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Date: 30 AUGUST 2023

GOLDEN PLAINS WIND FARM

Brolga Monitoring and Compensation Plan

Prepared by:

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DOCUMENT HISTORY AND STATUS

The following table outlines the revisions made to this document

Version	Date of Issue	Description	Issued By	Reviewed by	Approved by
V02-01	13/12/2021	First submission to Minister for Planning	GPWFM	GPWFM	GPWFM
V03-01	28/06/2022	Second submission to Minister for Planning	GPWFM	GPWFM	GPWFM
V04-01	19/04/2023	Clarify status of Brolga and update map in Appendix C	Brett Lane (Nature Advisory)	Kyle Sandona (GPWFM)	Andrew Riggs (GPSA)
V04-02	29/08/2023	Fixed cross-references and typos.	Kyle Sandona (GPWFM)	Kyle Sandona (GPWFM)	Kyle Sandona (GPWFM)

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EXECUTIVE SUMMARY

Version V03-01 of the Brolga Monitoring and Compensation Plan (BMCP) for the Golden Plains Wind Farm was endorsed under Condition 54 of Planning Permit PA1700266-4 on 11 October 2022.

Amendments to version (V03-01) of the BMCP contained within this update (V04-02) include:

- Correction to figure 2 Brolga breeding record and wetlands (shown in Appendix C) to address administrative oversight of omitting wetland 27. No substantive amendments were required as the processes set out in the BMCP were developed having regard to the 27 wetlands but the incorrect map had been included in error;
- Clarify the status of the Brolga (*Antigone rubicunda*) under the FFG Act as Endangered. The clarification has been made for completeness and no substantive amendments have been made as a consequence, as the processes set out in the BMCP are considered appropriate in light of the endangered status of the Brolga;
- Other minor amendments, tidy-ups or clarifications.

This Brolga Monitoring and Compensation Plan (BMCP) defines the way in which impacts from the Golden Plains Wind Farm (the Project) on Brolga will be monitored and offset by replacing Brolga lost to the population over the life of the Project. The BMCP initially compensates for the estimated impacts as set out in the Project's Environment Effects Statement (EES) and Population Viability Assessment (PVA) and also prescribes ongoing monitoring and adaptive management measures that will increase the offset targets should the actual impacts of the Project exceed the estimated impacts.

The aim of the BMCP is:

to replace the six adult birds estimated to be lost to the Victorian population of the Brolga as a consequence of the Project.

This aim will be achieved through the delivery of a **wetland enhancement program** to provide additional breeding habitat to support additional breeding pairs to produce at least eight additional fledged young that survive to become six breeding adults.

The BMCP forms part of the Environmental Management Plan required by Condition 47 of the Permit. Conditions 54 and 55 of the Permit outline the requirement for the proponent, Golden Plains Shared Assets (GPSA), to prepare and implement a BMCP to offset the Project's potential impacts on the Victorian Brolga population to ensure zero net impact across the life of the Project. Table 0-1 provides a summary on how these requirements are met.

Table 0-1 - Conditions 54 and 55

Condition requirement	How this requirement is addressed
54. The Environmental Management Plan must include a Brolga Monitoring and Compensation Plan. The plan must be prepared in consultation with DELWP Environment Portfolio to the satisfaction of the responsible authority. Once endorsed, the plan must be placed on the project website for the life of the project.	The BMCP has been prepared in consultation with DELWP (now DEECA) Environment Portfolio and, once endorsed, will be placed on the project website for the life of the project.
54. a) (The BMCP must) be implemented for the life of the project	The BMCP will be implemented for the life of the Project (25 years initially, and extended if the Project operates for longer).
54. b) (The BMCP must) identify the location of potentially at-risk Brolga breeding, migration and flocking activities	At-risk brolga activities on and around the site were identified in the EES. A map showing the locations of these activities and a map showing the wind turbine layout endorsed under Condition 1 of the Permit on 28 February 2022 are included in Appendix C.

