeks prior to the start of the survey) yielded approximately 398 mm of rainfall at the Kaban Wind Farm (Tumoulin Station (ITUMOU1)) (Weather Underground, 2023b), which surpasses the survey guidelines prescribed in the *Revised Magnificent Brood Frog Monitoring Program – Construction Phase only* (i.e. minimum of 100 mm over a five day period, or when rainfall events offer favourable breeding conditions or are likely to trigger calling by the MBF).

2.2 Monitoring sites

The third annual MBF monitoring survey was conducted in accordance with the methods prescribed in the FMP and *Revised Magnificent Brood Frog Monitoring Program – Construction Phase only* (E2M, 2021a; E2M, 2021).

The microhabitat assessment (E2M 2023a) and the MBF target survey were conducted at all eleven monitoring sites, and the disturbance intercept photo monitoring survey (E2M 2023b) was conducted only at the five impact sites. The abundance monitoring transects are approximately 200 m long (± 5 m) and follow the contours of drainage lines confirmed to support MBF breeding habitat. The exception to this is Off-site Control 2 which had been shorten to 135 m due to a lack of suitable habitat further downstream. The MBF monitoring site locations were those surveyed in the second annual monitoring survey in January 2022.

The MBF annual monitoring sites are located within three treatment areas:

- Impact sites – five (5) survey sites located directly adjacent (<10 m) or intercepted by the disturbance footprint in areas of MBF habitat where the species is known to occur. These sites will determine whether indirect impacts associated with the project are impacting the abundance of MBF within the site.
- On-site control sites – three (3) survey sites located within the proposed offset areas (minimum of 100 m from disturbance) in MBF habitat where the species is known or likely to occur. These sites will act as an on-site control as they are unlikely to be impacted by project related impacts and therefore changes may indicate the presence of non-project related factors (eg. climate variation).
- Off-site control sites – three (3) survey sites located within nearby National Parks and State Forests in suitable MBF habitat where the species is known to occur and anthropogenic impacts are minimal. These sites will act as an additional level of control and assist in determining if changes in MBF abundance at the impact sites are caused by project related impacts or due to non-project related factors (eg. climatic variation).

The location of the eleven MBF monitoring sites are shown in **Error! Reference source not found.**.

2.3 Trigger Analysis

Pursuant to the FMP and the Revised Magnificent Brood Frog Monitoring program the annual abundance estimates are assessed against the following triggers:

1. a 30% reduction in the average relative abundance of magnificent brood frogs across all impact sites between two consecutive monitoring events (i.e., over a one-year period), with no comparable reduction in brood frog abundance at control sites over the same period; and/or
2. a 50% reduction in the relative abundance of magnificent brood frogs at an individual impact site between two consecutive monitoring events (i.e., over a one-year period), with no comparable reduction in brood frog abundance at control sites over the same period; and/or
3. a continued 10% reduction (10% per year over five years) in the relative abundance of magnificent brood frogs across all impact sites, with no comparable reduction in brood frog abundance at control sites over the same period.

2.4 MBF target survey method

In accordance with the survey guidelines prescribed in the SPRAT Database (DEE, 2019) and the FMP (E2M, 2021a), nocturnal acoustic surveys were conducted along each of the eleven transects. The transects were slowly walked, avoiding the leaf litter / grass along the banks, while following the contours of the drainage line. Individual MBFs were recorded at the origin of their call. The location of individual was marked with a fluorescent flag, placed loosely in the grass near to each MBF to help with the accuracy of counting, see Plate 1.

One MBF acoustically detected on two transects were also visually recorded to inspect for the presence of egg clutches. Care was given to minimise the effects of encroachment on breeding habitat.

Each monitoring site was surveyed twice, comprising separate nights from two of the three survey periods of approximately 7:00 pm, 8:15 pm, and 9:30 pm. This ensured that temporal bias and variability in conditions, such as change in temperature, were accounted for.

Plate 1. Fluorescent flags placed near to each MBF location.

2.5 Microhabitat assessment method

In accordance with the prescribed method in the FMP and *Revised Magnificent Brood Frog Monitoring Program – Construction Phase only* (E2M, 2021a; E2M, 2021) a minimum of two Photo Monitoring Points (PMPs) were surveyed at each of the eleven monitoring sites. The microhabitat photo monitoring is repeated monthly during the wet season and results presented in a series of *Magnificent Brood Frog Monthly Microhabitat Monitoring Reports* (see E2M 2023b) for current report).

2.6 Disturbance footprint photo monitoring method

Photo monitoring points were established at each of the five (5) impact sites at the point where civil earthworks (disturbance) intercept the drainage line. The disturbance footprint intercept photo monitoring is repeated monthly during the wet season and results presented in a series of *Magnificent Brood Frog Monthly Disturbance Intercept Photo Monitoring Reports* (see E2M Pty Ltd, 2023a for current report).

FIGURE 2 REMOVED. CONTAINS
SENSITIVE ECOLOGICAL RECORDS

3 Results

MBF were recorded along each transect at the eleven monitoring sites for both nights surveyed. A minimum total of 284 MBF (sum of the minimum number of individuals known alive across all sites) were detected. The minimum known alive (MKA) for each site and relative abundance, expressed as number of MBF per 10m, are detailed in Table 1

There was significant variability in the number of MBF recorded for some of the monitoring sites across the two survey nights, see Table 1. The biggest difference was at Off-site Control 3, where sixty-three MBF were observed on the first night then 41 on the second night.

The individual records for the minimum number known alive, at each monitoring site, can be viewed in Figure 2.

There was a slight increase in the average relative abundance of MBF in the 2023 survey compared to the 2022 survey at impact sites and on-site control sites while there was a decrease at off-site control sites (Figure 3). The increase was greatest at the impact sites and only marginal at the on-site control sites (Figure 3).

3.1 Trigger Assessment

Trigger values were calculated as per section 2.3 Trigger Analysis. Table 1, identifies that there were no triggers within the individual impact sites. While Impact Site 5 had a significant reduction in numbers, On-site Control 3 had similar a fall in relative abundance, with respective falls of 44.1 and 40.3 percent. Offsite Control 2 also had a marked reduction in numbers, falling more than 50 percent.

When comparing the average relative abundance of the different groupings for consecutive years, Table 3, there were no groups having greater than a 30 percent reduction in MBF relative abundance.

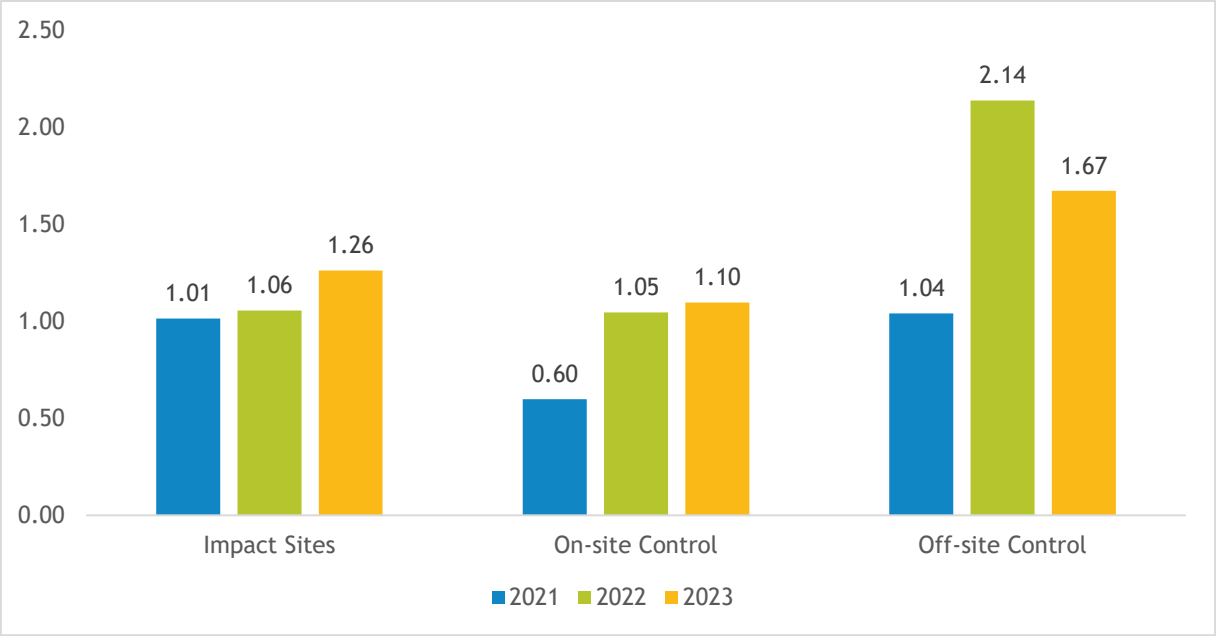

Figure 3: Comparison of average relative abundance (MBF/10 m) between the 2021, 2022 and 2023 surveys

Table 1: Relative abundance and minimum known alive of MBF recorded in the 2023 survey compared to the 2022 and 2021 surveys.

Monitoring site	2023 MBF records			Transect length (m)	Relative abundance (MBF/10m)*			Minimum number MBF		
	Night 1	Night 2	Average		2021	2022#	2023#	2021	2022#	2023#
Impact Site 1	30	13	21.5	207	0.53	1.21	1.45	11	25	30
Impact Site 2	23	31	27.0	200	1.10	0.95	1.55	22	19	31
Impact Site 3	15	33	24.0	204	1.42	1.91	1.62	29	39	33
Impact Site 4	19	24	21.5	202	n/a	0.30	1.19	n/a	6	24
Impact Site 5	8	10	9.0	201	n/a	0.89	0.50	n/a	18	10
On-site Control 1	3	6	4.5	200	0.10	0.20	0.30	2	4	6
On-site Control 2	33	48	40.5	203	0.93	1.92	2.36	19	39	48
On-site Control 3	12	11	11.5	199	0.75	1.01	0.60	15	20	12
Off-site Control 1	16	17	16.5	200	0.40	1.45	0.85	8	29	17
Off-site Control 2	10	7	8.5	136	0.96	1.54	0.74	13	21	10
Off-site Control 3	63	41	52.0	202	1.73	3.22	3.12	35	65	63

* Relative abundance (MBF/10m) calculated by taking the minimum number of MBF individuals known to be present at a monitoring site and dividing it by the length of the transect, then multiplied by 10 m.

Green text indicates an increase from the previous year, amber is decrease but within acceptable levels and red text indicates a decrease from the previous year and trigger event.

Sites	2022 - Relative Abundance (/10m)	2023 - Relative Abundance (/10m)	Trigger %	Calculated Difference (%)
Impact Site 1	1.21	1.45	-50	19.8
Impact Site 2	0.95	1.55	-50	63.2
Impact Site 3	1.91	1.62	-50	-15.3
Impact Site 4	0.3	1.19	-50	296.0
Impact Site 5	0.89	0.50	-50	-44.1
Onsite Control 1	0.2	0.30	-50	50.0
Onsite Control 2	1.92	2.36	-50	23.2
Onsite Control 3	1.01	0.60	-50	-40.3
Offsite Control 1	1.45	0.85	-50	-41.4
Offsite Control 2	1.54	0.74	-50	-52.3
Offsite Control 3	3.22	3.12	-50	-3.1

Table 2: Trigger analysis comparing the relative abundance from 2022 to 2023 for each site. A trigger is identified if the relative abundance between consecutive annual monitoring events is reduced by more than 50%. Triggers are highlighted red.

Site groupings	2022 - Average Relative Abundance (/10m)	2023 - Average Relative Abundance (/10m)	Trigger %	Calculated Difference (%)
Impact Sites	1.06	1.26	-30	19.6
Onsite Control	1.05	1.10	-30	4.8
Offsite Control	2.14	1.67	-30	-21.7
All Controls	1.56	1.37	-30	-12.4

Table 3: Trigger analysis comparing the relative abundance from 2022 to 2023 for each grouping. A trigger is identified if the average relative abundance between consecutive annual monitoring events is reduced by more than 30%.

3.2 Evidence of breeding

In addition to the adult MBF that were detected, an egg clutch was recorded at Impact Site 1. This clutch was located underneath grasses on the bank of the watercourse and comprised of at least 15 eggs, see Plate 2. This was just an incidental observation during a confirmation search to an MBF call. No structured effort is made, nor necessary, to identify oviposition sites or breeding success. Tadpoles were observed at three monitoring sites comprising Impact Site 1 and Off-site Control 2 and 3, however, the species was not identified. Two frogs were observed in open space, see Plate 3. This is an unusual occurrence; however it did occur at each site impacted by fire. There was no evidence of breeding for those individuals found without grass cover.

Plate 2: MBF egg clutch at Impact Site 1

Plate 3: MBF observed with no vegetation cover.

3.3 Cane toads

Cane toads were observed at seven of the survey sites, excluding only Impact Site 5, On-site Control 1 and 2 and Off-site Control 1.

Table 4: Comparison of minimum number of cane toads observed from the 2022 and 2023 surveys

Monitoring site	Minimum number of cane toads	
	2022	2023
Impact Site 1	2	1
Impact Site 2	1	1
Impact Site 3	1	1
Impact Site 4	0	1
Impact Site 5	2	0
On-site Control 1	2	0
On-site Control 2	0	0
On-site Control 3	2	2
Off-site Control 1	2	0
Off-site Control 2	2	2
Off-site Control 3	3	3

4 Discussion

Other reports supporting the third annual Magnificent Brood Frog Monitoring Program are:

1. *Magnificent Brood Frog Monthly Microhabitat Monitoring Report – January 2023* (E2M Pty Ltd, 2023b)
2. *Magnificent Brood Frog Monthly Disturbance Intercept Photo Monitoring - January 2023* (E2M Pty Ltd, 2023a)

The third annual monitoring survey of the Magnificent Brood Frog Monitoring Program was completed from 17 to 26 January 2023. There was a period of significant rainfall in the preceding month (Weather Underground, 2023b) and weather conditions during the survey period were suitable for amphibian surveys.

The MBF target survey recorded a minimum total of 284 MBF across the eleven monitoring sites (Table 1), as well as one egg clutch found at Impact Site 1 (Plate 2). At most monitoring sites, there was an increase in relative abundance compared to the 2022 survey, with the greatest increase at the on-site control sites and only a marginal increase at the impact sites (Figure 3). There was a decrease in relative abundance at Impact Site 3 of 15% and at Impact Site 5 of 44%, neither of which meet the impact triggers prescribed within the FMP.

While there was a significant decrease in relative abundance at Impact Site 5 there was a comparative decrease at On-site Control 1. Both these sites were significantly impacted by an uncontrolled bushfire during November 2022. The fire burnt to the very banks of each creekline removing a large percentage of the riparian zone ground cover. Those MBF recorded this year, were mostly found within clumps of grass that were not impacted by fire. There appears to be a very strong correlation to the presence of fire and absence of magnificent brood frog.

Offsite Controls 1 and 2, also had respective falls in relative abundance of 41 and 52 percent. It is unclear why numbers were lower, but the likely cause was the lower amount of rainfall and subsequently less water flows and pooling within these systems. Rainfall near the offsite controls was recorded as 77 mm and the Kaban Wind Farm recorded 266 mm in the week prior to surveys.

Cane toad abundance remains relatively low for all sites, however detection of these pests is difficult due to the thick grasses typical of MBF habitat. While current detection methods do not allow for accurate abundance estimates they will provide some measure of cane toad population dynamics over the long term.

5 Conclusion

After comparing the magnificent brood frog relative abundance results over the last three years, there is little evidence suggesting that the wind farm construction activities are negatively impacting the MBF populations. At most sites, including the impact sites, population relative abundance has increased from the 2022 survey through to the 2023 survey. None of the triggers, detailed within the Revised Magnificent Brood Frog Monitoring program (E2M 2021) were exceeded at any of the impact sites.

Any potential impacts to MBF populations will continue to be closely monitored through the monthly monitoring during the wet season, including:

- Microhabitat Photo Monitoring; and
- Disturbance Intercept Monitoring.

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Greater Glider Monitoring Program – 2022 Second Annual Survey

2 December 2022

Neoen Australia Pty Ltd
Level 10, 227 Elizabeth Street Sydney NSW 2000

Document Management

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Definitions

Term	Definition
Approval Conditions	The conditions pursuant to the EPBC Act Approval (EPBC2018/8289).
Habitat	Greater glider habitat is characterised by connected eucalypt forests and woodlands containing large trees >30cm, for foraging and >50cm diameter at breast height (dbh) for denning. Contains known feed-trees such as *E. portuensis, E. teriticornistereticornis, C. citriodora, C. intermedia, E. crebra* and *E. moluccana*.
The Project	The construction of the Kaban Green Power Hub.
The Kaban site	The areas of Lot 1 on RP735194, Lot 33 on CWL374, Lot 35 on CWL391, Lot 2 on RP735194 and Lot 34 on CWL374 which contain proposed turbines.
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered I, vulnerable (V) or conservation dependent (CD) under the *Environmental Protection and Biodiversity Conservation Act 1999* or extinct in the wild (PE), Endangered, Vulnerable or Near Threatened (EVNT) under the *Nature Conservation Act 1992*.

Abbreviations

Abbreviation	Description
DAWE	Department of Agriculture, Water, and the Environment
E2M	E2M Pty Ltd
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ha	Hectare
KGPH	Kaban Green Power Hub
Neoen	Neoen Australia Pty Ltd
RE	Regional Ecosystem

1 Introduction

1.1 Project Overview

The Kaban Green Power Hub (KGPH), developed by Neoen Australia Pty Ltd (Neoen), received *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval in April 2020 (EPBC 2018/8289). The KGPH (also referred to as 'the Project') is a wind farm towards the end of construction, consisting of 28 turbines as well as ancillary infrastructure including a substation, temporary and permanent meteorology masts, compounds/facilities, laydown areas, access tracks and underground cabling (Figure 1). It is anticipated that the wind farm is fully operational by early 2023.

The Project has been designed to avoid and mitigate impacts on Matters of National Environmental Significant (MNES), however, the KGPH will have a significant residual impact on 61.2 ha of greater glider (*Petauroides volans*) habitat (E2M, 2019). In accordance with the EPBC Act Environmental Offsets Policy (EOP) and the Commonwealth Department of Agriculture, Water and the Environment (DAWE) Approval Conditions, compensatory offsets are required.

A suitable Offset Area encompassing approximately 307.6 ha of greater glider habitat was identified adjacent to, but outside of, the Project disturbance footprint (Figure 2). The habitat will be managed according with the recommendations detailed in the Offset Area Management Plan (OAMP) (E2M Pty Ltd, 2021) to achieve a conservation gain for greater glider and compliance with the Approval Conditions (E2M Pty Ltd, 2021).

To monitor and guide the effectiveness of the OAMP over time, greater glider monitoring surveys are conducted within the Offset Area annually for the first five years and then once every five years thereafter for the life of the offset.

1.2 Scope and Objectives

E2M was commissioned by Neoen to conduct the second annual survey for the Greater Glider Monitoring Program within the Offset Area. The objective of the survey is to monitor for the continued presence of the greater glider over time. The scope of the survey includes:

- targeted greater glider surveys within three established transects within the Offset Area in accordance with Commonwealth and State survey methodology; and

The baseline dataset, and the dataset of future monitoring surveys, will be used to guide the effectiveness of the OAMP and ensure ongoing compliance with the Approval Conditions.

1.3 Site Description

Seven disjunct areas within three contiguous properties collectively form the Offset Area (Figure 2).

The three properties (formally 1RP735194, 2RP735194 and 32CWL254) are largely characterised by remnant vegetation composed of mixed eucalypt woodlands on metamorphic rock. Properties 1RP735194 and 2RP735194 are both bound by Bluff State Forest to the south and west, with rural properties to the north and east (Figure 2).

Property 32CWL254 is bound by Ravenshoe State Forest to the east and rural properties to the north, south and west (Figure 2). This property also contains an active mango orchard in the north-east corner.

1.4 Improvements to Offset Areas

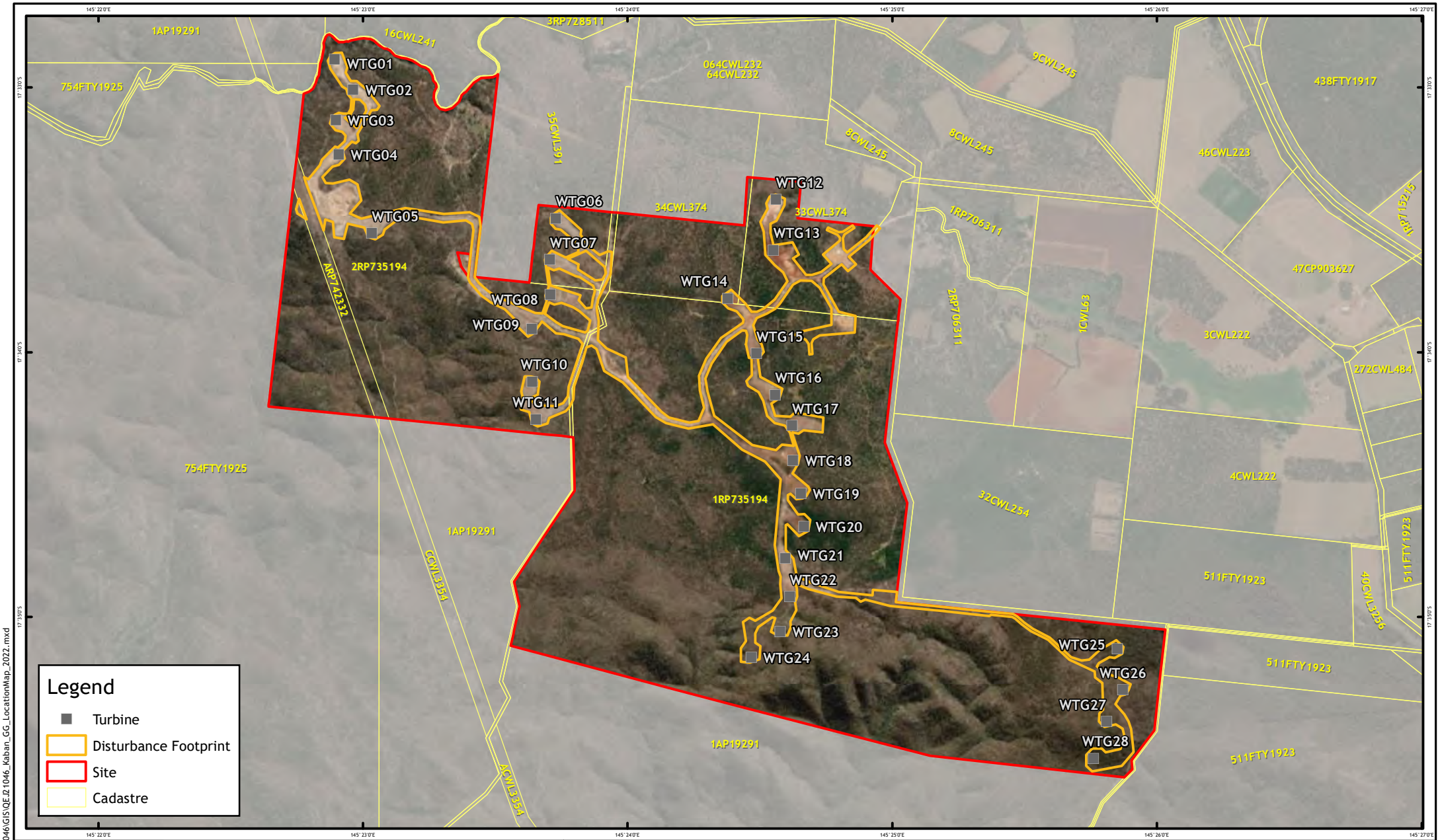
During the first year of offset establishment, several important steps to improve greater glider habitat, within and adjacent to offset areas, have been conducted. These are:

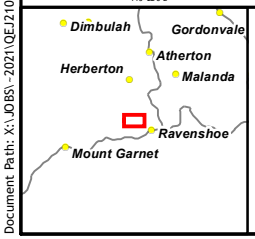
- Removal of cattle from all offset areas
- Commencement of active weed treatment program
- Replacing the top barbed wire with barbless wire for all internal fences and most[1] boundary fences,
- Development of a project Fire Management Plan to ensure timely ecological burns are conducted; and
- Commencement of controlled ecological burns in offset areas

1.5 Survey Limitations

The Kaban Green Power Hub project is currently under construction and principal contractor site safety management plans do not permit personnel to work outside the construction disturbance footprint or away from any pre-existing disturbance areas due to the risk of potential unexploded ordinance. Therefore, all survey effort was conducted from pre-existing tracks.

[1] Permission to replace, barbed with barbless, wire for some boundary fences was not granted by adjoining cattle graziers. In these circumstances, un-energised electric fence tape was stapled to the top strand to improve fenceline visibility to fauna moving throughout the landscape.





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Notes:
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FIGURE 1: PROJECT LOCATION

2022 GREATER GLIDER SURVEY REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
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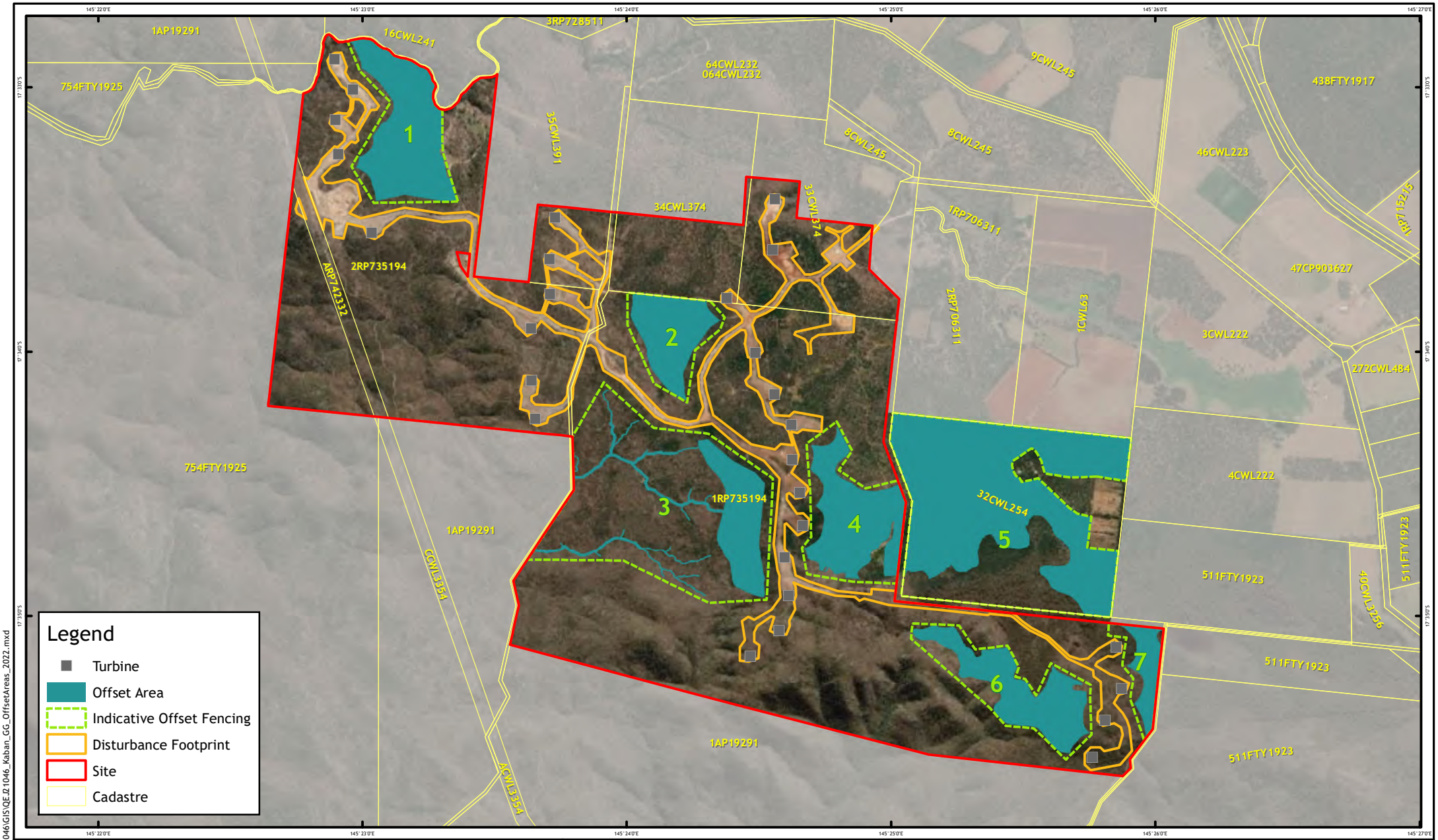

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FIGURE 2: OFFSET AREA LOCATIONS

2022 GREATER GLIDER SURVEY REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
1 of 1	QEJ21046	0

2 Methods

2.1 Survey Methodology

2.1.1 Targeted greater glider survey

Spotlight surveys are a standard method used to survey nocturnal arboreal fauna, including greater gliders (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2011).

In accordance with the methods prescribed by the approved OAMP (E2M Pty Ltd, 2021), three 500 m spotlighting transects were established within the Offset Area (Figure 3). These transects are 'permanent transects' to be surveyed at each annual monitoring event.

Three permanent survey transects were established based on the:

- results of previous Offset Area survey
- habitat suitability and representation of Offset Areas
- spatial positioning (i.e. spread across the different Offset Areas)
- permanent access tracks with around the year access
- sites that have been examined for unexploded ordinance

Each permanent transect was surveyed over three consecutive nights on the 15th and 17th of November commencing thirty minutes after sunset. Each transect was surveyed for a minimum of 60 person minutes. Incidental greater glider observations were also made off transect within the Offset Area.

2.1.2 Habitat assessment

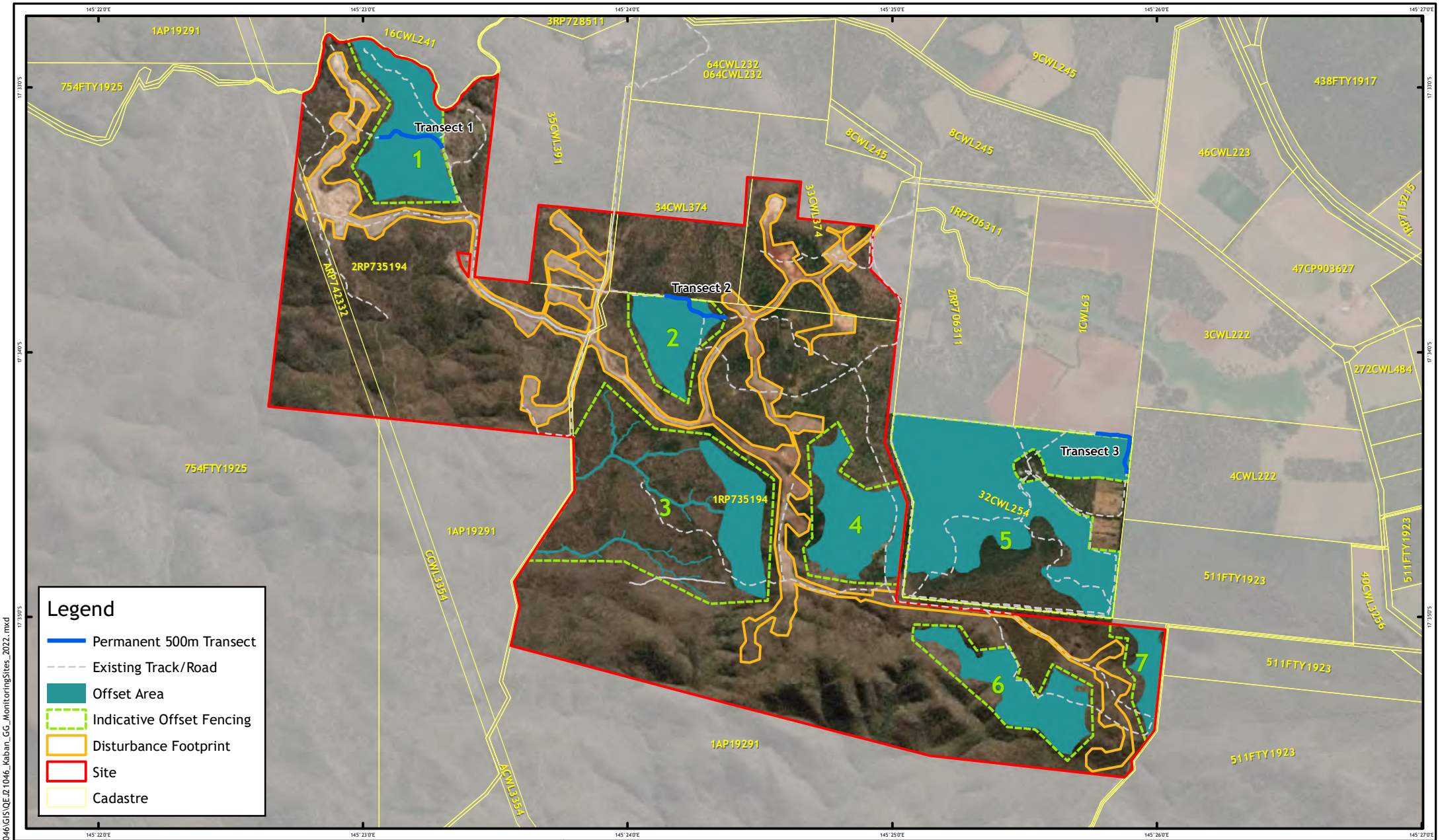
Overall greater glider habitat condition within the Offset Area will be assessed during a separate survey every two years. The habitat condition will be assessed by undertaking a Habitat Quality Assessment, in accordance with the *Guide to Determining Terrestrial Habitat Quality version 1.2* (Department of Environment and Science, 2020).

2.1.3 Impact triggers

Section 7.5.2.1 of the Kaban Green Power Hub, Offset Area Management Plan (OAMP) provides details of triggers for corrective actions concerning greater glider monitoring

- The absence of the species across all monitoring sites in a single monitoring event; and/or
- The absence of the species at a single monitoring site for three consecutive years.

On completion of the survey, an assessment against each trigger will be undertaken and presented in the results section



Dimbulah
Gordonvale
Atherton
Herberton
Malanda
Ravenshoe
Mount Garnet

N

Scale 1:35,000 (A4)

0 1.5

Kilometres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Notes:
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0	Issued for Use	GO	CO	02/12/2022
A	Issued for Review	GO	DJ	23/11/2022

FIGURE 3: GREATER GLIDER MONITORING SITES

2022 GREATER GLIDER SURVEY REPORT
KABAN GREEN POWER HUB

Map Number	Job Number	Rev
1 of 1	QEJ21046	0

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3 Field assessment results

3.1 Survey conditions

The Greater Glider Monitoring Program – Second Annual Survey was conducted during the wet season (15 – 17th of November 2022) by two Suitably Qualified Ecologists. The weather conditions during the three-night survey were optimal. Night-time temperatures ranged between 18ºC and 24ºC, humidity was moderate (~69%), wind was light (~5km/h) and no rainfall was recorded during the survey. The region had received average rainfall during the preceding month, (Weather Underground, 2022).

3.2 Greater glider observations

A total of five greater glider observations were recorded across three consecutive nights of spotlighting (Figure 4). Greater gliders were observed on all three transects (Figure 5).

Figure 4 Image of greater glider recorded during survey

Greater gliders were observed in a variety of tree species including *Corymbia citriodora*, *Eucalyptus tereticornis* and *Eucalyptus tindaliae*. All data including the dates, times, coordinates and tree species for each individual was recorded and can be found in Table 1. A comparative table for season 2021 and season 2022 greater glider monitoring results has been included, see Table 2.

Table 1: 2022 Greater glider spotlighting records

Transect	Time & date of record	Number of individuals	Coordinates	Tree species
T1	16/11/2022 19:40	1	[redacted]	*Corymbia citriodora*
T3	17/11/2022 19:26	1		*Eucalyptus tereticornis*
T2	18/11/2022 20:21	1		*Eucalyptus tindaliae*
T3	18/11/2022 20:58	1		*Eucalyptus tereticornis*
T3	18/11/2022 21:17	1		*Eucalyptus tereticornis*

Table 2: Comparative greater glider records for surveys 2021 and 2022

Transect	Greater glider observations 2021	Greater glider observations 2022
T1	1	1
T2	3	1
T3	3	3

3.3 Habitat quality assessment

Habitat quality assessments were postponed until there are more favourable monitoring conditions. There has been insufficient rain to promote the growth and flowering of ground cover species. In addition, there has been some impacts on the long-term habitat quality monitoring site located in Offset Area 5 from a recent controlled burn event.

3.4 Impact triggers

An assessment against the triggers, detailed in the OAMP, was performed and the results are detailed in Table 3.

Table 3: Assessment against impact triggers

Trigger Item	Result
1. The absence of the species across all monitoring sites in a single monitoring event	**No trigger:** All sites recorded the presence of greater glider
2. The absence of the species at a single monitoring site for three consecutive years	**No trigger:** All sites recorded the presence of greater glider

FIGURE 5 REMOVED. CONTAINS
SENSITIVE ECOLOGICAL RECORDS

4 Discussion and Conclusion

The purpose of these surveys is to monitor the ongoing presence and/or absence of greater gliders within the offset areas and to measure the results against the impact trigger items detailed within the OAMP and perform corrective actions, if necessary. Greater gliders were observed in all three permanent spotlighting transects, during the 2021 and 2022 surveys with respective total observations of seven and 5 animals. Therefore, there were no impact triggers activated and no corrective actions needed. However, ongoing management of the offset should be continued to assist in improving greater glider habitat within the offset areas.

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Appendix 6 Notice for Securing Offsets

Author: Rebecca Williams
File / Ref number: 2022/001512

Queensland Government
Department of **Resources**

30 August 2022

Mr George Schinckel
Level 21, 570 George Street
SYDNEY, NSW, 2000

Via email only: george.schinckel@neoen.com

Dear Mr Schinckel,

Re: Declaration made on part of Lots 32 CWL254 & 1,2 RP735194 - Tablelands Regional Council

This is to advise you that a declaration on has been made, consistent with your request on the above lot by the Department of Resources on 30 August 2022. A copy of each of the following certified documents is attached for your records:

- Notice of Declaration (2022/001512)
- Declared area map DAM 2022/001512 and attachment (GPS points)
- Declared area management plan entitled *Kaban Green Power Hub, Offset Area Management Plan* - dated: 10 May 2021 (which includes landowners' signatures)
- Property map of assessable vegetation PMAV 2022/001513 and information notice

As contact, it is your responsibility to provide each of the registered property owners with a copy of these declaration documents for their records.

Please note, that in accordance with the declaration, management of the declared area, monitoring the condition of the declared area, and reporting on the condition of the declared area will be required. Please refer to the declaration documents for the specifics regarding such requirements. If clearing is required in the declared area to meet management outcomes, a permit may need to be obtained or a code adhered to under the Vegetation Management Framework. Please phone 135 834 to discuss or see https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals for more information.

If a registered owner requires additional copies of the certified documents, these can be purchased at Department of Resources Customer Service Centre.

This declaration will be noted on the title of the declared area—binding management, monitoring and reporting responsibilities upon current and future owners.

PO Box 1167
Bundaberg 4670 QLD

Telephone: 135 VEG (135 834)
Email: vegetation@resources.qld.gov.au
www.resources.qld.gov.au

ABN 59 020 847 551

If you wish to discuss this matter further, please contact Rebecca Williams on telephone number 4131 2392 quoting the above reference number.

Yours sincerely

Sandra Witheyman
Senior Natural Resource Management Officer

Notice of Declaration (2022/001512)

ss19E – 19L of the Vegetation Management Act 1999

Queensland Government
Department of **Resources**

1. Details of request

1.1. **Proponent's name:** Kaban Wind Farm PTY LTD A.C.N. 637 687 622, Trustee Under Instrument 721089121, William Higham, Clarence Higham, David Higham

1.2. **Date request received:** 20/5/2022

1.3. **Request:** Declare stated land as an area of high nature conservation value

1.4. **Property description:** parts of Lots 1 and 2 on RP735194 and 32 on CWL254

1.5. **Land tenure:** Freehold

1.6. **Decision reference**: 2022/001512

2. Declaration information

2.1. **Declaration made:**

The Chief Executive of the Department of Resources declares the area identified on Declared Area Map DAM 2022/001512 as an area of high nature conservation value in accordance with s19F of the *Vegetation Management Act 1999*.

The chief executive considers the declared area to meet the following criteria under s19G of the *Vegetation Management Act 1999*—

The declared area is an area of high nature conservation value under s19G(1)(b), as the area is *another area that contributes to the conservation of the environment*.

The documents outlined in 2.2 form part of this declaration.

2.2. **Declaration documents:**

The following documents form part of this declaration, and must be read in conjunction with this notice:

- ❑ Declared Area Map DAM 2022/001512 and attachment
- ❑ Kaban Green Power Hub, Offset Area Management Plan - dated: 10 May 2021 (which includes landowners' signatures)

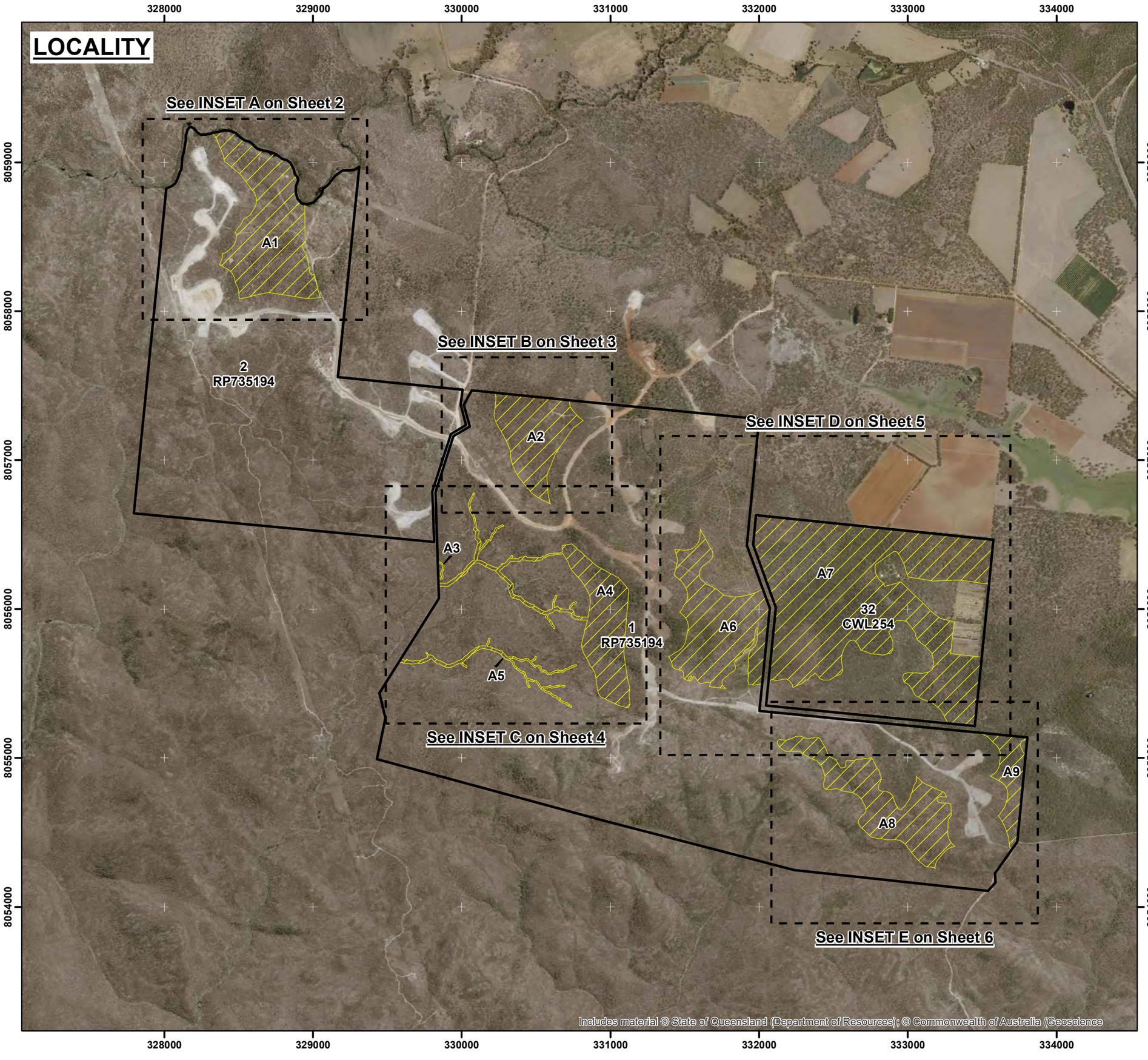
2.3. **Property Map of Assessable Vegetation**

In accordance with s20B(1)(a) and (b) of the *Vegetation Management Act 1999*, Property Map of Assessable Vegetation PMAV 2022/001513 has been prepared for the declared area.