54. c) (The BMCP must) include recommendations in relation to a mortality rate for Brolga which would trigger the requirement for responsive mitigation measures to be undertaken by the operator.	The triggers for responsive mitigation measures are outlined in Section 2.4 of this BMCP.
54. d) (The BMCP must) specify who is accountable for implementing the plan and the monitoring required under the plan	Sections 3.3, 3.4 and 4.8 of the BMCP outline the roles and responsibilities of all parties involved in delivering the Plan.
54. e) (The BMCP must) include the principles for the selection of potential Brolga breeding wetlands that will be enhanced ('enhancement sites')	The principles for selection of enhancement sites are outlined in Section 3.2.2
54. f) Prior to the commencement of works at each enhancement site, a signed copy of the Delivery Agreement/Landholder Agreement for the Brolga breeding site enhancement project must be submitted to the Responsible Authority. Agreements for the breeding site enhancement project must extend for the duration of the life of the Wind Energy Facility.	Section 3.2.3 requires Landholder Agreements to be submitted to the Responsible Authority prior to commencement of wetland enhancement works (outlined in Section 3.2.5) at each enhancement site.
54. g) (The BMCP must) include methods of enhancement which will be determined at each enhancement site.	Table 3-2 and Section 3.2.5 provide the wetland restoration and management principles, including potential methods of enhancement, that will guide the site enhancement program.
54. h) (The BMCP must include) where appropriate, a program of appropriate fox baiting leading up to each breeding season.	Table 3-2 outlines the program's proposed use of fox baiting and the criteria for determining when baiting is appropriate.
54. i) (The BMCP must include) five-yearly performance targets for each enhancement site and the program as a whole, consistent with the outcomes of the Population Viability Assessment included in the Golden Plains Wind Farm EES, the zero-net impact objective (to be amended every five years depending on outcomes), and the data and recommendations in the plan	Table 4-2 and Table 4-3 outline the program's performance targets that are consistent with the PVA, EES and Interim Brolga Guidelines.
54. j) (The BMCP must include) monitoring and reporting requirements, including public reporting after 1 year, 2 years, 5 years, 10 years, 15 years, 20 years and 25 years from when the plan is approved, on whether the plan is expected to achieve the 25-year zero net impact objective.	Section 4.8 outlines a schedule of reporting consistent with this Condition.

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55. Implementation of the Brolga Monitoring and Compensation Plan must commence before the development starts. Implementation must be to the satisfaction of the responsible authority in consultation with DELWP Environment Portfolio.	Implementation of the BMCP will commence before the development starts. The activities that are proposed to be undertaken before the development starts are outlined in Table 3-3.

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NOMENCLATURE

Term	Definition
BAMP	Bat and Avifauna Management Plan
BL&A	Brett Lane and Associates (now Nature Advisory)
BMCP	Brolga Monitoring and Compensation Plan (this Plan)
CRM	Collision Risk Modelling
DEECA	Department of Energy, Environment and Climate Action
DELWP	Former Department of Environment, Land, Water and Planning
DTP	Department of Transport and Planning
The EES	The Project's Environment Effects Statement
GPSA	Golden Plains Shared Assets Pty Ltd
GPWF	Golden Plains Wind Farm
GPWFM	Golden Plains Wind Farm Management Pty Ltd
The Permit	Planning Permit PA1700266-4 dated 15 September 2022
The Project	Golden Plains Wind Farm
PVA	Population Viability Assessment
WEF	Wind Energy Facility
WestWind Energy	WestWind Energy Pty Ltd

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1 INTRODUCTION

This Brolga Monitoring and Compensation Plan (BMCP) has been prepared for the Golden Plains Wind Farm (the Project) by Nature Advisory. The BMCP was written in response to conditions 54 and 55 of Planning Permit No. PA1700266 (the Permit) which was issued by the Minister for Planning on 14 November 2021, and most recently updated on 15 September 2022. It reflects the approval of the Golden Plains Wind Farm as approved under the Permit and Development Plans endorsed under condition 1 of the Permit.

The Brolga is listed as endangered under the Flora and Fauna Guarantee Act 1988 (FFG Act). The objective of this BMCP is to achieve the Victorian government's policy of avoiding cumulative impacts from the wind energy industry on the Brolga (Antigone rubicunda) by ensuring that each individual wind farm achieves at a minimum ***'zero net impact'*** on the Victorian Brolga population[1].

This BMCP defines the way in which the Project's impacts on Brolga will be monitored and offset by replacing Brolga lost to the population over the life of the Project. The BMCP initially compensates for the estimated impacts as set out in the Project's Environment Effects Statement (EES) and Population Viability Assessment (PVA) and also prescribes ongoing monitoring and adaptive management measures that will increase the offset targets should the actual impacts of the Project exceed the estimated impacts. The BMCP interacts with the Bat and Avifauna Management Plan (BAMP) endorsed under the Permit, in particular in that the BAMP sets out processes to monitor and report brolga breeding, flocking and other brolga sighting, and to monitor, report and respond to any injured or dead brolga identified through monthly searches of the wind farm site.

The primary aim of the BMCP is:

to replace the six adult birds estimated to be lost to the Victorian population of the Brolga as a consequence of the Project.

This aim will be achieved through the delivery of a **wetland enhancement program** to provide additional breeding habitat to support additional breeding pairs to produce additional fledged young.

This program is expected to offset the Project's impacts on Brolga which will ensure the Project achieves at a minimum 'zero net impact' on the Victorian Brolga population. Adaptive management measures detailed in Section 4.7 mean that the wetland enhancement program may be expanded as the Project progresses to ensure the zero net impact target is met.

This plan is divided into the following sections:

- **Section 1** provides an overview of the BMCP structure, and an introduction to the Project including details of the Permit requirements.
- **Section 2** assesses the Project's anticipated impacts on the Brolga population and establishes the compensation targets required to offset those impacts.
- **Section 3** outlines the process for implementing the BMCP principles and stages of implementation. This section also identifies the roles and responsibilities of all parties involved in the implementation, management, and oversight of the BMCP.
- **Section 4** outlines the framework for monitoring, evaluation of the wetlands and overarching BMCP performance, and details the program's reporting schedule.

This BMCP was prepared by a team from Nature Advisory comprising Curtis Doughty (Senior Zoologist), Inga Kulik (Senior Ecologist & Project Manager) and Brett Lane (Principal Consultant).

1.1 Golden Plains Wind Farm overview

The Project involves the establishment of a wind energy facility (WEF) including wind turbines and associated electrical infrastructure on 16,723 ha to the west, south and south-east of Rokewood, a small rural town in the Shire

[1] *Interim guidelines for the assessment, avoidance, mitigation and offsetting of the impacts of wind farms on the Victorian Brolga population (DSE 2012)*

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of Golden Plains, approximately 60 km north-west of Geelong.

The site is located on land that is primarily used for agricultural purposes and has been substantially modified over time due to agricultural operations such as broad acre cropping and livestock grazing.

The proposed 215 wind turbines will have a maximum blade tip height of 230 metres above ground level and a maximum rotor diameter of 165 metres.

Figure 1-1 - Overview of the location of the Golden Plains Wind Farm

1.2 Planning Permit Requirements

The approval for the Project was issued following consideration through an Environment Effects Statement (EES) process, including a public comment period and a Planning Panel inquiry (the Panel Inquiry). The current version of the Planning Permit (PA1700266-4) (the Permit) for the Project was issued by the Victorian Minister of Planning on the 15 September 2022.

Conditions 54 and 55 of the Permit outline the requirement for GPSA to prepare and implement a BMCP to offset the Project's potential impacts on the Victorian Brolga population to ensure zero net impact across the life of the Project.

Table 0-1 sets out the requirements of Conditions 54 and 55 of the Permit and outlines how the requirement is addressed by the BMCP.

2 OFFSET TARGETS

2.1 Background and Estimated Impacts

The Project's EES, EES Panel Report and the Minister's Assessment of the EES discussed the anticipated impacts of the Project on the Victorian Brolga population. As part of the EES, Collision Risk Modelling (CRM) and a PVA were undertaken to quantify the potential impacts.

The Minister agreed with the Panel's recommendation that the project implement turbine-free buffers in line with the BL&A habitat model that was presented during the hearing. The outcomes of the CRM and PVA following the implementation of the recommended turbine-free buffers for the Planning Permit Application layout showed that an estimated 0.23 collisions may occur per annum which would result in **5.75 brolga mortalities** over the life of the Project[2], assuming a 90% avoidance rate[3]. Three different avoidance rates, being 90%, 95% and 99%, were assessed and modelled with the conservative 90% avoidance rate being adopted in accordance with the advice tabled during panel hearings[4].

An updated CRM[5] has been undertaken for the revised turbine layout which estimates **5.58** collisions over the life of the project (0.223 annual collisions over 25 years). Although the revised turbine layout has reduced the estimated impacts of the Project, this BMCP initially adopts and compensates for the impacts contemplated and approved by the Panel.