2.4. **Date of Declaration:** 30 August 2022

3. Delegated officer's details

Sandra Witheyman
Senior Natural Resources Management Officer



Declared Area Map

Sheet 1 of 6

Queensland Government

DAM 2022/001512

LOT on PLAN

1RP735194, 2RP735194, 32CWL254

0 0.5 1 1.5 2

Kilometers

Scale: 1:25000

(original size A3)

N

LEGEND

- Subject Lots
- Declared Area (A1 to A9)

This plan must be read in conjunction with Declaration Notice 2022/001512

Notes:

Property boundary provided by Department of Resources.
The property boundaries shown on this map an are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
Horizontal Datum: GDA 2020
Projection: Universal Transverse Mercator - Zone 55

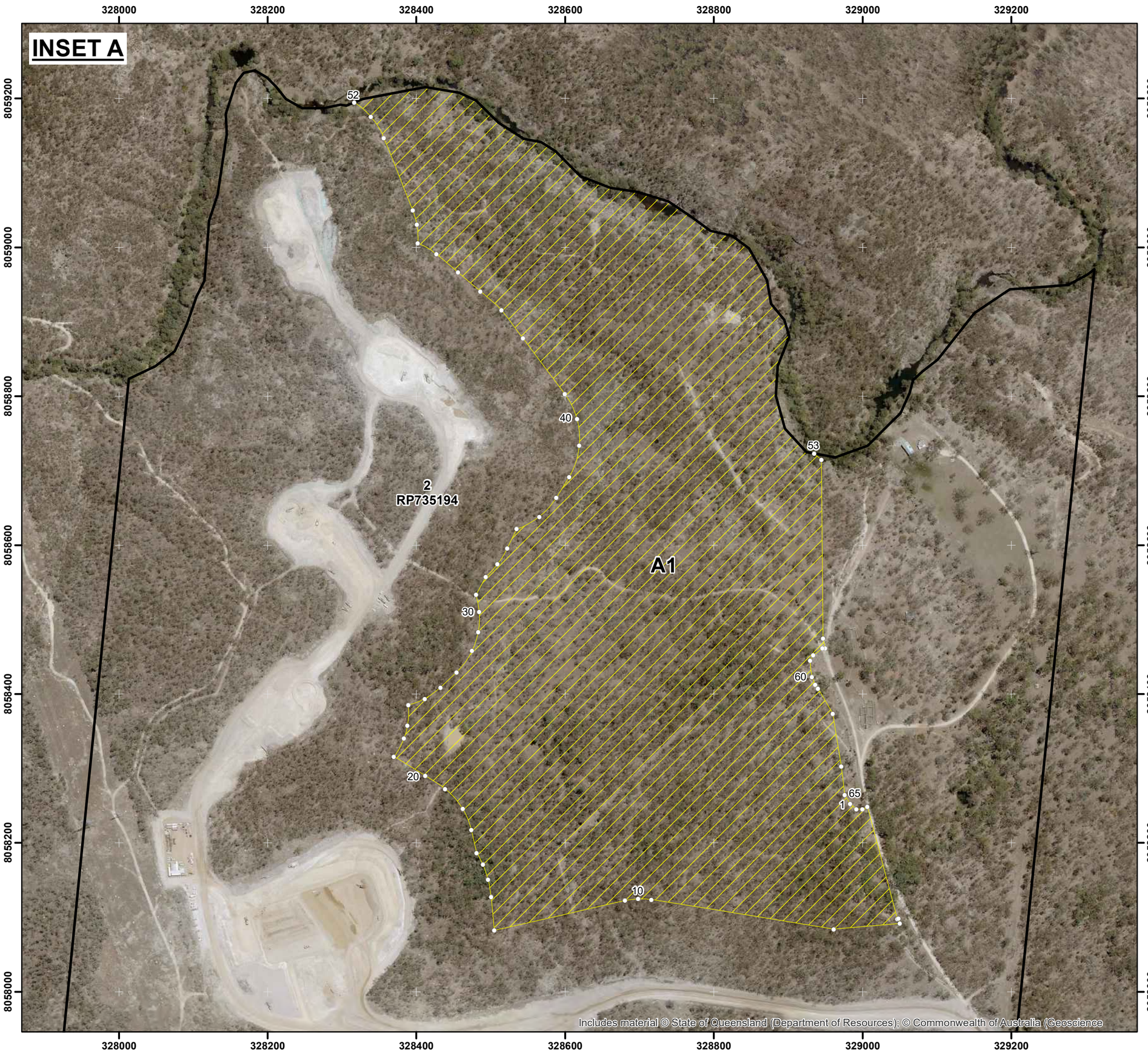
Digital Imagery: North_Qld_Coastal_2021_20cm_SISP
Imagery Capture Date: August to October 2021
Imagery Type: Digital Orthophoto

While every care is taken to ensure the accuracy of this product, the Department of Resource makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability, including without limitation, liability in negligence for all expenses, losses, damages (including indirect or consequential damage) and costs which might incur as a result of the product being inaccurate or incomplete in any way and for any reason. Data must not be used for direct marketing or be used in breach of the privacy laws.

Map Prepared by: LMO

Map Preparation Date: 08/06/2022

This colour map must be reproduced in colour.



Declared Area Map

Sheet 2 of 6

Queensland Government

DAM 2022/001512

LOT on PLAN

1RP735194, 2RP735194, 32CWL254

0 100 200 300 400

Meters

Scale: 1:5000

(original size A3)

N

LEGEND

- Derived Reference Points (see attachment)
- Subject Lots
- Declared Area (A1 to A9)

This plan must be read in conjunction with Declaration Notice 2022/001512

Notes:

Property boundary provided by Department of Resources.
The property boundaries shown on this map an are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
Horizontal Datum: GDA 2020
Projection: Universal Transverse Mercator - Zone 55

Digital Imagery: North_Qld_Coastal_2021_20cm_SISP
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Map Prepared by: LMO

Map Preparation Date: 08/06/2022

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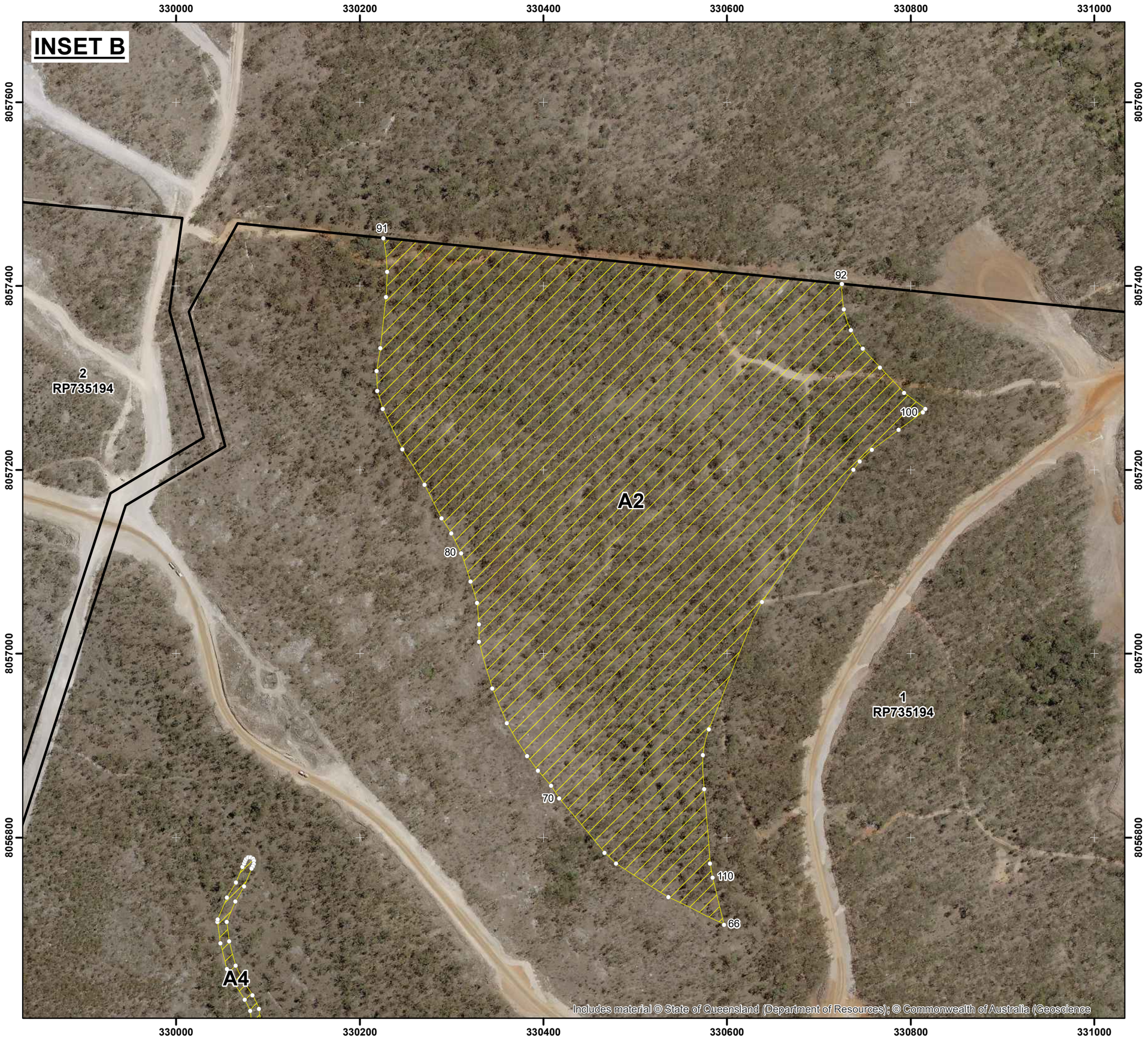

Declared Area Map

Sheet 3 of 6

Queensland Government

DAM 2022/001512

LOT on PLAN

1RP735194, 2RP735194, 32CWL254

0 50 100 150 200 250 300

Meters

Scale: 1:4000

(original size A3)

N

LEGEND

- Derived Reference Points (see attachment)
- Subject Lots
- Declared Area (A1 to A9)

This plan must be read in conjunction with Declaration Notice 2022/001512

Notes:

Property boundary provided by Department of Resources.
The property boundaries shown on this map an are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
Horizontal Datum: GDA 2020
Projection: Universal Transverse Mercator - Zone 55

Digital Imagery: North_Qld_Coastal_2021_20cm_SISP
Imagery Capture Date: August to October 2021
Imagery Type: Digital Orthophoto

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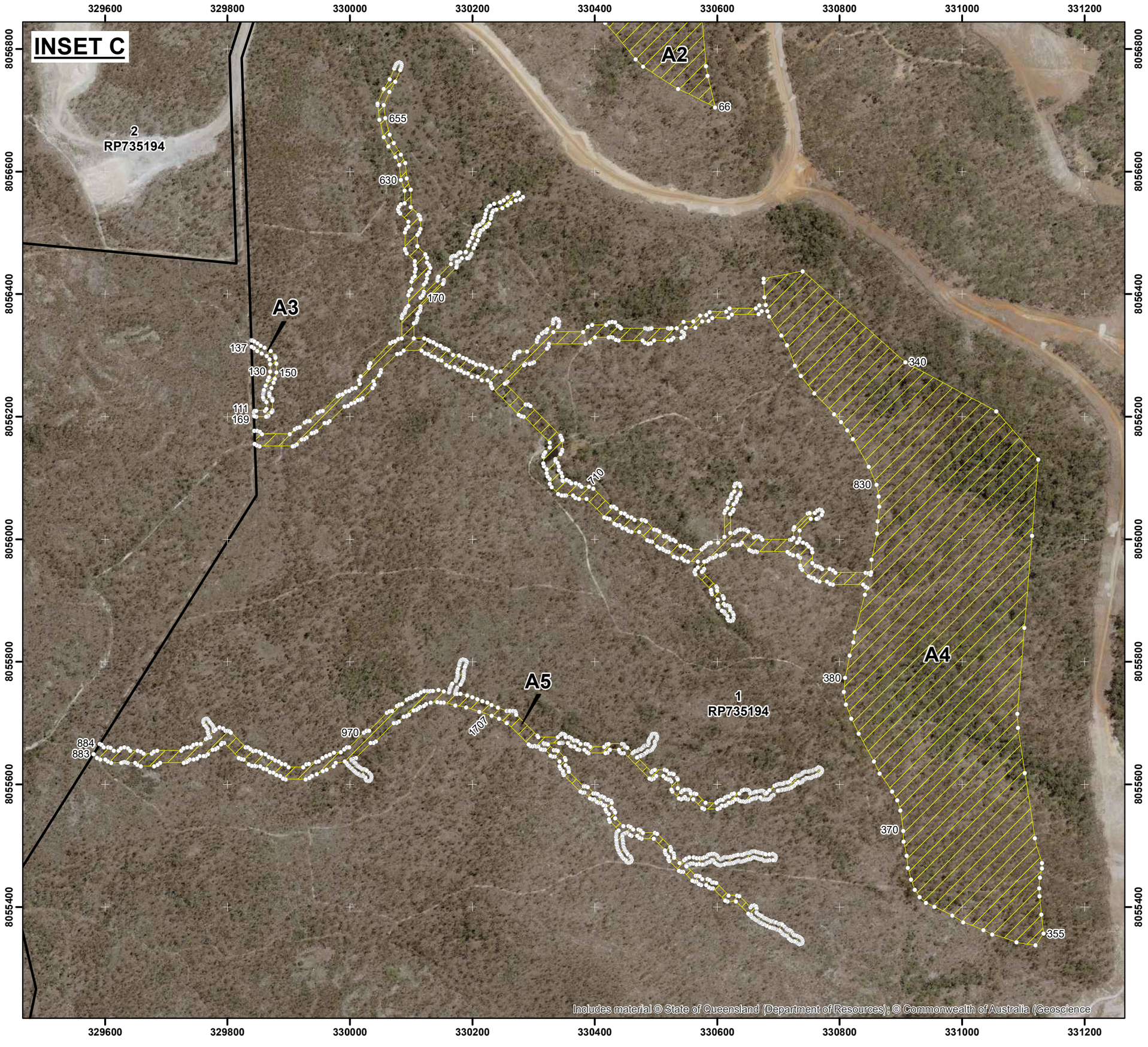
Map Prepared by: LMO

Map Preparation Date: 08/06/2022

This colour map must be reproduced in colour.



Declared Area Map

Sheet 4 of 6

DAM 2022/001512

LOT on PLAN
1RP735194, 2RP735194, 32CWL254

Queensland Government

0 100 200 300 400 500
Meters

Scale: 1:6000
(original size A3)

N

LEGEND

- Derived Reference Points (see attachment)
- Subject Lots
- Declared Area (A1 to A9)

This plan must be read in conjunction with Declaration Notice 2022/001512

Notes:

Property boundary provided by Department of Resources.
The property boundaries shown on this map an are approximate only. They are not an accurate representation of the legal boundaries.

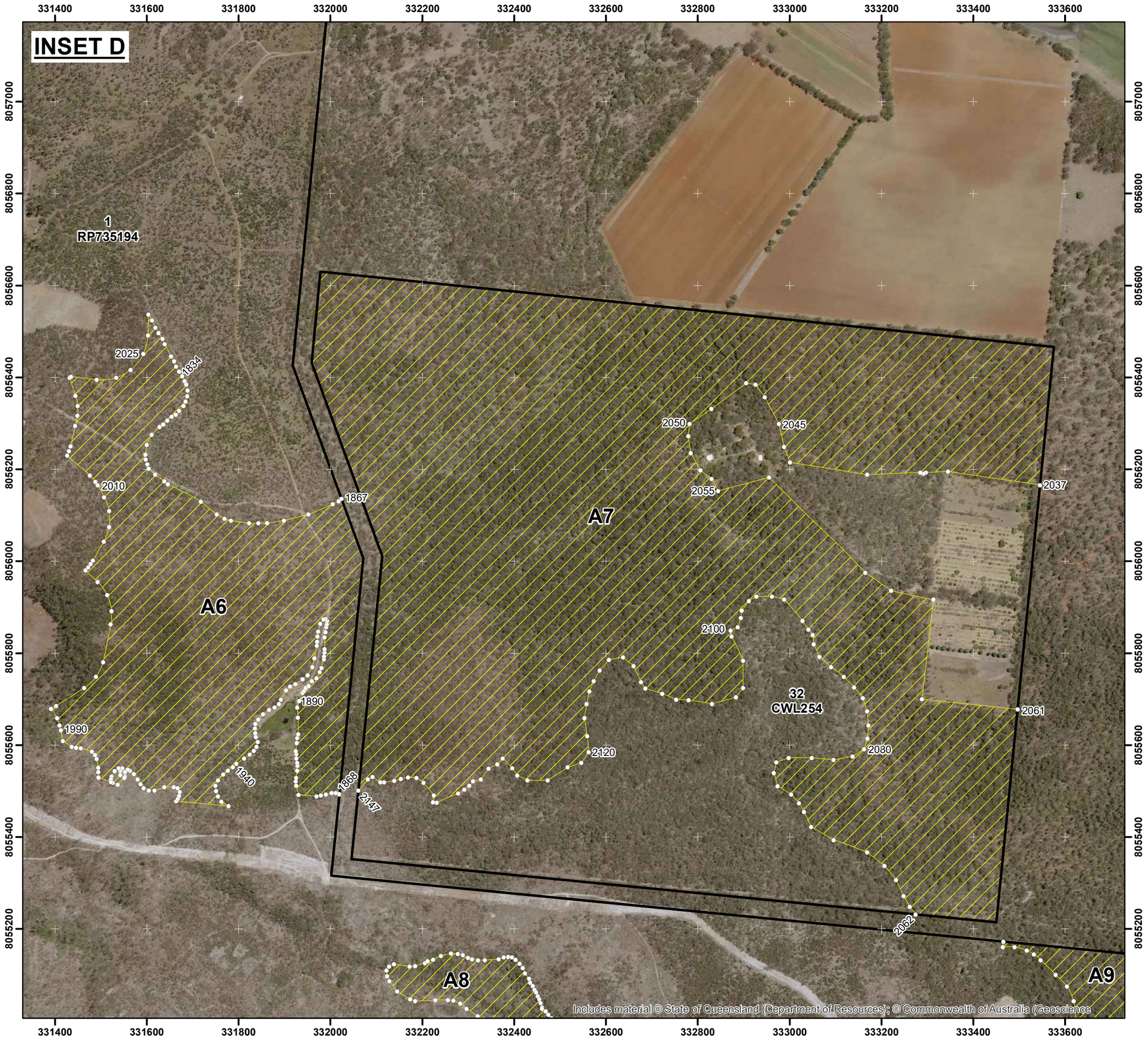
Map Information:
Horizontal Datum: GDA 2020
Projection: Universal Transverse Mercator - Zone 55

Digital Imagery: North_Qld_Coastal_2021_20cm_SISP
Imagery Capture Date: August to October 2021
Imagery Type: Digital Orthophoto

Map Prepared by: LMO

Map Preparation Date: 08/06/2022

This colour map must be reproduced in colour.



Declared Area Map

Sheet 5 of 6

DAM 2022/001512

LOT on PLAN

1RP735194, 2RP735194, 32CWL254

Queensland Government

0 100 200 300 400 500 600

Meters

Scale: 1:8000

(original size A3)

N

LEGEND

- Derived Reference Points (see attachment)
- Subject Lots
- Declared Area (A1 to A9)

This plan must be read in conjunction with Declaration Notice 2022/001512

Notes:

Property boundary provided by Department of Resources.
The property boundaries shown on this map an are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
Horizontal Datum: GDA 2020
Projection: Universal Transverse Mercator - Zone 55

Digital Imagery: North_Qld_Coastal_2021_20cm_SISP
Imagery Capture Date: August to October 2021
Imagery Type: Digital Orthophoto

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Map Prepared by: LMO

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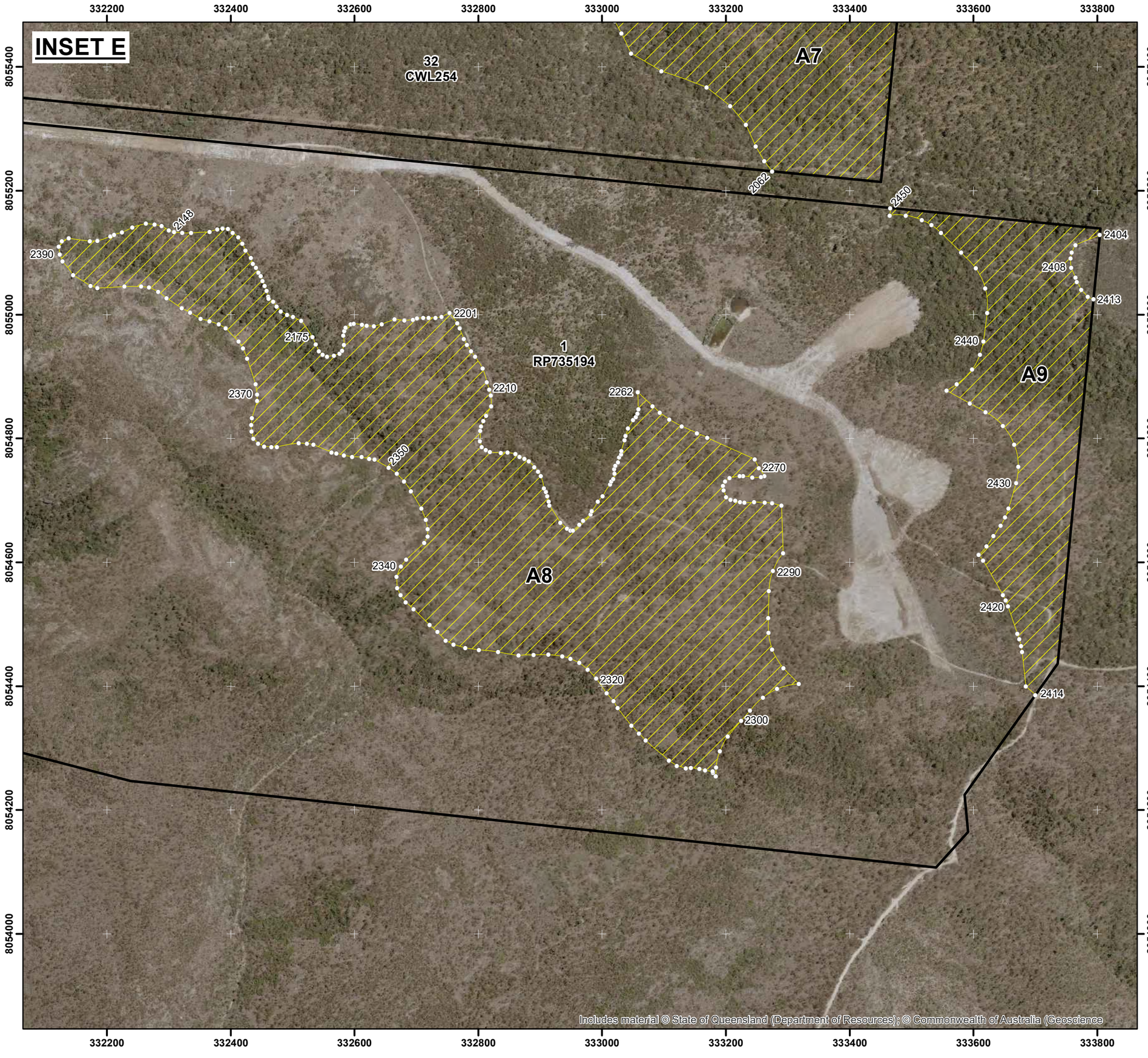

Declared Area Map

Sheet 6 of 6

DAM 2022/001512

LOT on PLAN

1RP735194, 2RP735194, 32CWL254

Queensland Government

0 100 200 300 400 500

Meters

Scale: 1:6000

(original size A3)

N

LEGEND

- Derived Reference Points (see attachment)
- Subject Lots
- Declared Area (A1 to A9)

This plan must be read in conjunction with Declaration Notice 2022/001512

Notes:

Property boundary provided by Department of Resources.
The property boundaries shown on this map an are approximate only. They are not an accurate representation of the legal boundaries.