Therefore, for the Project to achieve zero net impact or better, the offset mechanisms proposed in the BMCP will need to offset at least **6 collisions** over the life of the project. On-site mortality monitoring and adaptive management measures will ensure the offset targets are increased in the event that the Project's actual impacts exceed the estimated impacts.

2.2 Offset Targets

The BMCP will offset the Project's impacts on the Brolga through implementation of a wetland enhancement program. The Wetland Enhancement Program aims to offset the Project's entire impact on the Victorian Brolga population, in that it aims to produce eight fledglings that survive to become six breeding adults. The following section calculates the number of enhanced wetlands required to generate six breeding adults over the life of the Project.

2.2.1 Survival Rates from Juvenile to Adult

The PVA notes that the estimated survival rate from juvenile to adult can be applied to calculate the number of new juvenile birds required to offset impacts on adult birds. Based on the requirement to recruit six additional adult birds, the number of extra juveniles required can be calculated as *6/j* where *j* represents the survival rate from juvenile to adult. A conservative survival rate of 0.77 (77%) has been adopted in this BMCP, which results in a requirement to fledge 7.79 (rounded to eight) new juvenile brolga to compensate for the six lost adult birds.

2.2.2 Breeding and Fledging Success Rate

Brolga breeding and fledging success per attempt varies between 20-29% (Marchant and Higgins 1993, cf. Myers 2001) and Brolga exhibit site fidelity. First-time breeders are likely to occupy a newly-restored site and will require some years to establish successful breeding at that site.

This BMCP assumes an average unmanaged fledging success rate of 20% per breeding attempt, with eggs laid every second year after an initial 5-7 year lag from initial occupation of the site. These assumptions result in the production of two fledged young from a restored wetland over 25 years.

These assumptions may represent considerable over- or under-estimation and this BMCP will proceed to describe contingencies to deal with this uncertainty.

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[2] Golden Plains Wind Farm EES Inquiry and Planning Panel Permit Application Panel Report, p. 35
[3] CRM based on 150m diameter turbine rotor, 190m tip height and 40m lower tip height.
[4] Panel Document Number 102, p. 10
[5] Based on revised 215 turbine layout, 165m diameter turbine rotor, 140m hub height.

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Table 2-1 - Estimated fledging success rates per breeding wetland for Project duration

Year	Breeding Attempt	Estimated Fledging Success Rate
1 –6	No	0
7	Yes	0.2
8	No	0
9	Yes	0.2
10	No	0
11	Yes	0.2
12	No	0
13	Yes	0.2
14	No	0
15	Yes	0.2
16	No	0
17	Yes	0.2
18	No	0
19	Yes	0.2
20	No	0
21	Yes	0.2
22	No	0
23	Yes	0.2
24	No	0
25	Yes	0.2
Total	10 breeding attempts over 25 years	2 fledged young over 25 years

2.2.3 Wetland Restoration Targets

Based on the above calculation of fledging rates and the Project's anticipated impacts, this BMCP proposes the restoration of **four wetlands**, which will generate eight fledglings over the 25-year life of the Project. Given the uncertainties around implementing BMCPs, this target and the preceding calculations are deliberately conservative in nature. Ongoing monitoring of wetland condition and breeding activity across the life of this plan provide opportunities once implementation commences for reviewing the rate at which young can be produced and adjusting the Project deliverables (including the number of restored wetlands) if required.