Map Information:
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Digital Imagery: North_Qld_Coastal_2021_20cm_SISP
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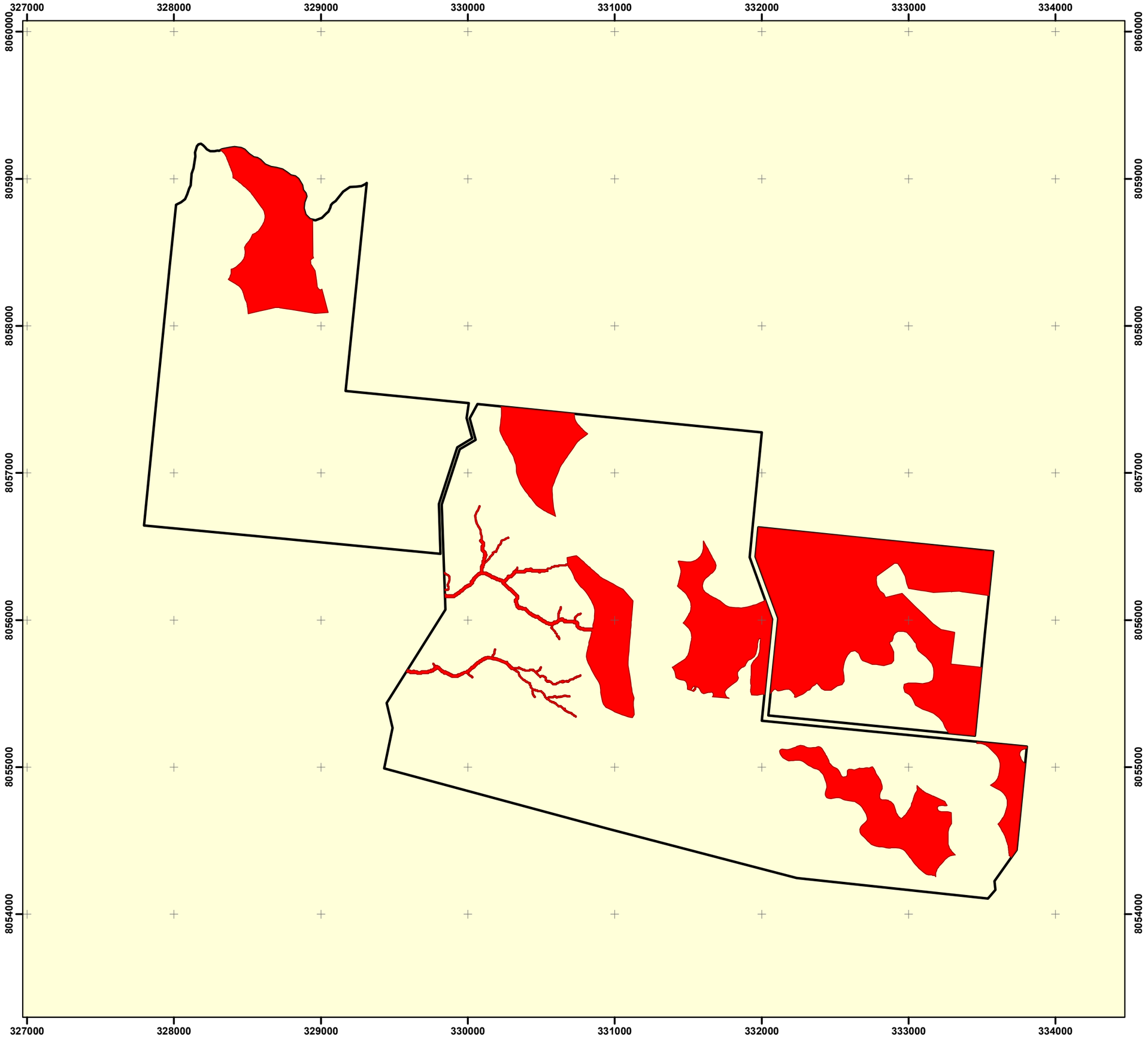

Property Map of Assessable Vegetation

PMAV 2022/001513

LOT on PLAN

1RP735194, 2RP735194, 32CWL254

Sheet 1 of 1

Queensland Government

0 0.5 1 1.5 2

Kilometers

Scale: 1:25000

(original size A3)

N

LEGEND

- Subject Lot(s)
- Area to which the PMAV does not apply

Vegetation Category Area

- Category A area

Notes:

Property boundaries provided by Department of Resources.
The property boundaries on this map are a spatial representation of the property boundaries.
They are not the legal property boundaries and are subject to change as more accurate information becomes available.
The PMAV does not move with changes to the property boundaries.

Map Information:
Horizontal Datum: GDA 2020
Projection: Universal Transverse Mercator - Zone 55

This PMAV is made under section 20B of the *Vegetation Management Act 1999* (VMA) as sections 20B(1)(a) and 20B(1)(b) of the VMA apply to the area. This PMAV replaces PMAV 2005/105739 for the subject area under section 20D of the VMA.

Signed for the Chief Executive of the Department of Resources by:

Name: Sandra Witheyman

Title: Senior Natural Resource Management Officer

Signature:

Date: 30 August 2022

Map Prepared by: LMO

Map Preparation Date:08/06/2022

This colour map must be reproduced in colour.

INFORMATION NOTICE

Information Notice issued pursuant to section 20B (2) of the *Vegetation Management Act 1999* (VMA)
Property Map of Assessable Vegetation (PMAV) issued under section 20B (1) of the VMA

1. **PMAV reference:** 2022/001513
2. **Decision:** to make a PMAV under section 20B(1) of the VMA over part of land described as Lot 1 RP735194, Lot 2 RP735194 and Lot 32 CWL254.

   This decision can be internally reviewed if requested by an owner. The details on how to do this are contained in **Appendix 1**.
3. **Reasons for decision:**

   Areas of Lot 1 RP735194, Lot 2 RP735194 and Lot 32 CWL254 have been declared (decision reference: 2022/001512) as an area of high nature conservation value in accordance with s19F of the VMA.

   The declared area application detailed that the area to be declared is an offset area (EPBC 2018/8289)).

   In accordance with sections 20B (1)(a) and (b) of VMA, the decision has been made to make a PMAV over the declared area which is an offset area.
4. **Additional information**

   Sections 20AL (a) (i) and (ii) of the VMA state that a category A area is an area that is a declared area or an offset area. The declared area which is an offset area on Lot 1 RP735194, Lot 2 RP735194 and Lot 32 CWL254, will be shown as a category A area on PMAV 2022/001513.

   Subsequent updates of the regulated vegetation management map will also show the declared area as a category A area.
5. **Date:** 30 August 2022

Appendix 1: Rights of Review of the Decision

If you do not agree with the decision to make this PMAV, you may make an application for an internal review of the decision under Part 4 of the *Vegetation Management Act 1999*.

Please see the following extract from the *Vegetation Management Act 1999* for:

- your rights of review;
- the time period in which you have to apply for review; and
- how the rights of review are exercised under this Act.

Extract from the Vegetation Management Act 1999 –

Part 4 Reviews and legal proceedings

Division 1 Internal reviews by chief executive

62 Internal review process before external review
Every review of an original decision must be, in the first instance, by way of an application for an internal review of the decision.

63 How to apply for internal review
(1) A person who is given, or is entitled to be given, an information notice about a decision made under this Act may apply for an internal review of the decision.

(2) An application for internal review of a decision must be—
(a) in the approved form; and
(b) made to the chief executive; and
(c) supported by enough information to enable the chief executive to decide the application.

(3) The application **must be made within 20 business days** after—
(a) the day the person is given the information notice about the decision; or
(b) if paragraph (a) does not apply—the day the person otherwise becomes aware of the decision.

(4) The chief executive may extend the time for applying for the internal review.

(5) The application does not stay the decision.

63A Review decision
(1) The chief executive must, within 30 business days after receiving the application—
(a) review the decision (the ***original decision***); and
(b) make a decision (the ***review decision***) to—
(i) confirm the original decision; or
(ii) amend the original decision; or
(iii) substitute another decision for the original decision; and
(c) give the applicant notice (the ***review notice***) of the review decision.

(2) If the review decision is not the decision sought by the applicant, the review notice must comply with the QCAT Act, section 157(2).

(3) However, subsection (2) does not apply if the review decision relates to an original decision under—

a) section 20O(1)(b) or (2)b or (c), 20R(2) or the provisions as applied under section 20ZC(6); or
b) section 20O(3)(b), 20S(1)(a) or 20ZB(1)(b) or (c).

Division 1A External reviews by QCAT

63B Who may apply for external review

(1) A person who is dissatisfied with a review decision may apply, as provided under the QCAT Act, to QCAT for a review of the review decision.

(2) However, subsection (1) does not apply if the review decision relates to an original decision mentioned in section 63A(3).

Appendix 7 OAMP – Habitat Quality Assessment

Kaban Green Power Hub - Habitat Quality and Photo Monitoring Year 2

29 June 2023

Neoen Australia Pty Ltd

Kaban Green Power Hub

Document Management

Rev.	Issue Date	Description	Author (s)	Approved	Signature
0	29/06/2023	Issued for review	J. Hintz	D. Jones	

Document Reference: \\192.168.100.3\Data\JOBS\~2021\QEJ21046\DELIVERABLES\FY23\9. Habitat Quality Assessment - OAMP\QEJ21046_OAMP-Habitat Quality Assessment_RevA.docx

Contact Information	
Ph: 07 3062 6960	Email: e2mconsulting.com.au
Level 3, 19 Lang Parade, Milton, Queensland, 4064	PO Box 1444, Milton, Queensland, 4064

Contents

List of Tables

List of Figures

Appendices

Definitions

Term	Definition
Assessment Unit	Relatively homogenous units defined by a distinct regional ecosystem and broad condition state.
Greater glider habitat	All areas of eucalypt forests or woodlands that contain, or have the potential to contain, hollow-bearing trees as described in the Conservation Advice *Petauroides volans* (greater glider) (TSSC, 2016)
Magnificent Brood Frog habitat	Seeps and drainage channels in open eucalypt forests with an understorey comprised of *Themeda triandra* as described in the Conservation Advice *Pseudophryne covacevichae* (Magnificent Brood Frog) (TSSC, 2017)
Habitat Quality Guide	Habitat quality assessments were conducted in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.2* (referred to as the 'Habitat Quality Guide') (Department of Environment and Heritage Protection, 2017).
Offset Area	The delineated Offset Area (approx. 790 ha) within KGPH (Lot 7 and 8 on Plan SP282139).
Offset Investigation Area	The area surveyed within KGPH during E2M's initial baseline investigation to determine the suitability of the proposed area as an offset.
Regional Ecosystem	A vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil. Regional Ecosystems are described in the Regional Ecosystem Description Database (REDD), produced by the Queensland Herbarium.
Regulated Vegetation	Vegetation that is mapped within the regulated vegetation management map produced by the Queensland Department of Resources. The *Vegetation Management Act 1999* is applicable to regulated vegetation.
Suitable habitat	Suitable habitat/microhabitat that comprises suitable breeding places, habitat connectivity and/or access to foraging resources. Suitable habitat may include breeding, foraging and shelter resources for fauna or preferred environmental conditions of flora.
Vegetation community	An identified vegetation community (i.e., structure, composition, condition and/or underlying geology) verified from a field survey. Communities may include Regional Ecosystems, remnant vegetation and/or disturbed/novel ecosystems (e.g., parkland, disturbed roadsides etc.).
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat may include breeding, foraging and shelter resources for fauna
Offset area	The area which will be legally secured as an offset within: • Lot 1 RP735194 • Lot 2 RP735194; and • Lot 32 CWL254.
The project	Kaban Green Power Hub

Abbreviations

Abbreviation	Description
AU	Assessment Unit
DAWE	Commonwealth Government Department of Agriculture, Water and the Environment
DEE	Commonwealth Government Department of the Environment and Energy
E	Endangered
E2M	E2M Pty Ltd
EO Act	*Environmental Offsets Act 2014* (QLD)
EOP	EPBC Act Environmental Offsets Policy (Cth)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ha	Hectare
LC	Least Concern
MNES	Matter of National Environmental Significance
MBF	Magnificent Brood Frog
MSDS	Material Safety Data Sheet
NC Act	*Nature Conservation Act 1992* (QLD)
Neoen	Neoen Australia Pty Ltd
OAMP	Offset Area Management Plan
OC	Of Concern
RE	Regional Ecosystem
VM Act	Vegetation Management Act 1999 (QLD)

1 Introduction

1.1 Project Background

Neoen Australia Pty Ltd (Neoen) are now at the post-construction stage of the Kaban Green Power Hub (KGPH) wind farm in north Queensland, suppling renewable energy to the national electricity market consisting of 28 turbines as well as ancillary infrastructure. The KPGH is located near the township of Tumoulin, Queensland, within the Tablelands Regional Council Local Government Area. KGPH has been designed to avoid and mitigate impacts on Matters of National Environmental Significance (MNES), however significant residual impacts are considered likely on two MNES, including:

- *Pseudophryne covacevichae* (magnificent brood frog, (MBF)); and
- *Petauroides volans* (greater glider) (E2M, 2021a).

In accordance with the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act) *Environmental Offsets Policy* (EOP) compensatory offsets were required for all MNES of which the project will have a significant residual impact. EPBC Act offset liabilities for the greater glider and MBF were met through the establishment of an offset area within:

- Lot 1 on RP735194
- Lot 2 on RP735194; and
- Lot 32 on CWL254.

The total offset area is approximately 307.6 ha in size and consists of seven separate areas (herein referred to collectively as the Offset Area (Figure 1). The ongoing management and monitoring of the Offset Area is detailed in the EPBC Act approved *Kaban Green Power Hub - Offset Area Management Plan (OAMP)* (E2M, 2021a).

1.2 Scope and Objectives

E2M was engaged by Neoen to conduct the Year 2 Habitat Quality and Photo Monitoring in accordance with the OAMP. The scope of the assessment includes:

- undertaking habitat quality assessments in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.2*, at a minimum of three baseline monitoring locations for MBF and greater glider; and
- complete photo monitoring at a minimum of three baseline monitoring locations for MBF and greater glider.

FIGURE 1 REMOVED. CONTAINS
SENSITIVE ECOLOGICAL RECORDS

1.3 The Offset Area

Seven disjunct areas within three contiguous properties collectively form the Offset Area (Figure 2).

The three properties (formally 1RP735194, 2RP735194 and 32CWL254) are largely characterised by remnant vegetation composed of mixed eucalypt woodlands on metamorphic rock. Properties 1RP735194 and 2RP735194 are both bound by Bluff State Forest to the south and west, with rural properties to the north and east (Figure 2).

Property 32CWL254 is bound by Ravenshoe State Forest to the east and rural properties to the north, south and west (Figure 2). This property also contains an active mango orchard in the north-east corner.

The two Regional Ecosystems (REs) and corresponding Assessment Units (AUs) within the Offset Area are detailed in Table 1.

Table 1: Vegetation communities within the Offset Area

RE	AU	State	Description	Offset Area (ha)
7.12.30a	1	Remnant	*Corymbia citriodora*, *Eucalyptus portuensis*, *C. intermedia*, *Syncarpia glomulifera* woodland to low woodland to open forest with *Callitris intratropica, Acacia calyculata* and *Xanthorrhoea johnsonii*. Uplands and highlands, of the moist and dry rainfall zones. Not a Wetland.	146.2
7.8.8a	5	Remnant	*Eucalyptus tereticornis, Corymbia intermedia, E. reducta, Angophora floribunda* tall open forest and tall woodland with *Allocasuarina torulosa*. Uplands and highlands on basalt, of the moist rainfall zone. Not a Wetland.	36.9

FIGURE 2 REMOVED. CONTAINS
SENSITIVE ECOLOGICAL RECORDS

2 Methods

Field surveys were conducted in accordance with the baseline assessment undertaken in 2019 and methodologies prescribed in the OAMP. Detailed methodologies are prescribed in the following sections.

2.1 Field Assessment

2.1.1 Field survey conditions

The Habitat Quality Assessment was conducted during the wet season (28 to 29 March 2023) by two ecologists. Temperatures ranged between 14˚C and 22˚C, humidity was high (54-99%) and wind was light with no rainfall even (BOM,2023). Rainfall 3 months prior to the survey was above average with a total of 1080 mm compared to a long-term average total of 815mm for the months of January, February and March.

During the survey period, ground cover species including perennials were readily identifiable with both vegetative and reproductive material present.

2.1.2 Habitat quality assessment and photo monitoring

Habitat Quality assessments were conducted in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.2* (referred to as the 'Habitat Quality Guide') (Department of Environment and Heritage Protection, 2017). This method was used as it is the prescribed method for determining habitat quality for land-based offsets under the *Queensland Environmental Offsets Policy* and aligns with the EPBC Act *Environmental Offsets Policy*. This method measures "Habitat Quality" based on three key indicators:

- site condition (a general condition assessment of vegetation compared to a benchmark)
- site context (an analysis of the site in relation to the surrounding environment); and
- species habitat index (the ability of the site to support a species).

The Habitat Quality Guide incorporates landscape scale data, site-based vegetation attribute data (using the BioCondition Assessment Manual (Queensland Herbarium, 2015) and fauna species-specific habitat data. This standardised, replicable approach to conducting Habitat Quality assessments allows the data to be comparable over time to measure and monitor change in vegetation and community.

To monitor habitat condition improvement over time, a minimum of three permanent transects were established within both magnificent brood frog and greater glider offset areas. At the centre of each transect a photo monitoring site was established to assist in depicting changes in condition. Four photos were taken at each photo monitoring point, at a height of approximately 1.5m high, in a north, south, east and west direction. Monitoring sites are presented in Figure 1.

Field data used to derive Habitat Quality scores were collected at the four habitat quality monitoring sites identified in Table 2 and depicted in Figure 2. Photographs at each monitoring site are shown in Appendix A.

Table 2: Habitat Quality Monitoring Sites in the Offset Area

MNES	Survey site	RE	Class	BVG	AU	Latitude	Longitude
MBF and Greater Glider	BC112	7.12.30a	remnant	10b	1	[redacted]	
MBF and Greater Glider	BC125	7.12.30a	remnant	10b	1		
MBF and Greater Glider	HQ208	7.12.30a	remnant	10b	1		
Greater Glider	HQ215	7.8.8a	remnant	9c	5		

2.2 Calculating Habitat Quality

Habitat quality scores were calculated in accordance with the Habitat Quality Guide. However, given the monitoring locations do not occur throughout all assessment units assessed as part of baseline surveys, area weighting of scoring needed to be adjusted. The following adjustments were made when area weighting scores:

- MBF habitat occurs across three (3) AUs, though all MBF monitoring sites occur within a single AU. Therefore, scores were unable to be area weighted. As such, the total habitat quality score was calculated by averaging the three monitoring site scores. Variation in habitat quality across this single assessment unit is expected to be representative of condition across the remaining AUs.
- Greater glider habitat occurs across five (5) AUs, though greater glider monitoring sites are restricted to two AUs. Therefore, scores were unable to area weighted in accordance with the Habitat Quality Guide. As such, scores were area weighted by weighting scores based on the relative proportion each AU makes up compared to each other. That is, AU1 makes up 80% of the Offset Area and AU5 is 20%, therefore AU1 makes up 0.8 of the score while AU5 makes up 0.2 of the score. Variation in habitat quality across these two AUs is expected to be representative of condition across the remaining AUs.

3 Results

3.1 Overall Habitat Quality and Completion Criteria

The OAMP completion criteria of a 1-point increase in habitat quality within 10 years from the commencement of the action. Habitat quality assessments will be undertaken every 2 years until the performance criteria has been met, then every 5 years thereafter.

Results identified that both MBF and greater glider overall habitat scores have remained unchanged since the baseline assessment (Table 3). This is a likely a result of management measures taking time to lead to variation in overall habitat condition (i.e. native species diversity and cover is still recovering from years of cattle grazing and inappropriate fire regimes).

Across the MBF monitoring sites most values remained constant or slightly increased with the exception of leaf litter (Site BC112) and course woody debris (BC125) which had both declined since the baseline assessment (Appendix B).

Similarly to MBF, the majority of greater glider monitoring site values remained constant or slightly increased, with the exception of Site HQ215 which has had both its shrub and forb species diversity decline as a result on a substantial increase in non-native cover (Appendix B).

Table 3: Habitat Quality Assessment scores for each MNES

Habitat quality score	Greater glider	Magnificent Brood Frog
2019 Offset Area Management Plan*	8.07	7.99
2023 Habitat Quality Assessment	8.35	8.37

*Field Survey conducted in 2019, OAMP was revised 2021.

3.2 Impact Triggers and Interim Targets

3.2.1 Impact triggers

The OAMP section 7.5.3.1, identifies the following impact triggers to determine where corrective actions are required:

- Increase in weed cover within any monitoring site; and/or
- Introduction of a new priority weed species into any monitoring site; and/or
- Decrease in species diversity when compared to previous years' results.

As discussed in Section 3.1, two of the impact triggers (increased weed cover and decreased species diversity) have been reached within Site HQ215. A potential reason for this, is the prescribed control burn undertaken in the area in July 2022, as required by the OAMP. The burn was very effective in reducing high fuel loads that had accumulated, over a 20-year period. In its immediate capacity the burn was also very effective in reducing weed cover. However, with the higher-than-average rainfall over the following wet season, the weeds (mostly *Desmodium uncinatum)* were quick to respond and return. Not only did the rainfalls exceed the average but they were constant over the growing period, which prevented any follow-up herbicide treatments during the early stages of regrowth. As of writing this report, there has been great effort in reducing the weed cover in this site through spraying herbicide. Prior to the burns the weed

cover and biomass were extremely high, dominating the groundcover (as noted in pre-burn management assessments). Cattle were removed from this site over 3 years ago allowing weeds such as *Desmodium uncinamtum* to proliferate. Long-term management and treatment of weeds, using burns, herbicides and other methods will be necessary to reduce weed cover and allow for native forbs and grasses to return.

Recommendations for corrective actions are discussed further in Section 4.

3.2.2 Interim targets

The OAMP specifies indicative interim targets for habitat quality values to assist in monitoring habitat quality against the completion criteria. Comparison of current habitat quality values against the indicative interim targets identified that majority of indicators are heading in a positive direction with the exception of forb species richness for greater glider, which has declined. As discussed in Section 3.2.1, this decline in forb species richness can primarily be associated with an increase in non-native cover within site HQ215 (AU5). Recommendations for corrective actions are discussed in Section 4.

Table 4: Indicative five-yearly habitat quality completion criteria scores

Feature	Year		
	0	2[1]	5[2]
Magnificent brood frog			
Native plant species richness - grasses	3	3.67	3
Native plant species richness – forbs	3	3	3
Native shrubs canopy cover	3	4.33	3
Non-native plant cover	5	8.33	10
Threats to species	7	7	15
Quality and availability of shelter	10	10	10
Greater glider			
Native plant species richness - grasses	3	3.5	3
Native plant species richness – forbs	3	2.25	3
Native shrubs canopy cover	3	4	3
Non-native plant cover	5	6.25	10
Threats to species	7	10	15

[1] Average scores from Year 2 monitoring

[2] Indicative target scores for 2026, after five years of management.

4 Recommendations

Based on the results of the field assessment E2M has detailed species specific recommendations to be implemented to ensure habitat quality scores continue to progress towards the completion criteria.

4.1 Greater Glider recommendations

The recommendations to ensure continued improvement in habitat quality scoring and prevent future impact triggers being reached for greater glider are provided below:

- controlled burns as per the OAMP, that may facilitate the recruitment and establishment of preferred feed trees (*E. tereticornis*, *E. camaldulensis* and *C. tessellaris*) within assessment unit AU1 & AU5), particularly in areas where feed trees are widely spaced;
- allowing for the maturation of hollow-bearing canopy trees, particularly within assessment unit AU5;
- erecting nest boxes[1] for greater glider in areas where suitable hollows are in short supply. This is particularly relevant to AU1;
- managing fuel loads in the understory of riparian woodland habitat through controlled mosaic burns as per the Landscape Fire Management Plan (Firelands Consultancy 2023), as there are expected El Nino events in the coming years (BOM, 2023); and
- Ongoing (annual) weed treatment in those sites with high weed abundance such as AU5 (HQ215). Weed treatment through chemical application, manual removal and/or by selective grazing by low impact and preferential grazers such as goats. Goats could possibly used in a very controlled manner, whereby animals are introduced after an ecological burn, when weeds such as *Desmodium uncinatum* are reshooting. This would put weeds at a competitive disadvantage and allow natives to return (Meat and Livestock Australia 2007).

4.2 Magnificent Brood Frog recommendations

The recommendations to ensure continued improvement in habitat quality scoring and prevent future impact triggers being reached for MBF are provided below:

- ongoing improvements to sediment traps and roadside drainage to prevent risk of offset areas being negatively impact by indirect project impacts, and
- Maintain scheduled ecological burns as per the Landscape Fire Management Plan (Firelands Consultancy 2023) to reduce the likelihood of high energy burn that may penetrate riparian zones where MBF inhabit.

[1] Neoen have approved the installation of ten nest boxes, and these are scheduled to be installed late 2023.

5 Conclusion

There has been a slight improvement to habitat quality scores for both assessment units found within the Offset Areas. The weighted scores for greater glider habitat increased from 8.07 to 8.35, and the magnificent brood frog habitat increased from 7.99 to 8.37. While only a slight improvement, it is very encouraging result, as significant management changes are already taking place. Such as, removal of all cattle, maintenance of cattle-proof fencing, replacement of top barbed-wire for fences within greater glider habitat, ongoing modifications to sediment traps, a successful ecological burn during 2022 within an offset with extremely high fuel loads, and an intensive weed treatment program to eliminate declared weeds, and to reduce abundance and prevent the spread of other environmental weeds.

While controlled burns are not necessarily a mechanism to significantly improve Habitat Quality Scores for MBF, as per the current departmental scoring criteria, they will be extremely important in mitigating the potential harm that uncontrolled burns will have on populations seeking refuge in damp grassy seep areas along creek-lines. Reducing fuel loads through soft-burns will reduce the likelihood of damaging burns penetrating the grasses in the seep zones. The first of an ongoing series of ecological burns are taking place during the 2023 burn season, in accordance with the Landscape Fire Management Plan (Firelands Consultancy 2023).

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Appendix A BioCondition monitoring site photographs

A.1 BC112 2019 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.2 BC112 2023 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.3 BC125 2019 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.4 BC125 2023 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.5 HQ208 2019 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.6 HQ208 2023 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.7 HQ215 2019 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

A.8 HQ215 2023 Photo Monitoring

Photograph looking north

Photograph looking east

Photograph looking south

Photograph looking west

Appendix B BioCondition survey data

B.1 Greater Glider Habitat Quality Calculations

Assessment Type (Impact Site / Offset Site):			AU 1			AU 1			AU 1					AU 5		
Fragmented/Intact Subregion			Fragmented			Fragmented			Fragmented					Fragmented		
Assessment Site No.:			BC112 (2023)			BC125 (2023)			HQ208 (2023)					HQ215 (2023)		
Regional Ecosystem:	7.12.30 (Draft)*		7.12.30a			7.12.30a			7.12.30a			HQ16 considered Best on Offer (same BVG)		7.8.8a		
BVG1M:	10b		10b			10b			10b			9c		9c		
Ecological Condition Indicator	**Benchmark**	**MAX VALUES**	**Value**	**% of Bench.**	**Score**	**Value**	**% of Bench.**	**Score**	**Value**	**% of Bench.**	**Score**	**Benchmark**	**MAX VALUES**	**Value**	**% of Bench.**	**Score**
1. Recruitment of woody perennial species (%)	100	5	100.0	1.0	5	75.0	0.8	5	89.0	0.9	5	100	5	75.0	0.8	5
2. Native plant species richness (No.):																
- Trees	5	5	4.0	0.8	3	6.0	1.2	5	9.0	1.8	5	4	5	7.0	1.8	5
- Shrubs	13	5	5.0	0.4	3	6.0	0.5	3	6.0	0.5	3	4	5	2.0	0.5	3
- Grasses	7	5	4.0	0.6	3	3.0	0.4	3	8.0	1.1	5	7	5	2.0	0.3	3
- Forbs	25	5	8.0	0.3	3	6.0	0.2	2.5	12.0	0.5	3	9	5	0.0	0.0	2.5
3. Tree canopy height (m):																
- Canopy Layer	17		15.8	0.9	5	15.8	0.9	5	17.7	1.0	5	18.4	5	22.3	1.2	5
- Sub-Canopy Layer	6		NA	NA		NA	NA		8.0	1.3	5	NA	NA	NA	NA	NA
- Emergent Layer																
Average Score		5			5			5			5					5
4. Tree canopy cover (%):																
- Canopy Layer	55		46.0	0.8	5	38.0	0.7	5	48.0	0.9	5	34.3	5	85.0	2.5	3
- Sub-Canopy Layer	13		NA	NA		NA	NA		29.0	2.2	3	NA	NA	NA	NA	NA
- Emergent Layer																
Average Score		5			5			5			4					3
5. Native shrub canopy cover (%):	7	5	1.0	0.1	3	5.0	0.7	5	13.0	1.9	5	3	5	1.0	0.3	3
6. Native perennial grass cover (%):	35	5	94.0	2.7	5	80.0	2.3	5	79.0	2.3	5	65	5	0.0	0.0	0
7. Organic litter (%):	17	5	3.0	0.2	3	20.0	1.2	5	20.0	1.2	5	21	5	6.0	0.3	3
8. Large trees/ha																
- Eucalypts	23		8.0			10.0			44.0			52		72.0		
- Non-eucalypts	2		0.0			0.0			2.0			0		2.0		
- Total	25	15	8.0	0.3	5	10.0	0.4	5	46.0	1.8	15	52	15	74.0	1.4	15
9. Coarse woody debris (m/ha):	290	5	280.0	1.0	5	240.0	0.8	5	430.0	1.5	5	197	5	400.0	2.0	2
10. Non-native plant cover (%):	0	10	7.0	7.0	5	0.0	0.0	10	0.0	0.0	10	0	10	92.2	92.2	0
Ecological Condition Indicator Score:					**53**			**63.5**			**75**					**49.5**
Site Condition Score	**Max Score**											**Max Score**				
1. Size of patch (Fragmented)	10	10			10.0			10.0			10.0	10	10			10.0
2. Connectedness (Fragmented)	5	5			5.0			5.0			4.0	5	5			4.0
3. Context (Fragmented)	5	5			5.0			5.0			5.0	5	5			4.0
4. Distance from water (Intact)	NA	na			NA			NA			NA	NA	na			NA
5. Ecological Corridors	6	6			6.0			6.0			6.0	6	6			6.0
Site Condition Score:					**26.0**			**26.0**			**25.0**					**24.0**
Species Habitat Index Score	**Max Score**											**Max Score**				
1. Threats to species	15	15			10.0			10.0			10.0	15	15			10.0
2. Quality and availability of food and foraging habitat	10	10			10.0			10.0			10.0	10	10			10.0
3. Quality and availability of shelter	10	10			10.0			10.0			10.0	10	10			10.0
4. Species mobility capacity	10	10			10.0			10.0			10.0	10	10			10.0
5. Role of site location to species overall population in the state	5	5			4.0			4.0			4.0	5	5			4.0
Species Habitat Index Score:					**44.0**			**44.0**			**44.0**					**44.0**
Habitat Quality Score (Max)		**156**											**156**			
Habitat Quality Score (measured):			**123.00**			**133.50**			**144.00**					**117.50**		
Average Habitat Quality Score (measured):			**133.50**											**117.50**		
Assessment Unit Habitat Quality Score			**8.56**											**7.53**		
Proportion of Offset Area Assessed			**0.80**											**0.20**		
Weighted Habitat Quality Score			**6.85**											**1.51**		
Habitat Quality Score out of 10			**8.35**													

Improved score
Declined score

* Draft Benchmarks provided by the Queensland Herbarium

B.2 Magnificent Brood Frog Habitat Quality Calculations

Assessment Type (Impact Site / Offset Site):			AU 1			AU 1			AU 1		
Fragmented/Intact Subregion			Fragmented			Fragmented			Fragmented		
Assessment Site No.:			BC112 (2023)			BC125 (2023)			HQ208 (2023)		
Regional Ecosystem:	7.12.30 (Draft)*		7.12.30a			7.12.30a			7.12.30a		
BVG1M:	10b		10b			10b			10b		
Ecological Condition Indicator	Benchmark	MAX VALUES	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	5	100.0	1.0	5	75.0	0.8	5	89.0	0.9	5
2. Native plant species richness (No.):											
- Trees	5	5	4.0	0.8	3	6.0	1.2	5	9.0	1.8	5
- Shrubs	13	5	5.0	0.4	3	6.0	0.5	3	6.0	0.5	3
- Grasses	7	5	4.0	0.6	3	3.0	0.4	3	8.0	1.1	5
- Forbs	25	5	8.0	0.3	3	6.0	0.2	2.5	12.0	0.5	3
3. Tree canopy height (m):											
- Canopy Layer	17		15.8	0.9	5	15.8	0.9	5	17.7	1.0	5
- Sub-Canopy Layer	6		NA	NA		NA	NA		8.0	1.3	5
- Emergent Layer											
Average Score		5			5			5			5
4. Tree canopy cover (%):											
- Canopy Layer	55		46.0	0.8	5	38.0	0.7	5	48.0	0.9	5
- Sub-Canopy Layer	13		NA	NA		NA	NA		29.0	2.2	3
- Emergent Layer											
Average Score		5			5			5			4
5. Native shrub canopy cover (%):	7	5	1.0	0.1	3	5.0	0.7	5	13.0	1.9	5
6. Native perennial grass cover (%):	35	5	94.0	2.7	5	80.0	2.3	5	79.0	2.3	5
7. Organic litter (%):	17	5	3.0	0.2	3	20.0	1.2	5	20.0	1.2	5
8. Large trees/ha											
- Eucalypts	23		8.0			10.0			44.0		
- Non-eucalypts	2		0.0			0.0			2.0		
- Total	25	15	8.0	0.3	5	10.0	0.4	5	46.0	1.8	15
9. Coarse woody debris (m/ha):	290	5	280.0	1.0	5	240.0	0.8	5	430.0	1.5	5
10. Non-native plant cover (%):	0	10	7.0	7.0	5	0.0	0.0	10	0.0	0.0	10
Ecological Condition Indicator Score:					53			63.5			75
Site Condition Score	Max Score	80									
1. Size of patch (Fragmented)	10	10			10.0			10.0			10.0
2. Connectedness (Fragmented)	5	5			5.0			5.0			4.0
3. Context (Fragmented)	5	5			5.0			5.0			5.0
4. Distance from water (Intact)	NA	na			NA			NA			NA
5. Ecological Corridors	6	6			6.0			6.0			6.0
Site Condition Score:					26.0			26.0			25.0
Species Habitat Index Score	Max Score	26									
1. Threats to species	15	15			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10	10			10.0			10.0			10.0
3. Quality and availability of shelter	10	10			10.0			10.0			10.0
4. Species mobility capacity	10	10			10.0			10.0			10.0
5. Role of site location to species overall population in the state	5	5			4.0			4.0			4.0
Species Habitat Index Score:					41.0			41.0			41.0
Habitat Quality Score (Max)		156									
Habitat Quality Score (measured):			120.00			130.50			141.00		
Average Habitat Quality Score (measured):			130.50								
Habitat Quality Score out of 10			8.37								

Improved score

Declined score

* Draft Benchmarks provided by the Queensland Herbarium

Appendix 8 Landscape Fire Management Plan

FIRELAND CONSULTANCY

Neoen Australia

Kaban Green Power Hub

Landscape Fire Management Plan

April 2023

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Neoen Australia – Kaban Green Power Hub – Landscape Fire Management Plan

Project Site:	1 / RP735194 2 / RP735194 32 / CWL254 - Offset Area 33 / CWL374 - Partial 34 / CWL374 - Partial 35 / CWL391 - Partial	**Area:**	806.72 ha 393.8 ha 185.79 ha (126.7ha is offset) 68.03 ha 47.21 ha 26.37 ha	**LFMP Version:**	V1.0 – **3rd May 2023**

Introduction

This Landscape Fire Management Plan (LFMP) is designed to meet the specific bushfire management needs of Neoen Australia Pty Ltd. The plan is comprised of the following sections:

1. The supporting information: provides background on the detail that informed strategic decisions within the strategy.
2. The Fire Strategy: identifies the Strategic objectives, the current state of the Project Site values, and desired outcomes.
3. The Operational Plan: includes an indicative works schedule and specifications to achieve the strategic outcomes.

LFMP Background

This Plan has been developed to guide bushfire management of across the Kaban Green Power Hub Project Site as well as satisfying the requirements of the Offset Area Management Plan [1] (OAMP). The OAMP was developed in 2021 to guide the management of legally secured offset areas located within the Project Site.

Fire management related objectives identified in the Offset Area Management Plan are:

- Protect the offset areas from high-intensity wildfires that may impact site vegetation and species habitat suitability; and
- Improve the ecological condition of offset areas through implementation of appropriate fire regimes.

Due to the location and nature of the Offset areas within the Project Site, achievement of the above objectives will require fire management activities to be extended to the entire project site. Hence this LFMP addresses fire management requirements for both the offset areas and the broader project site.

Additional information:

This document details the objectives and associated strategy and operational works required to manage bushfire related threats across the broader Kaban Green Power Hub Project Site. A separate Bushfire Management Plan [2] (BMP) was prepared in 2021 to identify the bushfire management requirements associated with the Kaban Green Power Hub project infrastructure. The BMP was developed as a requirement of the Development Permit for a Material Change of Use and only focussed on the Project Footprint, comprising approximately 136ha of the overall site of 1,345ha.

The recommendations contained in this Landscape Fire Management Plan do not supersede or override any requirements identified in the LEC Report. In particular the Asset Protection Zone (APZ) requirements from the LEC report have been incorporate directly into this LFMP. Fireland Consultancy has not undertaken any work to verify or validate the assessments used by LEC to determine the required APZ minimum widths. Their use in this report does not constitute any form of verification of their validity.

[1] Kaban Green Power Hub - Offset Area Management Plan. E2M Consulting May 2021.
[2] Bushfire Management Plan. Land and Environment Consultants (LEC) May 2021.

Project Site Background

The Kaban Green Power Hub project site is located approximately 8.5km north west of Ravenshoe. The site covers approximately 1330 ha. The majority of the site is covered by remnant open forest vegetation which is in good ecological health. Areas of non-remnant vegetation, previously cleared for agricultural purposes, are also largely forested. These areas typically contain a range of native and exotic plant species including a number of weed species that are being actively managed.

The site is contiguous with large, forested areas contained within the Ravenshoe State Forest, The Bluff State Forest and the Evelyn Creek Conservation Park.

Objectives of the LFMP

1. Protection of human life and built assets.
2. Protect the offset areas from high-intensity wildfires that may impact site vegetation and species habitat suitability.
3. Improve the ecological condition of offset areas through implementation of appropriate fire regimes.
4. Maintain and enhance the ecological values of the remainder of the site.

Built Asset Values within the Project Site

- Twenty-eight Wind Turbine Generators
- Substation & grid connection infrastructure
- Operations and Maintenance Building
- Meteorology Mast
- Water supply bores x 2
- Sawmill (Adam Lockyer – Access agreement)
- Private residence (Adam Lockyer – Access agreement)
- Private residence (owned by David Higham)

Bushfire related threats to the Built Asset Values within the Project Site

1. Smoke impacts.
2. Ember attack, radiant heat, and direct flame contact on built assets.

Built Asset Values in the surrounding landscape

The broader landscape contains numerous built assets that need to be considered as part of the Strategic Plan including:

- 2x 132kV Power Transmission Lines (operated by Powerlink)
- 2 x 275kV Power Transmission Lines (operated by Powerlink)
- Private residences 1.2km ENE and 2.1 km NW of the Operations and & Maintenance Building
- Communities of Tumoulin, Ravenshoe and Millstream.

Bushfire related threats to the surrounding Built Asset Values

1. Smoke impacts.
2. Ember attack, radiant heat, and direct flame contact.

Offset areas

A total of 307.6ha of offset areas have been set aside in 7 separate locations across the site. They are legally secured and protected areas of magnificent brood frog and greater glider habitat. A separate Offset Area Management Plan has been developed for these areas. Effective and ecologically appropriate fire management is a key component of the Plan.

Bushfire related threats to the Offset areas and associated habitat values

1. Inappropriate fire regimes leading to a decline in habitat values.
2. High intensity bushfire negatively impacting natural values.
3. Lack of fire age class diversity across the site increasing the potential for a single fire event to impact all areas.
4. Vegetation clearing during fire suppression operations.

Disclaimer

Natural values

Regional Ecosystems

There are numerous regional ecosystems (vegetation communities) occurring within the Project Site. The Regional Ecosystem descriptions contain Fire Management Guidelines for these ecosystems. The area sits on the boundary of two Bioregions. The Wet Tropics Bioregion Planned Burn Guidelines (PBG) and the Einasleigh Uplands Bioregion Planned Burn Guidelines (PBG) provide further guidance on managing these communities to optimise their ecological health. The chapters in the PBG are based on Fire Vegetation Groups which are groups of regional ecosystems with similar ecological fire requirements.

Regional ecosystems [3]	Fire Vegetation Group and relevant chapter in the Wet Tropics PBG	Recommended fire interval [4]	Recommended burn coverage	Area of RE within Project Site		EPBC Status	VM Class [5]	BD Status [6]
				Hectares	% of total area			
7.3.26a Casuarina cunninghamiana woodland to open forest on alluvium fringing streams	Riparian Communities - Ch 8	Do not deliberately burn	N/A	0.9	0.1%	Nil	OC	E
9.3.15 Eucalyptus tereticornis +/- Casuarina cunninghamiana +/- Melaleuca spp. fringing woodland on channels and levees	Riparian Communities - Ch 4 [7]	Do not deliberately burn	N/A	0.2	0.01%	Nil	LC	OC
7.8.7a Eucalyptus tereticornis open forest and associated grasslands, predominantly on basalt uplands	Open forests - Ch 2	2 – 5 years	<30%	6.7	0.5%	Nil	OC	E
7.8.8a Eucalyptus tereticornis, E. reducta +/- Angophora floribunda open forest to woodland on basalt	Open forests - Ch 2	2 – 5 years	<30%	57.9	4.2%	Nil	OC	E
7.8.8b Eucalyptus reducta open forest to woodland. Uplands and highlands on basalt, of the moist rainfall zone.	Open forests - Ch 2	2 – 5 years	<30%	3.6	0.3%	Nil	OC	E
7.8.10b Eucalyptus moluccana woodland to open forest. Uplands and highlands on basalt, of the dry rainfall zone.	Open forests - Ch 2	2 – 5 years	<30%	8.9	0.7%	Nil	OC	OC
7.8.19 Corymbia clarksoniana open forest to woodland on basalt.	Open forests - Ch 2	2 – 5 years	<30%	5	0.4%	Nil	E	E
7.12.27a Eucalyptus reducta medium open forest and woodland. Uplands and highlands on shallow granitic and rhyolitic soils, of the moist rainfall zone.	Open forests - Ch 2	2 – 5 years	<30%	188.6	13.8%	Nil	LC	NCP
7.12.27c Eucalyptus resinifera and Syncarpia glomulifera open woodland. Uplands and highlands on shallow granitic and rhyolitic soils of the moist rainfall zone.	Open forests - Ch 2	2 – 5 years	<30%	15.5	1.1%	Nil	LC	NCP
7.12.30a Corymbia citriodora, Eucalyptus portuensis, C. intermedia, Syncarpia glomulifera woodland to low woodland top open forest with Callitris intratropica, Acacia calyculata and Xanthorrhoea johnsonii.	Open forests - Ch 2	2 – 5 years	<30%	361.2	26.5%	Nil	LC	NCP
7.12.34 Eucalyptus portuensis and/or E. drepanophylla, +/- C. intermedia +/- C. citriodora, +/- E. granitica open woodland to open forest on uplands on granite.	Open forests - Ch 2	2 – 5 years	<30%	12.5	0.9%	Nil	LC	NCP
7.12.60a Floodplain (other than floodplain wetlands). Melaleuca viridiflora woodland. Granite and rhyolite.	Melaleuca Communities - Ch 7	5 – 15 years	<30%	7.2	0.5%	Nil	OC	E
7.12.65a Rock pavement communities of dry rainfallzone with Acacia leptostachya, Eucalyptus lockyeri subsp. exuta, Lophostemon confertus, L. suaveolens, Persoonia falcata, Ficus rubiginosa and Allocasuarina inophloia.	N/A	6 – 10 years	Burn in association with surrounding vegetation.	0.2	0.01%	Nil	LC	OC
9.12.4 Eucalyptus shirleyi and/or E. melanophloia and/or Corymbia peltata and/or Callitris intratropica low open woodland on igneous rocks.	Eucalypt Communities - Ch 1 [7]	5 – 10 years	Apply mosaic across the landscape	12.8	0.9%	Nil	LC	NCP
9.12.20 Eucalyptus pachycalyx +/- E. cloeziana +/- Corymbia leichhardtii woodland on steep igneous hills	Eucalypt Communities - Ch 1 [7]	5 – 10 years	Apply mosaic across the landscape	0.4	0.03%	Nil	LC	NCP
9.12.30a Woodland to open forest of Corymbia leichhardtii (yellowjacket) and Eucalyptus cloeziana (Gympie messmate) +/- E. portuensis (white mahogany) +/- C. citriodora subsp. citriodora (lemon-scented gum) +/- E. cullenii (Cullen's ironbark) +/- Callitris intratropoica (cypress pine).	Eucalypt Communities - Ch 1 [7]	5 – 10 years	Apply mosaic across the landscape	683	50%	Nil	LC	NCP

[3] Information primarily sourced from *Planning Report – Kaban Green Power Hub* (AECOM 2017).
[4] Source: Fire Management Guidelines. Planned burning may occur outside of the recommended intervals and coverages to achieve the Objectives identified in the plan.
[5] Vegetation Management Act Class: E – Endangered, OC – Of Concern, LC – Least Concern.
[6] Biodiversity status: E – Endangered, OF – Of Concern, NCP – No Concern at Present.
[7] See the Einasleigh Uplands Bioregion Planned Burn Guidelines for chapters relating to this Regional Ecosystem.

Flora Species

Species name	Common name	EPBC Status [8]	NCA Status [9]	Distribution / habitat [10]	Likelihood of occurring within Project Site
Coleus amoenus (formerly *Plectranthus amoenus)*		NL	V	Known from Atherton Tableland between Atherton and Herberton. Occurs on granite rock outcrops and pavements in open forest. There are four known populations recorded within the Project Site.	Known
Diuris oporina	Northern white donkeys tail	NL	NT	This terrestrial orchid grows to 50 cm in height and is known from grassy woodlands on rhyolite, open woodlands with granite soils open forests near creek lines dominated by canopy species including: Eucalyptus citriodora, E. cullenii, Callitris columellaris with understory of Xanthorrhoea and grasses.	Known
Grevillea glossadenia		V	V	Eucalypt woodland to low open forest in shallow granitic soils. Species is known to occur on rolling hills, gravel terraces near stream beds and in along tracks. Associated species include Eucalyptus cloeziana, E. cullenii, Corymbia leichhardtii, C. citriodora, Xanthorrhoea johnsonii. Homoranthus porteri (TSSC, 2008e).	High
Homoranthus porteri		V	V	Restricted range from Mareeba to Ravenshoe area. Usually recorded in woodland or heath in shallow soils on several rock types. Habitat includes rock outcrops, rocky hillsides, rock escarpments and sandstone pavement (TSSC, 2008f).	High
Aponogeton bullosus	North Queensland Lace Plant	E	E	Aquatic species which prefers shallow, cool, fast flowing rivers and streams on granite sand surfaces (TSSC, 2008b)	High
Melaleuca sylvana		NL	E	A tree or shrub to 5 m with papery bark and aromatic and very fine foliage. Occurs in Eucalyptus and Callitris open woodlands with grassy understory or closed heath. Grows on sandy soils derived from rhyolite and on steep rocky slopes around rhyolite outcrops above 800 m (DEHP, 2017).	High
Prostanthera clotteniana		CE	E	Occurs in stunted Eucalyptus woodland on granite or rhyolite-derived soils on rocky outcrops, cliff faces and rocky hillslopes at altitudes between 700 m and 800 m. Known from several populations in Atherton and Ravenshoe area (TSSC, 2015a).	High
Oenanthe javanica	Water Celery	NL	NT	A stoloniferous herbaceous perennial which grows to around 1 m in height and often forms pure stands. Occurs along slow moving streams or in areas of soakage in coastal and subcoastal north Queensland (Stephens and Dowling, 2002). Several records are known from creeklines within 10 km of the Study Area.	Moderate

Potential threats and impacts to these values should considered during any fire suppression operations undertaken across the site.