2.3 Interface with Bat and Avifauna Management (BAM) Plan

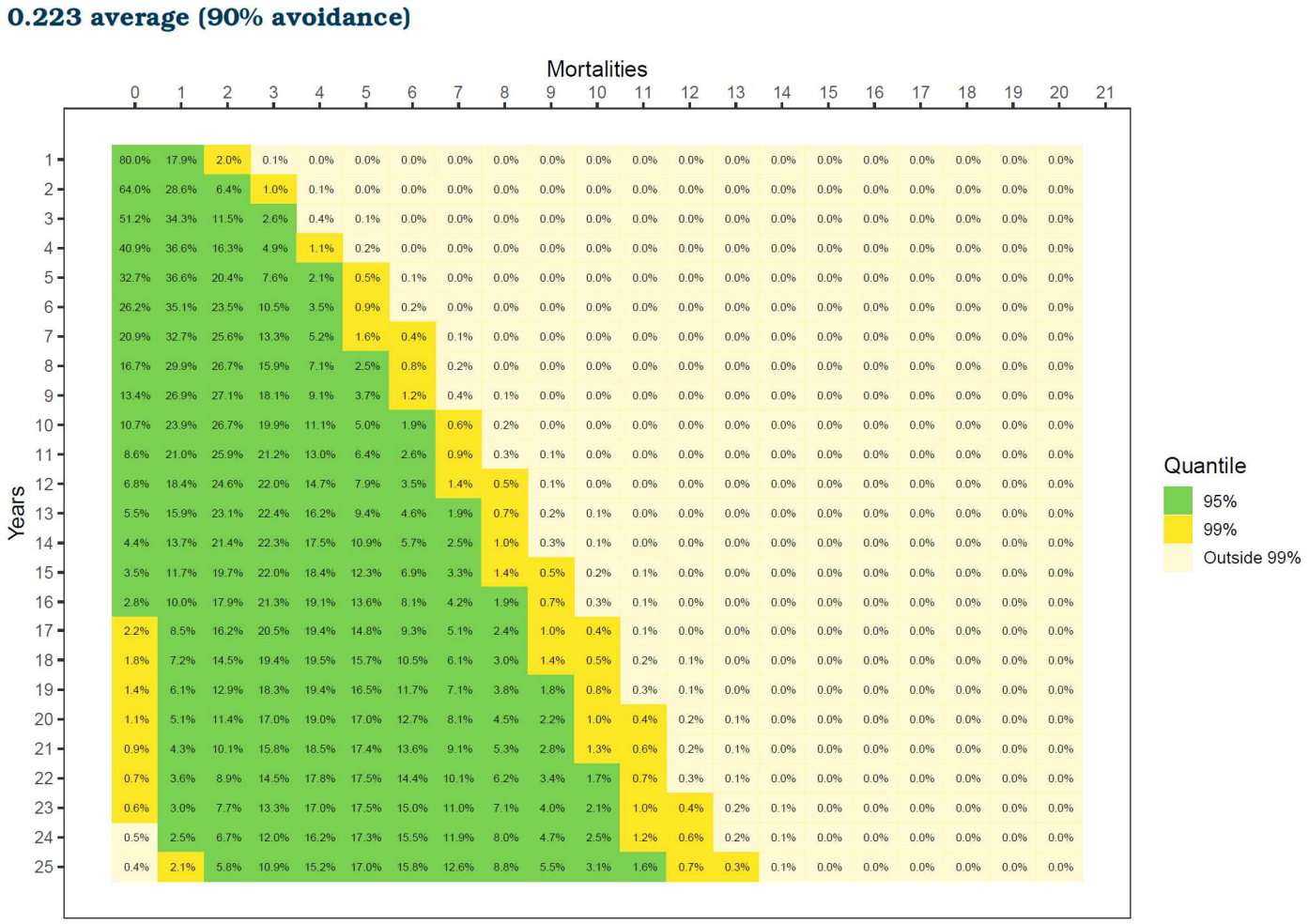
The Project's Bat and Avifauna Management Plan (BAMP) details a general on-site carcass monitoring program for the wind farm once operation has started. The BAMP also includes an on-site monitoring program involving monthly searches for impacted Brolga around each turbine as well as monitoring of brolga breeding activities at all likely breeding wetlands within 10 km of the Project site as well as Brolga flocking activities (refer to section 5.3.1 in BAMP). These monitoring activities will be undertaken for the life of the Project.

The results of the BAMP monitoring will inform the BMCP and will be used in the ongoing reviews outlined in Sections 4.6 to 4.8 of this Plan.

2.4 Ongoing review of Brolga impacts

Figure 2-1 (below and reproduced in Appendix B) shows the modelled likelihood of Brolga colliding with turbines over 25 years at an assumed 90% avoidance rate and is used to determine whether the observed rate of impacts is in line with the outcomes predicted by the CRM. By using the table to confirm that the project's actual impacts are in line with the modelled impacts at various points in time, we can be confident that the overall impact across the life of the project will also be in line with the modelled impacts.

Figure 2-1 - Modelled likelihood of Brolga impacts across the life of the project (90% avoidance, 165m diameter rotor, 140m hub height)



The table shows the results of a Poisson statistical model based on the results of the CRM (i.e. average of 0.223 collisions per year) and quantifies the likelihood of a given number of Brolga being impacted by the project by the end of each year of the project's operation.

The percentages show the probability of each cumulative result occurring by the end of each year. For example, at the end of year 10 there is a 10.7% likelihood that 0 brolga will have been impacted, a 23.9% likelihood of one impact, a 26.7% likelihood of two impacts and so on. By comparing these numbers to actual impact numbers, it is possible to assess the correlation between the CRM and the project's actual impacts.

Results within the 95% confidence interval (green area on the table) are considered to be within the bounds of the CRM and should result in the project's lifetime impacts being in line with the CRM results. Any result that is outside the 95% confidence interval warrants further investigation to determine whether it is simply an example of a rare but possible result, or whether there are potential issues with the correlation between the CRM and the real world.

If actual impacts between the 95% and 99% confidence interval (bright yellow area on the table) are observed for three (3) consecutive years, contingency measures will be triggered as outlined in Section 4.7. Any result outside the 99% confidence interval (light yellow area) will immediately trigger contingency measures.

The application of similar analysis and tables is an accepted method for calculating triggers for adaptive management actions and is currently being used for analysis of eagle collisions with wind turbines in Tasmania, and for analysis of Brolga impacts at the Dundonnell Wind Farm in Victoria.

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3 WETLAND ENHANCEMENT PROGRAM IMPLEMENTATION

3.1 Principles

The following principles have been developed to ensure that the Wetland Enhancement Program is successful.

The overarching principles of the Wetland Enhancement Program are as follows.

- Independent Delivery Partner – Engagement of an Independent Delivery Partner (Delivery Partner) with proven expertise to ensure the integrity of the offset and the successful implementation of the BMCP.
- Staged Wetland Selection and enhancement process – To ensure that the BMCP results in the restoration, management and protection of wetlands with the greatest likelihood of successfully attracting Brolga to breed and recruit.
- Independent Monitoring, Evaluation and Reporting – To ensure high quality, independent monitoring occurs at the restored wetlands, to determine if the works deliver the intended results at five-year intervals and ultimately meet the 25–year zero net impact objective.

3.1.1 Independent Delivery Partner

Implementation of the Wetland Enhancement Program will ultimately be the responsibility of GPSA, but GPSA has recognised that many of the activities required for the successful implementation and management of the program are beyond its core business and area of expertise. To ensure the Wetland Enhancement Program is implemented in line with industry best practice, GPSA will engage a suitably experienced Delivery Partner who will be responsible for the implementation and management of the Wetland Enhancement Program.

The Delivery Partner:

- Must be suitably experienced in both the delivery of wetland enhancement programs, and in the ongoing monitoring of outcomes related to wetland enhancement;
- Will independently select the most appropriate wetlands for enhancement;
- Will be responsible for carrying out all of the activities required by the Wetland Enhancement Program; and
- Will undertake the monitoring and reporting required under this Wetland Enhancement Program to ensure the integrity of the monitoring protocols and reporting.

Further details on the roles and responsibilities for implementing the Wetland Enhancement Program are provided in Sections 3.3 and 3.4.

Evidence of the executed agreement between the nominated Delivery Partner and GPSA will be provided to DTP prior to the commencement of works under the Permit.

3.2 Stages of Implementation

The process for implementation of the BMCP is outlined below.

3.2.1 Identify Potential Enhancement Sites

The Delivery Partner will identify a number of sites that are potentially suitable for wetland restoration. Wetlands are to be considered potentially suitable for restoration if:

- The landholder is willing to participate in the wetland restoration program and is open to allowing the wetland to continue to function beyond the life of the Project and beyond the expiry of any formal agreement;
- The wetlands may, with enhancement, have the potential to support Brolga breeding activities, or have supported past breeding activity prior to the wetland's subsequent degradation;
- The wetlands are part of a larger wetland complex or cluster which consist of multiple wetlands of different depths, character and size; and
- Projections of future rainfall scenarios indicate rainfall is adequate to achieve regular inundation, taking

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estimated climate change scenarios into account.

It is expected that the pool of potential enhancement sites will include 10-20 sites of varying size, condition and location.

Once identified, the Delivery Partner will commence investigation and assessment of each site against the Site Selection Criteria in Section 3.2.2.