During detailed planning for fire access track maintenance works and planned burns the potential impacts of those works on the above species should be considered. Appropriate mitigation measures should be identified and implemented were practicable. Given the paucity of knowledge relating to the impacts of fire to these individual species an approach of maintaining healthy ecosystems at a landscape level should be the primary mitigation measure considered.

[8] *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) status: CE – Critically Endangered, E – Endangered, V – Vulnerable, NL – Not listed.
[9] Nature Conservation Act 1992 (NCA) status: E – Endangered, V – Vulnerable, NT – Near threatened.
[10] Information sourced from Kaban Green Power Hub – Flora Technical Report. AECOM Dec 2017

Fauna Species

Species name	Common name	EPBC Status [11]	NCA Status [12]	Likelihood of occurring within Project Site [13]
Macroderma gigas	Ghost bat	V	E	Known
Petauroides volans	Greater glider	V	V	Known
Pseudophryne covacevichae	Magnificent brood frog	V	V	Known
Pteropus conspicillatus	Spectacled flying fox	V	V	Known
Dasyurus hallucatus	Northern quoll	E	LC	Known
Tachyglossus aculeatus	Short-beaked echidna	NL	SLC	High
Apus pacificus	Fork-tailed swift	M	SLC	High
Hirundapus caudacutus	White-throated needletail	M	SLC	High
Erythrotriorchis radiatus	Red Goshawk	V	E	Moderate
Geophaps scripta scripta	Squatter pigeon	V	V	Moderate
Mesembriomys gouldii rattoides	Black-footed tree-rat (north Queensland)	V	LC	Moderate
Petaurus australis Wet Tropics subspecies	Yellow-bellied glider (wet tropics)	V	V	Moderate
Tyto novaehollandiae kimberli	Masked owl (northern)	V	V	Moderate
Phascolarctos cinereus	Koala	V	V	Moderate
Delma mitella	Atherton delma	V	NT	Moderate
Ornithorhynchus anatinus	Platypus	NL	SLC	Moderate
Cuculus optatus	Oriental cuckoo	M	SLC	Moderate
Myiagra cyanoleuca	Satin flycatcher	M	SLC	Moderate
Gallinago hardwickii	Latham's snipe	M	SLC	Moderate

Potential threats and impacts to these values should considered during any fire suppression operations undertaken across the site.

During detailed planning for fire access track maintenance works and planned burns the potential impacts of those works on the above species should be considered. Appropriate mitigation measures should be identified and implemented were practicable. Given the paucity of knowledge relating to the impacts of fire to these individual species an approach of maintaining healthy ecosystems at a landscape level should be the primary mitigation measure considered.

Bushfire related threats to the Natural Values

1. Inappropriate fire regimes leading to a decline in habitat and values for rare and threatened species.
2. High intensity bushfire negatively impacting natural values.
3. Lack of fire age class diversity across the site increasing the potential for a single fire event to impact all areas.
4. Weed proliferation can occur due to inappropriate use of fire and/or lack of fire and follow-up treatment.

[11] *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) status: E – Endangered, V – Vulnerable, M – Migratory, NL – Not listed.
[12] Nature Conservation Act 1992 (NCA) status: E – Endangered, V – Vulnerable, NT – Near threatened, SLC – Special least concern, LC – Least concern.
[13] Information sourced from Kaban Green Power Hub – Fauna Technical Report. AECOM Dec 2017. No additional fauna survey work has been undertaken.

Cultural heritage values

Thirty-three cultural heritage finds have been identified to date across the project site.

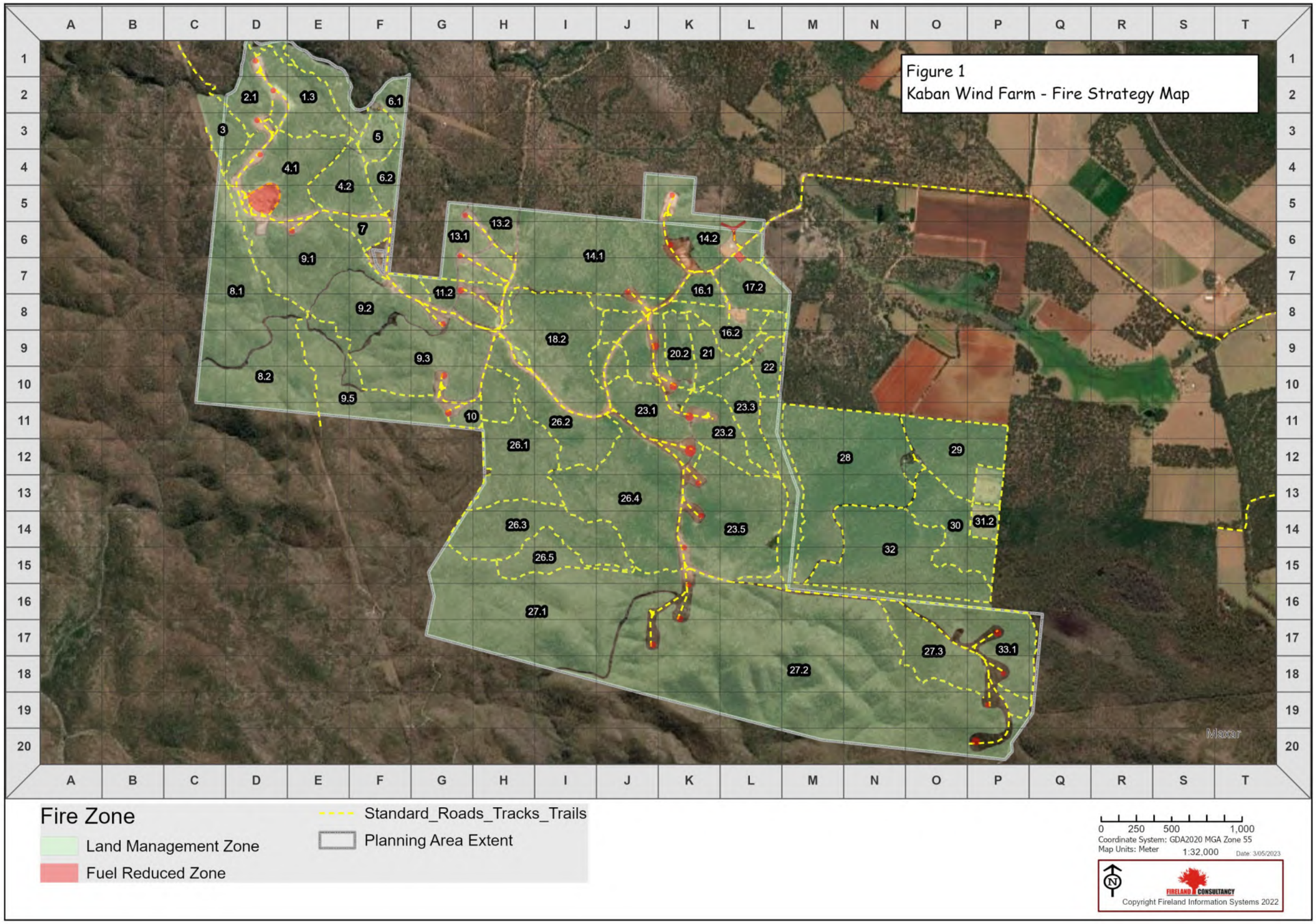
Cultural heritage item type	**Bushfire management related threat**		**Recommended mitigation measures**							
	Disturbance or damage from machinery undertaking fire access track construction and maintenance.	Loss or damage from fire impact.	Minimise the need for new fire access tracks.	Confine maintenance works to within existing disturbance footprints.	Minimise the need for mineral earth disturbance when conducting track maintenance.	Mark known sites on Operational maps.	Manually reduce fuels around known trees prior to planned burns.	Monitoring during planned burns where safe to do so.	Implement appropriate fire regimes.	Implement *Chance find protocols* during works to manage any additional potential items found.
Stone artefacts	X		X	X	X					X
Grinding bowls	X		X	X	X	X				X
Carved, scared or bent trees	X	X	X	X	X	X	X	X		X
Traditional food plants	X	X	X	X	X				X	X
Ochre	X		X	X	X					X
Fire sticks	X	X	X	X	X					X

Fire Management Strategy

Fire Management Zone:	Strategic Objective: *What are we setting out to achieve?*	Desired condition to be achieved through the life of this Strategy: *What do we want this zone to look like?*
Fuel Reduced Zones (FRZ)	• Reduce the likelihood and potential severity of bushfire impact (direct flame contact, radiant heat, ember attack and smoke impacts) on built assets.	• FRZs maintained as a hardened surface to minimise any future requirements for vegetation maintenance. Where not practical, they are to be maintained clear of woody vegetation and with grass cover which is nominally < 10 cm in height.
Land Management Zones (LMZ)	• To reduce the likelihood of high-intensity wildfires that may impact site vegetation and species habitat suitability; and • Improve the ecological condition of offset areas through implementation of appropriate fire regimes.	• Fire intervals across the site consistent with planned burn guideline recommendations. • Diversity of fire age classes across the site to reduce the likelihood of and potential impacts of a single, whole of project site bushfire event.
Strategic Fire Access Tracks [14]	• To maintain a network of fire access tracks that can be safely and effectively traversed by light 4WD vehicle to enable access for planned burning, offset area management and weed management activities.	• Strategic Fire Access Tracks are accessible, safe and fit for purpose for use by light 4WD. • Strategic Fire Access Tracks maintained on a regular basis to support the implementation of planned burns, offset area management and vegetation management activities. • Runoff and erosion control measures appropriate to the trail surface material, slope and planned level of utilisation are in place and maintained.
Dormant Fire Access Tracks	• A network of historical access tracks that could be utilised to support fire suppression operations. Current alignment and condition do not warrant re-opening and ongoing maintenance to achieve the objectives of this plan.	• Dormant tracks to remain unmaintained. • Tracks can be reopened if required to support fire suppression operations where operationally appropriate and impacts on site values including offset areas are minimised.

[14] These tracks are in addition to the Site Access Roads that have been constructed or upgraded as part of the initial development. Maintenance requirements for the Site Access Roads are not detailed in this plan.

Fire Management Strategy Map



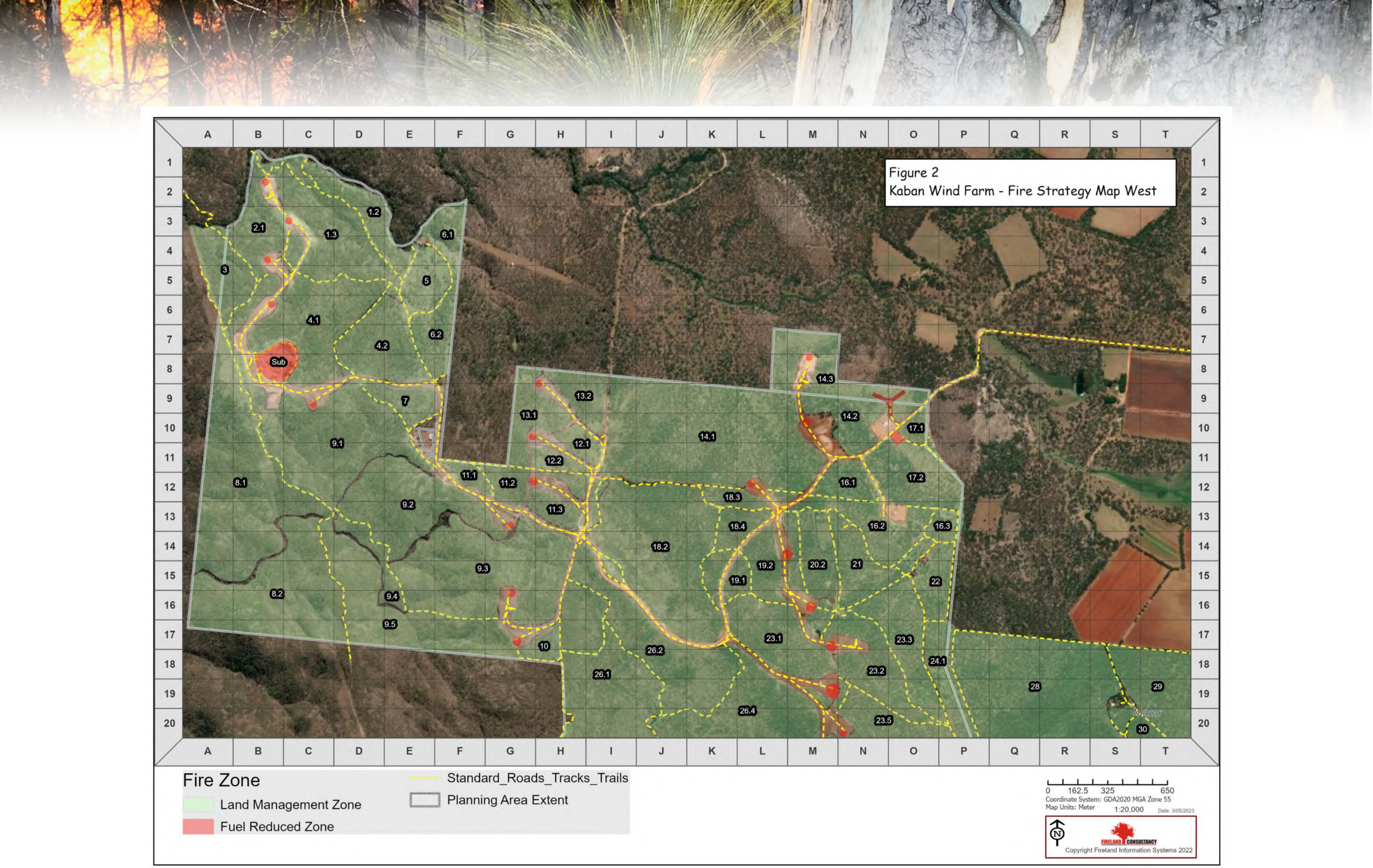


Figure 2
Kaban Wind Farm - Fire Strategy Map West
A B C D E F G H I J K L M N O P Q R S T
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1.2
2.1
1.3
6.1
3
5
4.1
6.2
4.2
Sub
7
9.1
8.1
9.2
11.1
11.2
11.3
13.2
13.1
12.1
12.2
14.1
14.3
14.2
17.1
16.1
17.2
18.3
18.4
16.2
16.3
18.2
19.2
20.2
21
22
19.1
9.3
8.2
9.4
9.5
10
26.2
26.1
23.1
23.3
24.1
23.2
26.4
23.5
28
29
30
Maxar
Fire Zone
Land Management Zone
Fuel Reduced Zone
Standard_Roads_Tracks_Trails
Planning Area Extent
0 162.5 325 650
Coordinate System: GDA2020 MGA Zone 55
Map Units: Meter
1:20,000
Date: 3/05/2023
FIRELAND CONSULTANCY
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Figure 3
Kaban Wind Farm - Fire Strategy Map East

Fire Zone
Land Management Zone
Fuel Reduced Zone
Standard_Roads_Tracks_Trails
Planning Area Extent

0 162.5 325 650
Coordinate System: GDA2020 MGA Zone 55
Map Units: Meter 1:20,000 Date: 3/05/2023

Operational Plan 2023 - 2027

Management Unit:	Desired Condition: *What do we want this zone to look like? From Fire Management Strategy table.*	Current condition of the Fire Zone (2022): *What does this zone look like now?*	Operational Treatment Objective: *How will we measure success?*	Recommended Actions and Timings:	Additional notes to support Operational Implementation:
Fuel Reduced Zones (FRZ): • Operations & Maintenance Building • WTG01 – WTG28 • Substation • Water Supply Bores	• FRZs maintained as a hardened surface to minimise any future requirements for vegetation maintenance. Where not practical, they are to be maintained clear of woody vegetation and with grass cover which is nominally < 10 cm in height.	• FRZs have been cleared of vegetation to facilitate construction activities and currently meet requirements identified in this plan.	• Maintain Overall Fuel Hazard at or below Moderate. • Refer to Treatment Specifications – Asset Protection Zones for the widths of each FRZ.	• Annual assessment of FRZ condition in November. • Follow-up treatment as required to maintain as per standard.	• Use spot herbicide application to treat woody eucalypt regrowth, particularly in areas where mechanical maintenance treatment cannot be conducted due to slope or terrain.
Fuel Reduced Zone (FRZ): Meteorology Mast	• FRZ to be maintained as a combination of hardened surface within a broader regularly slashed grass area.	• Grassland with scattered woody eucalypt regrowth.	• Maintain Overall Fuel Hazard at or below Moderate.	• Annual assessment of FRZ condition recommended. • Follow-up treatment as required to maintain as per standard.	• Use spot herbicide application to treat woody eucalypt regrowth, particularly in areas where mechanical maintenance treatment cannot be conducted due to proximity of guy wires.
Land Management Zones (LMZ): 3 - 7, 13, 14, 16 - 25, 28 - 33. Open Forests (Refer to Fig 1 – 3)	• Fire intervals across the site consistent with planned burn guideline recommendations. • Diversity of fire age classes across the site to reduce the likelihood of and potential impacts of a single, whole of project site bushfire event.	• Generally, in good ecological health with some weeds particularly in lower areas where more intensive grazing was carried out. • Open forest areas with grassy understorey.	• Implement Low to Moderate intensity planned burns with <30% coverage.	• 2 - 5 year interval to maintain a healthy grassy system. Refer to ***Indicative Works Schedule*** for recommended timing of planned burns across these units.	• Unit 18.2 contains two known populations of *Coleus amoenus* (formerly *Plectranthus amoenus*). The species occurs on granite rock outcrops and pavements in open forest. Mineral earth disturbance should be minimised in these areas. The response of the species to fire is unknown. Where practical fire should be excluded from rock outcrops and pavement areas. • Utilise sub-units where possible to support achievement of coverage objectives.
Land Management Zones (LMZ): 1, 2, 8 – 12, 27. Eucalypt Communities (Refer to Fig 1 – 3)	• Fire intervals across the site consistent with planned burn guideline recommendations. • Diversity of fire age classes across the site to reduce the likelihood of and potential impacts of a single, whole of project site bushfire event.	• Generally, in good ecological health with some weeds particularly in lower areas where more intensive grazing was carried out. • Open forest areas with grassy understorey.	• Apply mosaic across the landscape	• 5 - 10 year interval to maintain a healthy grassy system. Refer to ***Indicative Works Schedule*** for recommended timing of planned burns across these units.	• Units 9.2 and 11.2 contain two known populations of *Coleus amoenus* (formerly *Plectranthus amoenus*). The species occurs on granite rock outcrops and pavements in open forest. Mineral earth disturbance should be minimised in these areas. The response of the species to fire is unknown. Where practical fire should be excluded from rock outcrops and pavement areas. • Utilise sub-units where possible to support achievement of coverage objectives.

Operational Plan 2023 – 2027 continued

Management Unit:	Desired Condition: *What do we want this zone to look like? From Fire Management Strategy table.*	Current condition of the Fire Zone (2022): *What does this zone look like now?*	Operational Treatment Objective: *How will we measure success?*	Recommended Actions and Timings:	Additional notes to support Operational Implementation:
Strategic Fire Access Tracks	• Strategic Fire Access Tracks are accessible, safe and fit for purpose for use by light 4WD. • Fire Access Tracks maintained on a regular basis to support the implementation of planned burns, offset area management and vegetation management activities. • Runoff and erosion control measures appropriate to the trail surface material, slope and planned level of utilisation are in place and maintained.	• Majority of access tracks are currently not maintained with grassy and shrubby vegetation re-establishing across the track surfaces. • Little to no runoff and erosion control measures are currently in place however track surfaces are generally in good condition.	• Fire Access Tracks are trafficable by light 4WD, during dry weather, year-round. • Refer to *Treatment Specifications* section below for further details.	• Refer to ***Indicative Works Schedule*** for details. • Annual inspection in November to assess condition and maintenance requirements.	• If track maintenance work is undertaken by machinery imported to the property, weed seed hygiene shall be maintained by ensuring that machinery is washed down before entering the site to reduce the spread of weeds. Additional washdown should be undertaken to prevent the spread the Greenleaf Desmodium (*Desmodium intortum*) from Management Unit 29.
Dormant Fire Access Tracks	• To remain unmaintained. • Tracks can be reopened if required to support fire suppression operations where operationally appropriate and impacts on site values including offset areas are minimised.	• Currently not maintained with grassy and shrubby vegetation re-established across the track surfaces.	• Dormant fire access are shown on operational maps.	• No operational works planned. • Tracks to remain unmanaged.	• If tracks are reopened to support suppression operations then appropriate erosion control measures should be implemented as soon as practical.

Treatment specifications

Fuel Reduced Zones [15]

Fuel Reduced Zone	Width (m)	Fuel Reduced Zone	Width (m)
Operations and Maintenance Building	10	Meteorology Mast	10
Substation and grid connection infrastructure	30	Water Bore	5
WTG01	20	WTG15	26.7
WTG02	20	WTG16	26.7
WTG03	20	WTG17	30
WTG04	20	WTG18	40
WTG05	20	WTG19	20
WTG06	20	WTG20	20
WTG07	20	WTG21	20
WTG08	23.5	WTG22	20
WTG09	20	WTG23	23.5
WTG10	23.5	WTG24	23.5
WTG11	23.5	WTG25	26.7
WTG12	20	WTG26	20
WTG13	20	WTG27	20
WTG14	20	WTG28	30

Strategic Fire Access Tracks

All works are to be confined to existing disturbance footprints to minimise vegetation disturbance. Only minor regrowth can be cleared. All works must comply with the requirements of the Offset Area Management Plan [16] and the Vegetation Management Plan [17].

Initial Treatment:	Ongoing Treatment:
• Grasses and shrubs (Near-surface and Elevated fuels) to be slashed or mulched in situ to a width of 2m either side of the centreline of the track. • Lower branches of trees to be removed to a height of 3m above track footprint. • All stumps to be groomed flush with natural surface level. • Any woody debris retained on site to be reduced to less than 5cm in diameter or removed from the treatment area. • Passing / turning bays 4m in depth and 4m in width to be established every 200m along the track, utilising existing natural clearings wherever possible. • Track junctions to cleared to an area of 4m x 4m.	• Grasses and shrubs (Near-surface and Elevated fuels) to be maintained below 20cm in height along tracks and passing/turning bays. • 3m vertical clearance to be maintained above the track footprint. • Woody debris greater than 5cm in diameter to be removed from trails.

[16] Kaban Green Power Hub - Offset Area Management Plan. E2M Consulting May 2021.
[17] Kaban Green Power Hub – Vegetation Management Plan. E2M Consulting, 2021.

Indicative Works Schedule 2023 - 2027

This document has been developed to provide guidance to Neoen Australia on the works required to mitigate the risk of bushfires starting, spreading uncontrollably, and impacting negatively on human life, property, critical assets and the environment. This schedule provides guidance on activities to be conducted over the next five years. This schedule should be reviewed annually in November and adjusted as required based on the current condition of the project site (including considering changes due to planned and unplanned fires).

Fuel Reduced Zones

Management Unit:	2023	2024 onwards
• Operations & Maintenance Building • WTG01 – WTG28 • Substation	Annual inspection in November. Ongoing maintenance where appropriate to maintain to identified standard and width.	
Meteorology Mast	• Install 5m wide radius gravel hard stand areas around tower base and guy wire anchors. • Maintain grasses and shrubs below 10cm in height within 10m radius of tower, guy wire anchors and guy wires through regular slashing. • Woody eucalypt regrowth treatment utilising hand removal and cut stump herbicide treatment may be required prior to initial tractor slashing.	• Ongoing maintenance by slasher mower where appropriate to maintain to identified standard and width. • Selective herbicide treatment to prevent vegetation regrowth on hard stand areas. • Annual inspection in November.
Water Supply Bore - South	• Install a 5m wide radius gravel hard stand area around water bore. • Maintain access track to bore as per access track standards.	• Selective herbicide treatment to prevent vegetation regrowth on hard stand area. • Maintain access track to bore as per access track standards. • Annual inspection in November.

Strategic Fire Access Tracks

Recommended maintenance	Total length of tracks to be treated (km)	2023	2024	2025 onwards
Tractor slashing	12.9	Slash once per year in August. Assess effectiveness, timing and frequency during annual inspection.	Likely slash once per year. Assess effectiveness, timing and frequency during annual inspection.	Likely slash once per year. Assess effectiveness, timing and frequency during annual inspection.
Tractor slash then light maintenance grading	5.2	Slash once per year in August. Assess effectiveness, timing and frequency during annual inspection.	Slash then follow-up with light maintenance grading. Assess effectiveness, timing and frequency during annual inspection.	Likely slash once per year. Assess effectiveness, timing and frequency during annual inspection.
Light maintenance grading	5.4	Confirm requirements for following year (2024) during annual inspection.	Undertake light maintenance grading as required. Assess effectiveness, timing and frequency during annual inspection.	
Dozer work to re-establish drainage	1.7	Confirm requirements for following year (2024) during annual inspection.	Undertake works.	Transition to tractor slash then light maintenance grading
Forest mulching then tractor slashing	2.5	Confirm requirements for following year (2024) during annual inspection.	Mulch then follow-up slash.	Transition to tractor slash
Further assessment required	5.6	Assess during annual inspection.	To be confirmed.	To be confirmed.

Land Management Zones

Management Unit [18]	Last burnt	Recommended fire interval [19]	Implementation notes	2023 [20]	2024	2025	2026	2027
LMZ 1.1 - 1.3	>10 years	5 – 10 years	Includes offset area.		Planned burn			
LMZ 2.1 - 2.3	>10 years	5 – 10 years		Planned burn				
LMZ 3	>10 years	2 – 5 years	Logical boundary is power easement on western side. Burn in conjunction with QPWS.			Planned burn		
LMZ 4.1 & 4.2	>10 years	2 – 5 years	Includes offset area.	Planned burn				
LMZ 5	>10 years	2 – 5 years				Planned burn		
LMZ 6.1& 6.2	>10 years	2 – 5 years	Will require slashing along eastern boundary prior to implementation.				Planned burn	
LMZ 7	>10 years	2 – 5 years			Planned burn			
LMZ 8.1 & 8.2	>10 years	5 – 10 years	Unbounded to the west and south. Burn in conjunction with QPWS.				Planned burn	
LMZ 9.1 - 9.5	>10 years	5 – 10 years	Unbounded to the south. Burn in conjunction with QPWS.			Planned burn		
LMZ 10	>10 years	5 – 10 years				Planned burn		
LMZ 11.1 - 11.3	>10 years	5 – 10 years			Planned burn			
LMZ 12.1 - 12.3	>10 years	5 – 10 years			Planned burn			
LMZ 13.1 & 13.2	>10 years	2 – 5 years	Unbounded on the north and west. Burn in conjunction with private property neighbour.					Planned burn
LMZ 14.1 - 14.3	2020	2 – 5 years	Unbounded to the north. Burn in conjunction with adjoining private property neighbour.				Planned burn	
LMZ 16.1 - 16.4	>10 years	2 – 5 years	Predominantly non remnant.					Planned burn
LMZ 17.1 & 17.2	>10 years	2 – 5 years					Planned burn	
LMZ 18.1 - 18.5	>10 years	2 – 5 years	Includes offset area.			Planned burn		
LMZ 19.1 & 19.2	>10 years	2 – 5 years		Planned burn				
LMZ 20.1 - 20.4	>10 years	2 – 5 years					Planned burn	
LMZ 21	>10 years	2 – 5 years	All non-remnant.					Planned burn
LMZ 22	>10 years	2 – 5 years	All non-remnant.					Planned burn
LMZ 23.1 – 23.6	>10 years	2 – 5 years	Unit 23.4 is offset area.	Planned burn				
LMZ 24.1 – 24.2	>10 years	2 – 5 years	Includes offset area.		Planned burn			
LMZ 25	>10 years	2 – 5 years	Road easement. Burn in conjunction with Council.		Planned burn			
LMZ 26.1 – 26.5	>10 years	5 – 10 years	Unit 26.4 includes offset area. Unbounded to south and west. Burn in conjunction with QPWS.				Planned burn	
LMZ 27.1 – 27.3	Unit 27.2 in 2022	5 – 10 years	Unit 27.2 is an offset area. Unbounded to the south. Burn in conjunction with QPWS.					Planned burn
LMZ 28	>10 years	2 – 5 years	Offset area.			Planned burn		
LMZ 29	2022	2 – 5 years	Includes offset area.		Planned burn			
LMZ 30	>10 years	2 – 5 years	Includes offset area.	Planned burn				
LMZ 31.1 & 31.2	>10 years	N/A	Orchard area. No planned burns required.	N/A	N/A	N/A	N/A	N/A
LMZ 32	>10 years	2 – 5 years	Part offset area.				Planned burn	
LMZ 33.1 & 33.2	>10 years	2 – 5 years	Offset area.					Planned burn

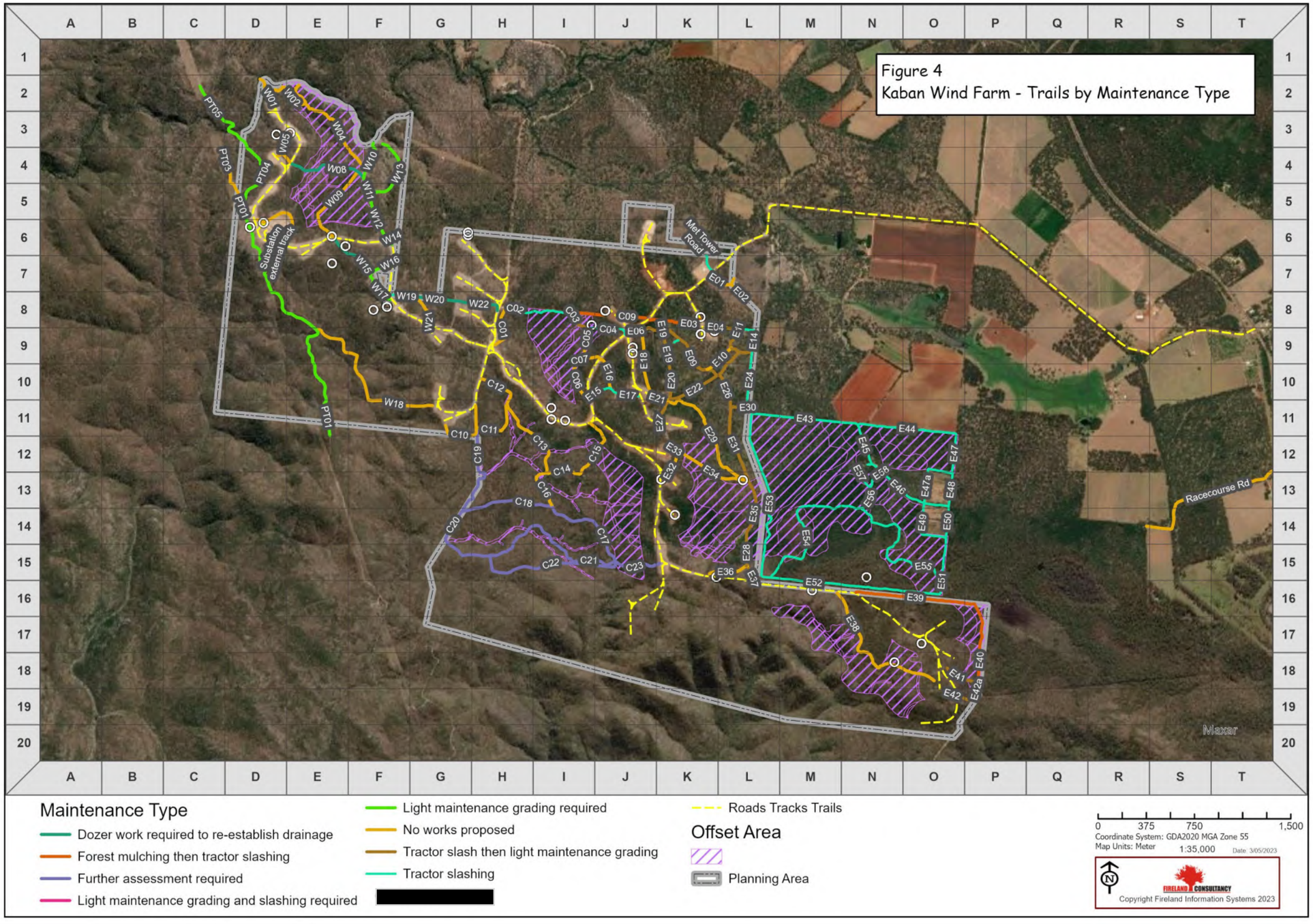
[18] Entire management units may not be treated in a single planned burn. Smaller individual sub-units may be treated to achieve identified objectives.
[19] Recommended fire interval as identified in the Fire Management Guidelines. These generic ecological guidelines are provided for regional ecosystems that are in good condition. Where burning is being conducted for non-ecological or to achieve multiple objectives then other factors relevant to those objectives should also be considered such as fuel re-accumulation rates.
[20] Actual planned burn intervals may be more or less frequent than the recommended schedule to achieve the Objectives identified in this plan. Timing is dependent on previous fire severity and coverage, vegetation type, climatic and seasonal conditions and actual rate of fuel re-accumulation. It is also important to note that some burns are sequenced with other burns in the landscape to further reduce risk, meaning that planned burning operations can occur in the same area over successive years.

Fire Access Track Status and Initial Maintenance Recommendations

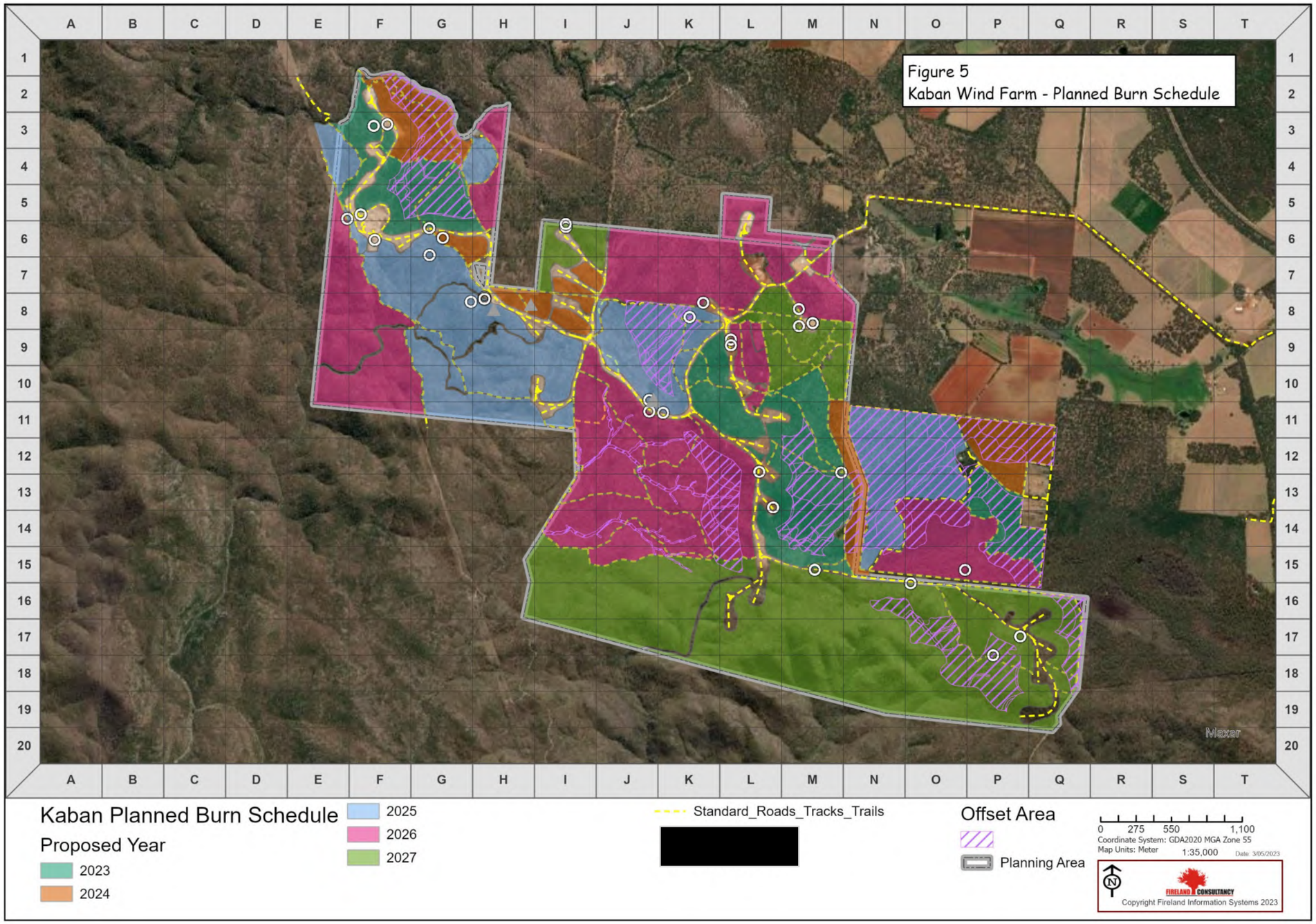
Name	Status	Recommended maintenance	Length (m)
C01	Dormant	No works proposed	331
C02	Strategic	Tractor slashing	548
C03	Strategic	Tractor slash then light maintenance grading	190
C04	Strategic	Tractor slashing	329
C05	Dormant	No works proposed	254
C06	Dormant	No works proposed	376
C07	Dormant	No works proposed	152
C08	Strategic	Forest mulching then tractor slashing	250
C09	Strategic	Forest mulching then tractor slashing	190
C10	Dormant	No works proposed	509
C11	Dormant	No works proposed	398
C12	Dormant	No works proposed	349
C13	Dormant	No works proposed	685
C14	Dormant	No works proposed	158
C15	Dormant	No works proposed	648
C16	Dormant	No works proposed	354
C17	Strategic	Further assessment required	757
C18	Strategic	Further assessment required	715
C19	Strategic	Further assessment required	755
C20	Strategic	Further assessment required	664
C21	Strategic	Further assessment required	1241
C22	Strategic	Further assessment required	1130
C23	Strategic	Further assessment required	354
E01	Dormant	No works proposed	140
E02	Dormant	No works proposed	181
E03	Strategic	Forest mulching then tractor slashing	428
E04	Strategic	Tractor slash then light maintenance grading	154
E05	Strategic	Tractor slashing	131
E06	Strategic	Tractor slash then light maintenance grading	242
E07	Strategic	Tractor slash then light maintenance grading	175
E08	Strategic	Tractor slashing	53
E09	Strategic	Tractor slash then light maintenance grading	343
E10	Dormant	No works proposed	256
E11	Strategic	Tractor slash then light maintenance grading	173
E12	Strategic	Tractor slash then light maintenance grading	67
E13	Strategic	Tractor slash then light maintenance grading	119
E14	Strategic	Tractor slashing	164
E15	Strategic	Tractor slashing	182
E16	Dormant	No works proposed	251
E17	Strategic	Tractor slashing	239
E18	Dormant	No works proposed	461
E19	Strategic	Tractor slash then light maintenance grading	136
E20	Strategic	Tractor slash then light maintenance grading	354
E21	Dormant	No works proposed	118
E22	Strategic	Tractor slash then light maintenance grading	430
E23	Strategic	Tractor slash then light maintenance grading	94
E24	Strategic	Tractor slashing	427
E25	Strategic	Tractor slash then light maintenance grading	248
E26	Strategic	Tractor slash then light maintenance grading	286
E27	Strategic	Tractor slash then light maintenance grading	189
E28	Strategic	Tractor slash then light maintenance grading	198
E29	Dormant	No works proposed	1006
E30	Strategic	Tractor slash then light maintenance grading	121
E31	Strategic	Tractor slash then light maintenance grading	604
E32	Dormant	No works proposed	185
E33	Dormant	No works proposed	68

Name	Status	Recommended maintenance	Length (m)
E34	Dormant	No works proposed	593
E35	Strategic	Tractor slash then light maintenance grading	506
E36	Dormant	No works proposed	317
E37	Strategic	Tractor slash then light maintenance grading	137
E38	Dormant	No works proposed	1235
E42a	Strategic	Tractor slash then light maintenance grading	80
E39	Strategic	Forest mulching then tractor slashing	974
E40	Strategic	Forest mulching then tractor slashing	663
E41	Strategic	Tractor slash then light maintenance grading	271
E42	Strategic	Tractor slash then light maintenance grading	187
E43	Strategic	Tractor slashing	835
E44	Strategic	Tractor slashing	784
E45	Strategic	Tractor slashing	322
E46	Strategic	Tractor slashing	743
E47	Strategic	Tractor slashing	309
E47a	Strategic	Tractor slashing	448
E48	Strategic	Tractor slashing	259
E49	Strategic	Tractor slashing	440
E50	Strategic	Tractor slashing	243
E51	Strategic	Tractor slashing	436
E52	Strategic	Tractor slashing	1398
E53	Strategic	Tractor slashing	1363
E54	Strategic	Tractor slashing	1279
E55	Strategic	Tractor slashing	1205
E56	Strategic	Tractor slashing	204
E57	Strategic	Tractor slashing	126
E58	Strategic	Tractor slashing	148
Met Tower	Strategic	Tractor slashing	143
PT01	Strategic	Light maintenance grading	2172
PT02	Strategic	Light maintenance grading	51
PT03	Dormant	No works proposed	400
PT04	Strategic	Light maintenance grading	327
PT05	Strategic	Light maintenance grading	926
W01	Dormant	No works proposed	211
W02	Dormant	No works proposed	396
W03	Dormant	No works proposed	195
W04	Dormant	No works proposed	749
W05	Dormant	No works proposed	202
W06	Dormant	No works proposed	91
W07	Dormant	No works proposed	71
W08	Strategic	Dozer work to re-establish drainage	648
W09	Dormant	No works proposed	673
W10	Strategic	Light maintenance grading	296
W11	Strategic	Light maintenance grading	157
W12	Strategic	Light maintenance grading	399
W13	Strategic	Light maintenance grading	665
W14	Dormant	No works proposed	72
W15	Strategic	Dozer work to re-establish drainage	402
W16	Strategic	Light maintenance grading	252
W17	Strategic	Light maintenance grading	214
W18	Dormant	No works proposed	1314
W19	Strategic	Tractor slashing	176
W20	Strategic	Dozer work to re-establish drainage	330
W21	Dormant	No works proposed	238
W22	Strategic	Dozer work to re-establish drainage	369

Access Track Maintenance Recommendations Map

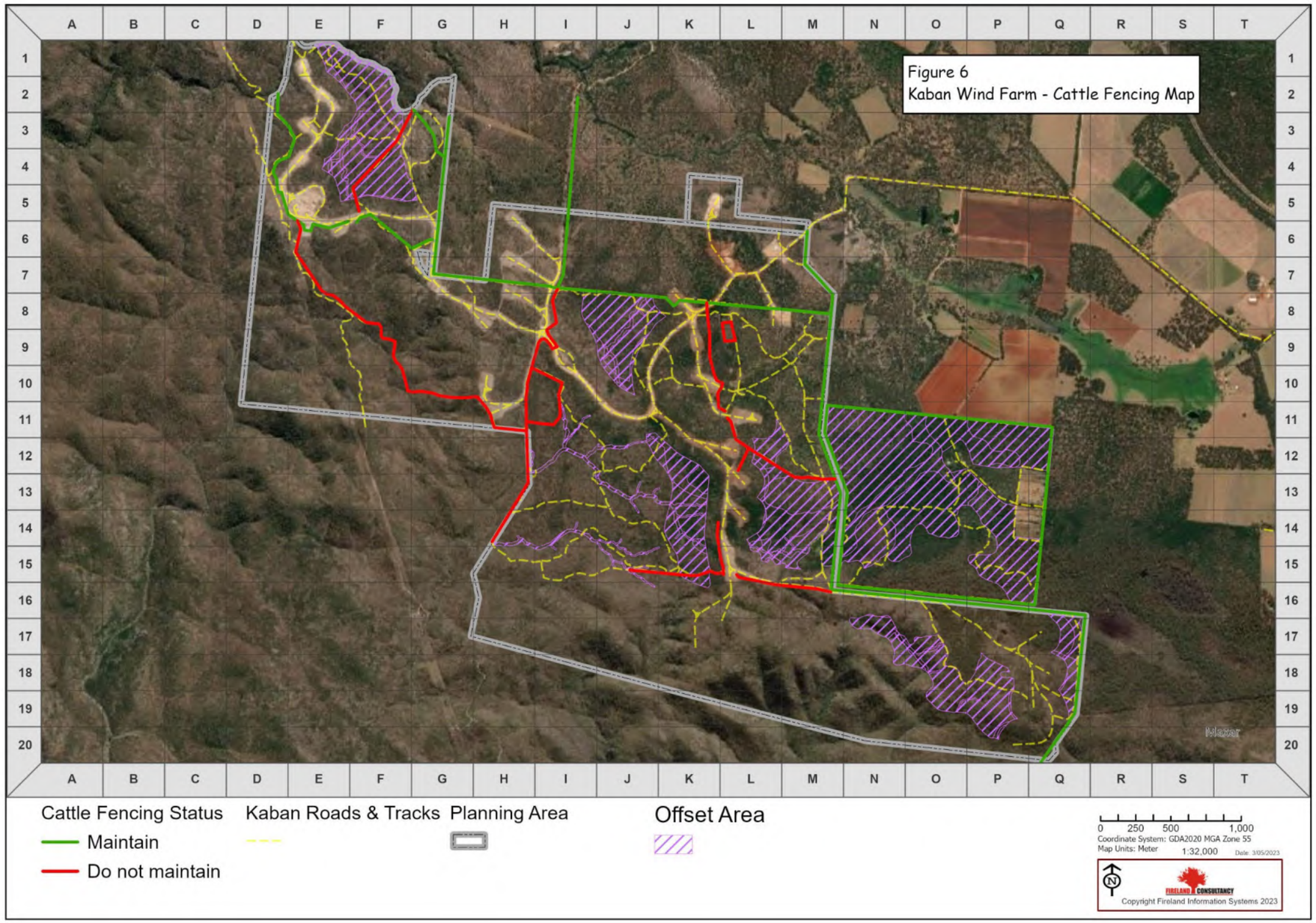


Indicative Planned Burn Schedule Map



Cattle Fencing Management

The project site has a network of cattle fencing that was established prior to the project. Some of this fencing will be actively maintained to exclude cattle from the Offset areas and to provide site security. The remaining fences will not be actively maintained due to their location and lack of access. These fences will also not be actively protected during planned burning or fire suppression operations. Refer to the map below showing the maintenance recommendations.