3.2.2 Site Selection Criteria

The site selection criteria provided in Table 3-1 below will be used to assess the suitability of each site for inclusion in the Wetland Enhancement Program.

Table 3-1 - Wetland selection criteria

Principles	
Historical or potential Brolga breeding site or area	The wetlands must be situated within the current confirmed range for Brolga breeding of the sub-population that occurs in south-western Victoria and south-eastern South Australia (see Figure 2-1). Sites should be within 40km of a known flocking site as this is where the largest number of young adult Brolga who have not yet established breeding site fidelity can be found. Sites that fall outside this range can still be considered if they are within average known distance that brolgas move between breeding and non-breeding sites, or if they are near wetlands where Brolga are still regularly sighted.
Suitable hydrology	The wetland must have been or is a natural wetland where the water source (surface or ground water) has not been compromised. This will be confirmed and detailed via a hydrological assessment for each nominated restoration site. Ideally, the site should have evidence of permanent drainage that has resulted in the site currently being unsuitable or sub-optimal for Brolga breeding.
Suitable vegetation and habitat, once restored	The wetlands belong to one or a number of the following wetland categories (from DEECA's wetland mapping data): ❖ Permanent freshwater marsh; ❖ Permanent freshwater swamp; ❖ Temporary freshwater marsh; and/or ❖ Temporary freshwater swamp and temporary freshwater lake. Where the site does not match the above categories, additional assessments will be required to confirm the suitability of the vegetation or habitat to be restored for Brolga breeding. The wetlands are likely to recover to support a high cover of emergent aquatic macrophytes (excluding Phragmites australis and Typha spp.), once restored, based on the presence of such species in or near the existing wetland basin.
Suitable inundation, once restored, including extent, depth and timing	The wetlands must remain suitable for Brolga for at least 4 to 5 months (130-150 days) or be situated in a complex of wetlands where those conditions occur across different parts of the complex. To ensure this, the wetlands, once rehabilitated, will aim to have inundation: Minimum depth 30 cm and maximum depth 50 cm for a minimum of 130 days in late winter and spring; Flooding seasonally across at least half the wetland basin (depending on wetland size, basin shape and fill level);

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	A summer-autumn dry phase in the majority of years; and Seasonal flooding in at least three out of four years. A hydrological report(s) must be prepared to determine the suitability and feasibility of the sites for restoration works. These reports should take into account long-term (25+ year) rainfall projections and climate change modelling.
Appropriate wetland size	The final rehabilitated wetlands must be of suitable size and have the appropriate wetland features to support Brolga breeding (i.e. a minimum area of 2.5 ha, ideally 10 ha or larger[6] Larger wetlands and/or larger wetland complexes are preferred, as they are more likely to provide conditions that attract Brolga and support successful breeding (chicks surviving to fledging).
Appropriate landscape context	The wetland/complex are (or will be) separated from potentially conflicting land uses, e.g. shooting ranges, blasting sites, wind farms, residences/dwellings. Sites adjacent to Protected Areas on public or private land will be considered a priority. The wetlands are located within a landscape context which includes other wetland features to ensure a breeding pair of Brolga has access to feeding habitat. The wetlands must be a minimum distance of 2 km from known Brolga breeding sites or 2 km from another wetland selected for restoration under this BMCP, to allow for breeding season home ranges.
Landholder is willing to participate	The landholder(s) is prepared to forego any incompatible use of the wetland (e.g. cropping) so it can be restored and maintained for the sole purpose of a functioning wetland suitable for successful Brolga breeding.
Enhancement works must not have detrimental impacts to other wetland values (include onsite, upstream and downstream values)	The wetlands must be able to support restoration works without negatively impacting onsite, upstream and downstream values. To assist in determining the above, an Index of Wetland Condition (IWC) assessment must be undertaken to inform understanding of wetland/s condition and values, and a hydrological report developed to the satisfaction of DEECA.

3.2.3 Assessment and Selection of Wetlands Enhancement Sites

The Proponent's Delivery Partner will assess each wetland that was nominated as a Potential Enhancement Site against the site selection criteria (see Section 3.2.2).

The Delivery Partner will use the criteria outlined in Table 3-1 to identify the most suitable wetlands for Brolga habitat restoration. All sites will be assessed on their suitability to support the entire offsetting approach, including demonstrating that successful breeding at the enhancement sites will be able to be attributed to the wetland restoration and management as a result of this Plan.