Appendix 9 Threatened Flora Surveys

Kaban Green Power Hub: Threatened Flora Monitoring Report

1 December 2022

Neoen Australia Pty Ltd
Level 10, 227 Elizabeth Street Sydney NSW 2000

Document Management

Rev.	Issue Date	Description	Author (s)	Approved	Signature
A	30/11/2022	Issued for review	Dean Jones	Chays Ogston	
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Executive Summary

Threatened flora monitoring for the Kaban Green Power Hub was conducted during March, May and November 2022, as per the requirements within the EPBC 2018/8289 approval and the Vegetation Management Plan (VMP), E2M 2021, to determine if construction activities have negatively impacted any known threatened flora populations. The results of this investigation, show there have been no impacts from construction activities. Prior to construction 88 known *Coleus amoenus* plants were recorded close to the construction footprint. The most recent assessment, towards the end of bulk construction activities, recorded a total of 270 plants. Additionally, the translocated populations of *Diuris oporina* within proximity to the construction footprint, were assessed during Autumn 2022. There are no indications that construction activities have impacted these populations, see Appendix A.

1 Introduction

Construction of the Kaban Green Power Hub (the Project) commenced during June 2021. This Project consists of 28 turbines and ancillary infrastructure located near Ravenshoe in the Atherton Tablelands. As per the EPBC 2018/8289 approval and in accordance with the VMP, E2M 2021, a survey was conducted to assess any impacts to nearby threatened flora populations. Two species of threatened flora were previously recorded on-site, namely *Coleus amoenus* and *Diuris oporina*. Respectively, *Coleus amoenus* and *Diuris oporina* are declared vulnerable and near threatened, under the Nature Conservation Act.

On-site, there are four populations of *Coleus amoenus* that were noted close to the construction footprint, see Figure 1. The total number of the four populations comprising of 88 individuals. There are 5 translocated populations of *Diuris oporina*, see Appendix A, also consisting of 88 individuals.

2 Methods

2.1 *Diuris oporina* surveys

During March and May 2022, the optimal flowering period for *Diuris oporina*, all five translocated *Diuris oporina* populations, were visited and assessed. Surveys aimed at assessing translocation success. Detailed methodology is presented in Appendix A.

2.2 *Coleus amoenus* surveys

On 15 November 2022, all four *Coleus amoenus* populations, see Figure 1, were assessed and all living individuals were counted by two trained ecologists. Each threatened flora site was photographed and any disturbance from animals, insects, natural events and from construction activities recorded.

FIGURE 1 REMOVED. CONTAINS
SENSITIVE ECOLOGICAL RECORDS

3 Results

3.1 *Diuris oporina*

Vegetative growth, twelve months after translocation, was observed for 53 of the 88 translocated *Diuris oporina* plants. Other than some disturbance from herbivores and insects, there was no other disturbance recorded. There was no disturbance from construction activities. The complete report for this assessment is presented in Appendix A.

3.2 *Coleus amoenus*

The count of individuals at each *Coleus amoenus* site/population is detailed in Table 1. There were 88 individuals counted in the 2019 survey and 270 individuals recorded during the November 2022 survey. While these numbers demonstrate the populations are stable or increasing, the large variance in counts may be a result of multiple factors, including:

- removal of cattle resulting in establishment of new individuals
- favourable weather conditions over the past year resulting in the establishment of new individuals; and/or
- variation in count methodology (i.e. the species growth pattern makes it hard to separate individuals.

Supporting the population estimate results, assessment of the presence and severity of disturbances at each site, identified no signs of construction related or other disturbance events. Plate 1 provides images of each population site, taken during the assessment.

Table 1: Comparative numbers for the 2019 and 2022 *Coleus amoenus* individuals at each site

Site #	2019	2022
1	6	9
2	41	149
3	31	86
4	10	26
TOTAL	**88**	**270**

Plate 1: Images of each *Coleus amoenus* site

Site 1

Site 2

Site 3

Site 4

4 Discussion and Conclusion

All five *Diuris oporina* populations were assessed in Autumn 2022, during the species peak flowering activity. While there was some disturbance from insects and animals, there was no signs that construction activities have impacted these translocated populations. A full report of the *Diuris oporina* populations is presented in Appendix A.

All four populations of *Coleus amoenus* were assessed prior to construction and towards the end of bulk construction activities. There were three times as many individuals noted in the most recent survey. While this large increase may be a result of multiple factors, it is evident that Project has not resulted in a decrease in the any of the four populations. This is supported by no evidence of construction related disturbance being presented at any of the population sites.

5 References

E2M Pty Ltd. (2021). Kaban Green Power Hub—Vegetation Management Plan.

Appendix A Diuris oporina translocation success assessment

01 July 2022

ATTN: George Schinkel
Kaban Windfarm Pty Ltd as trustee for Kaban Wind Farms Trust
27 Elizabeth Street
Sydney NSW 2000

Dear George

SUCCESS OF ORCHID (DIURIS OPORINA) TRANSLOCATION FOR KABAN WIND FARM PROJECT

This short report has been prepared in accordance with condition PPC004 of Protected Plant Clearing Permit WA0021296, which stipulates:

'*A report that discusses the success of establishing a population of at least 11 individuals of Diuris oporina must be provided to DES within 6 years after the completion of the Kaban Green Power Hub Project. This report must be e-mailed to wildlife.management@des.qld.gov.au*'

The successful establishment of donkey orchids (*Diuris oporina*) translocated to a site outside the Project disturbance footprint in early May of 2021 is discussed below.

Initial translocation

From May 4 through to May 6 of 2021, a total of 88 plants were removed from within the Project disturbance footprint and replanted at a new site outside the disturbance footprint situated at locations recorded in Appendix 1. At this time, the location of each translocated plant was marked with a metal stake and numbered on metal tags and upturned plastic pots, see Figure 1.

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Figure 1. Example of site with translocated *Diuris oporina*.

Monitoring results

Monitoring to assess the status of plants translocated in May 2021 were undertaken in March and May of 2022. The results of these surveys are presented in Appendix A.

From the two monitoring events, 53 of the 88 translocated plants had leaf growth and 40 individual plants had flower spikes indicating that they were successful in producing reproductive structure (

Figure 2). Twenty-six and 17 plants had respective damage to the leaves and/or flower spikes, from either fauna or insects. There were twelve plants showing successful development of seed pods.

Table 1. Status of translocated plants during monitoring surveys in March 2022 and May 2022.

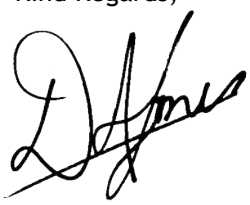
	A. Total March 2022	B. Total May 2022	C. New Individuals May 2022	D. Total unique findings (A+C)
Number established (leaf present)	46	34	7	53
Number with flower spike	36	30	4	40
Number with flowers	12	6	6	18
Number with seed pods	2	10	10	12
Number with damaged leaves	18	17	8	26
Number with damaged flower or flower spike	3	14	14	17

Figure 2. Left: Intact leaf on translocated donkey orchid (plant D83 photographed March 2022). Flowers and seed pod on translocated donkey orchid (plant D22 photographed March 2022).

Summary and conclusions

Condition PPC004 of Protected Plant Clearing Permit WA0021296, stipulates that a population of 11 translocated plants be successfully established. From the 88 *Diuris oporina* plants translocated in May 2021, there have been a minimum of 53 plants (60%) with growing leaves. However, successful establishment could be considered as plants that have produced reproductive structures. From the two monitoring events conducted in March and May 2022, a minimum of 40 plants were observed producing reproductive structure, indicating that these plants have established successfully. Therefore, condition PPC004, has been comprehensively satisfied, with the target of 11 plants exceeded by the successful establishment of 40 plants.

Kind Regards,



Dean Jones
Principal Ecologist

Appendix A Translocation Locations and Monitoring Data

Translocation locations (May 2021) and observations post translocation, March and May 2022.

ID	Translocation Date	POINT_X	POINT_Y	Leaf Present	Spike Present	Flower Present	Seed Pod	Leaf Damaged	Flower Damaged
D1	6/05/21	[redacted]		Yes	Yes	No	Yes	No	No
D10	6/05/21			Yes	Yes	No	No	Yes	Yes
D11	6/05/21			Yes	Yes	Yes	Yes	Yes	No
D12	6/05/21			No	No	No	No	No	No
D13	6/05/21			No	No	No	No	No	No
D14	6/05/21			No	No	No	No	No	No
D15	6/05/21			Yes	No	No	No	Yes	No
D16	6/05/21			Yes	Yes	Yes	No	No	Yes
D17	6/05/21			Yes	Yes	Yes	?	Yes	Yes
D18	6/05/21			No	No	No	No	No	No
D19	6/05/21			No	No	No	No	No	No
D2	6/05/21			No	Yes	No	No	Yes	Yes
D20	6/05/21			No	No	No	No	No	No
D21	6/05/21			Yes	Yes	No	No	Yes	Yes
D22	6/05/21			Yes	Yes	Yes	Yes	No	No
D23	6/05/21			Yes	Yes	No	Yes	No	No
D24	6/05/21			Yes	Yes	No	No	Yes	Yes
D25	6/05/21			Yes	Yes	No	No	Yes	Yes

D26	6/05/21	[redacted]	No	No	No	No	No	No
D27	6/05/21		Yes	Yes	No	Yes	Yes	No
D28	6/05/21		Yes	Yes	No	No	-	Yes
D29	4/05/21		No	No	No	No	No	No
D3	6/05/21		No	No	No	No	No	No
D30	4/05/21		No	No	No	No	No	No
D31	4/05/21		No	No	No	No	No	No
D32	4/05/21		Yes	Yes	No	No	No	No
D33	4/05/21		No	No	No	No	No	No
D34	4/05/21		Yes	Yes	Yes	Yes	Yes	No
D35	4/05/21		No	No	No	No	No	No
D36	4/05/21		Yes	No	No	No	No	No
D37	4/05/21		Yes	No	No	No	No	No
D38	4/05/21		Yes	Yes	Yes	No	Yes	Yes
D39a	5/05/21		Yes	Yes	No	No	Yes	Yes
D39b	6/05/21		Yes	No	No	No	Yes	No
D4	6/05/21		Yes	Yes	Yes	Yes	No	No
D40	4/05/21		Yes	Yes	Yes	No	No	No
D41	4/05/21		No	No	No	No	No	No
D42	6/05/21		Yes	No	No	-	Yes	-
D43	4/05/21		No	No	No	No	No	No

D44	4/05/21	[redacted]	Yes	Yes	No	No	No	No
D45	4/05/21		No	No	No	No	No	No
D46	4/05/21		No	No	No	No	No	No
D47	4/05/21		Yes	No	No	-	Yes	-
D48	4/05/21		No	No	No	No	No	No
D49	4/05/21		No	No	No	No	No	No
D5	6/05/21		Yes	Yes	No	No	No	Yes
D50	5/05/21		Yes	Yes	Yes	No	No	No
D51	5/05/21		No	No	No	No	No	No
D52	5/05/21		No	No	No	No	No	No
D53	5/05/21		No	No	No	No	No	No
D54	5/05/21		No	No	No	No	No	No
D55	5/05/21		Yes	Yes	Yes	?	No	No
D56	5/05/21		Yes	No	No	No	No	No
D57	5/05/21		Yes	Yes	No	No	Yes	Yes
D58	5/05/21		No	No	No	No	No	No
D59	5/05/21		Yes	Yes	No	Yes	No	No
D6	6/05/21		Yes	No	No	No	No	No
D60	5/05/21		No	No	No	No	No	No
D61	5/05/21		Yes	No	No	No	No	No
D62	5/05/21		Yes	Yes	Yes	Yes	No	No

D63	5/05/21		Yes	Yes	Yes	Yes	No	No
D64a	5/05/21		Yes	Yes	No	No	Yes	-
D64b	6/05/21		Yes	Yes	No	No	No	
D65	5/05/21		Yes	Yes	No	No	Yes	Yes
D66	5/05/21		No	No	No	No	No	No
D67	5/05/21		Yes	Yes	Yes	Yes	-	-
D68	5/05/21		No	No	No	No	No	No
D69	5/05/21		Yes	No	No	No	No	No
D7	6/05/21		Yes	Yes	Yes	No	Yes	Yes
D70	5/05/21		Yes	No	No	No	Yes	No
D71a	5/05/21		Yes	Yes	No	No	Yes	Yes
D71b	6/05/21		Yes	Yes		No	No	No
D72	5/05/21		Yes	No	No	No	Yes	-
D73	5/05/21		Yes	Yes	Yes	Yes	Yes	No
D74	5/05/21		Yes	Yes	Yes	No	No	No
D76	5/05/21		No	No	No	No	No	No
D77	5/05/21		No	No	No	No	No	No
D78	5/05/21		No	No	No	No	No	No
D79	5/05/21		No	No	No	No	No	No
D8	6/05/21		No	No	No	No	No	No
D80	5/05/21		Yes	No	No	No	No	No

D81	5/05/21	[redacted]	Yes	No	No	No	No	No
D82	5/05/21		Yes	Yes	No	No	Yes	Yes
D83	5/05/21		Yes	Yes	Yes	No	No	No
D84	6/05/21		Yes	Yes	No	No	Yes	Yes
D85	6/05/21		Yes	Yes	Yes	No	Yes	No
D86	6/05/21		No	No	No	No	No	No
D9	6/05/21		No	No	No	No	No	No

Appendix 10 Engineers report for improved designs of erosion and sedimentation controls

TOPO.

TECHNICAL MEMORANDUM

TO:	Robert Medley
COMPANY:	Vestas
FROM:	Tom Bailey
SUBJECT:	ESC Response to Magnificent Brood Frog Third Annual Monitoring Report
OUR REF:	20-0192 / T2774
DATE:	10/05/23

1 INTRODUCTION

Topo were requested by Vestas to conduct an independent site investigation of Erosion and Sediment Control (ESC) management related to the Magnificent Brood Frog Third Annual Monitoring Report at the Kaban Green Power Hub approximately 6 km north of Ravenshoe in the Atherton Tablelands. Monitoring identified seven key concerns, 6 of which are related to erosion and sediment control. These are presented in Table 1.

Table 1 – MBF Third Annual Monitoring Report Areas of Concern

Item	Concern/Deficiency	Location
1	Increased water catchment, increasing waterflows to MBF habitat	Water catchment from WTG 19 and 20 flowing down into Impact Site 3.
2	Uncontrolled waterflow along fence line west of impact Site 4	Uphill and west of the main discharge of Impact Site 4
3	Erosion of MBF creek line immediately downstream of disturbance	Impact Site 1 discharge into creek.
4	Ongoing sheet erosion and sedimentation from access road. Much of the sediments accumulating in the sediment trap is coming from the road.	Road going down from 4 Ways intersection through to Impact Site 2
5	The beginning of gully erosion at 4-Ways intersection	4-Ways intersection.
6	Insufficient Groundcover	Disturbed areas surrounding: Impact sites 1, 2, 3,4 and 5

Topo was requested to inspect these areas/concerns and provide input on the remedial activities proposed by E2M with respect to erosion, sediment and drainage control.

An inspection was completed on 19 April 2023 by Tom Bailey of Topo. Tom is a Senior Engineer and Certified Professional in Erosion and Sediment Control (CPESC) with over 12 years' experience specifically in the discipline of erosion and sediment control.

2 SUMMARY OF FINDINGS AND RECOMMENDATIONS

A number of recommendations were presented on site, these are broadly summarised below:

Item	Concern/Deficiency	Recommendation
1	Increased water catchment, increasing waterflows to MBF habitat	Remove/reconstruct existing rock berm to form level spreader and discharge as sheet flow, mostly reporting downslope of the impacted area. Refer site sketch 1.
2	Uncontrolled waterflow along fence line west of impact Site 4	Install chute to discharge track runoff into the existing rock lined drain. Refer site sketch 2.
3	Erosion of MBF creek line immediately downstream of disturbance	Options for remediating existing erosion outside the site constraints appear limited (such as vetiver grass hedging, hard armouring with rock etc). Potential to reduce further erosion by adding causeway across road east of the impact zone to reduce contributing catchment. Refer site sketch 3.
4	Ongoing sheet erosion and sedimentation from access road. Much of the sediments accumulating in the sediment trap is coming from the road.	Integrate appropriate drainage and stabilisation with the upcoming earthworks in this area. Recommended including a catch drain on the extent of disturbance, and rock armouring within both downslope drains.
5	The beginning of gully erosion at 4-Ways intersection	Integrate appropriate drainage and stabilisation with the upcoming earthworks in this area. Recommended including a catch drain on the extent of disturbance, and rock armouring within both downslope drains.
6	Insufficient Groundcover	Engage agronomist to undertake soil investigations to inform amelioration requirements and advise on rehabilitation (with consideration given to the MBF ecologists recommendation). Suggest adopting a seasonal based approach whereby vegetative establishment is supported by temporary stabilisation (such as bonded fibre matrix, compost blanket, soil binder or similar) until growth. This will avoid the need for consistent watering through dry periods (which will likely be ineffective). Landscaping treatments should be expanded to include all areas of disturbance, thus reducing the reliance on sediment controls throughout site which have high maintenance requirements and provide limited effectiveness in removing fine sediment from site runoff.

REVISION	DESCRIPTION	APPROVED BY	DATE
A	ORIGINAL ISSUE	TB	10/05/23

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PROJECT: KABAN GREEN POWER HUB

DRAWING TITLE: T2774 RESPONSE
SITE SKETCHES - ITEM 1

PROJECT No	DRAWING No	REVISION
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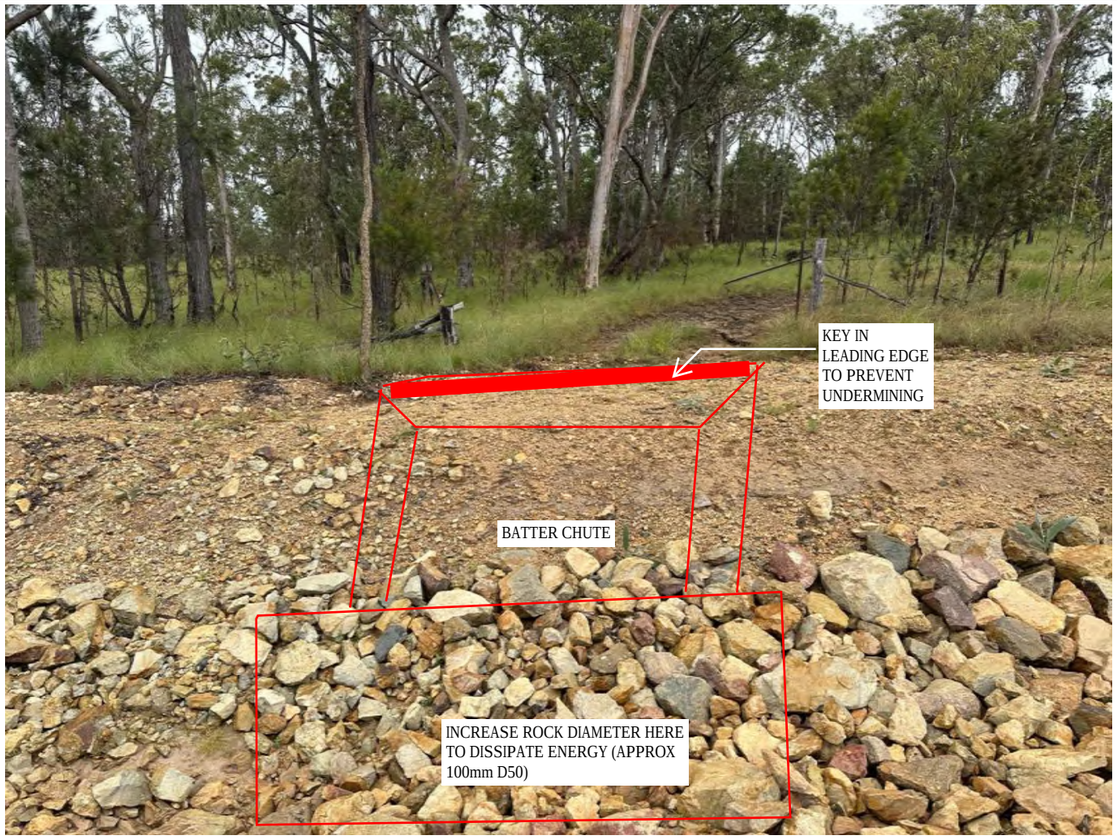
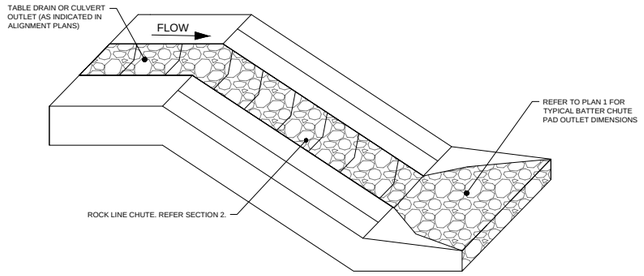
PROJECT: KABAN GREEN POWER HUB

DRAWING TITLE: T2774 RESPONSE
SITE SKETCHES - ITEM 1

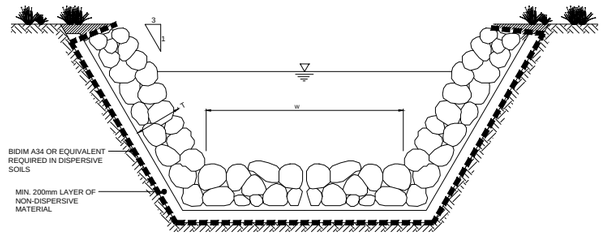
PROJECT No	DRAWING No	REVISION
20-0192	D02	A



REFER AECOM STANDARD FOR BATTER CHUTE. SHOULD CATER TO MIN Q2 FOR ESC ($0.2m^3/s$) OR DEFAULT TO PERMANENT DESIGN.



SECTION 1: TYPICAL BATTER CHUTE



SECTION 2: BATTER CHUTE CROSS SECTION

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PROJECT: KABAN GREEN POWER HUB

DRAWING TITLE: T2774 RESPONSE SITE SKETCHES - ITEM 2

PROJECT No	DRAWING No	REVISION
20-0192	D03	A

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CLIENT: VESTAS

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TB	TB	10/05/23

RPEQ / SIGNATURE (IF REQUIRED)

PROJECT: KABAN GREEN POWER HUB

DRAWING TITLE: T2774 RESPONSE
SITE SKETCHES - ITEM 3

PROJECT No	DRAWING No	REVISION
20-0192	D04	A