The assessment process may necessitate on-site trials, including but not limited to temporarily blocking drains with sandbags to assess the on-site flooding regime, fencing, vermin control, and monitoring of improvements in potential Brolga habitat condition. On-site trials will be undertaken at the discretion of the Delivery Partner and the results of the trials will contribute to the site assessments.

All sites that were investigated will be assessed against the selection criteria and ranked based on their suitability to

[6] *Per Herring, 2005*

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support the enhancement and offsetting goals of the BMCP.

As suitable sites are identified, they will be progressively secured via landholder agreements and preparation of Wetland Management Plans will commence. At this point, the results of the site assessments will be submitted to the responsible authority, together with a copy of relevant Landholder Agreements that satisfy condition 54 (f) of the Planning Permit.

3.2.4 Preparation of Wetland Management Plans for Enhancement Sites

Following site selection, the Delivery Partner will prepare a detailed Wetland Management Plan for each site. Each Wetland Management Plan will be specific to a particular wetland and will include details of the restoration works and management practices required at that wetland, including restoration of the natural flooding regime, stock control and fox baiting if appropriate. The Wetland Management Plans will follow the principles outlines in Table 3-2 below.

Table 3-2 - Wetland restoration and management principles

Principles	
Restoration	The restoration works will involve reversing modifications to the wetland (e.g. blocking and, if necessary, filling drains and providing sills at the original, natural invert level of the wetland outfall). The restoration works will use a temporary restoration measure, in the first instance, to ensure no permanent change to the wetland if the restoration measures are proven not to be successful or appropriate.
Revegetation	The aim of restoration will be to encourage the regeneration of *in situ* aquatic plants leading to an increase in their extent within the wetland and their cover within these areas, as well as the natural transportation of wetland seeds via the movement of waterbirds between wetlands. Wetland plants can naturally regenerate and cover much of the suitable habitat within a restored wetland within two to three years. If vegetation cover targets are not met via natural regeneration, active regeneration will be considered. If required, active planting of aquatic plants will need to be undertaken by qualified and experienced wetland revegetation specialists.
Stock control and fencing	Livestock will be excluded from the wetland area in the first two years after management commences to permit natural regeneration of wetland vegetation. During the first year when stock is excluded, the vegetation grows and sets seed. In the second year there is usually a burst of natural regeneration from seed that was produced the preceding year and vegetation becomes denser and starts to provide cover. If it is not viable for the landholders to exclude stock from the whole paddock during this time temporary fencing is to be erected around the wetlands to exclude them. The type of fencing and its location will be determined in consultation with the landholder and will take into consideration the potential collision risk for Brolga and the entanglement risk for young, flightless Brolga chicks.
Fox control	Fox control activities may lead to significant disturbance of breeding Brolga. As such, this BMCP proposes a reactive approach to fox control, whereby if the wetland monitoring and reporting suggest that the habitat is restored however fledglings are not surviving because of fox predation then a program for fox control will be developed. Fox control will involve an integrated approach (outside of the Brolga breeding season), in consultation with Agriculture Victoria, which will be adapted to the specific wetland circumstances, including measures such as: • Baiting (using 1080 baits);

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Principles	
	• Den fumigation and ripping; • Shooting; • Property hygiene; and • Harbour removal.

3.2.5 Wetland Enhancement Works

The Wetland Management Plans will also specify site-specific enhancement works that are to occur at each wetland enhancement site. The enhancement works will include, but will not be limited to, the following activities:

- Restoration of the natural flooding regime by reversing modifications to the wetland through blocking and filling drains and providing sills at the original, natural invert level of the wetland outfall;
- Revegetation and planting if vegetation cover targets are not met;
- Stock control and fencing;
- Weed management; and
- Fox control through baiting or other means.

The Delivery Partner will undertake the wetland enhancement works specified in each Wetland Management Plan. The Delivery Partner will be responsible for obtaining any permits or approvals required to undertake the works and will be responsible for all on-site management of the works.

3.3 Implementation Schedule

The key steps in the implementation of the Wetland Enhancement Program as well as the roles and responsibilities are outlined in Table 3-3. Year 1 commences concurrently with the commencement of construction of the first stage of the Project.

Table 3-3 - Implementation schedule

Step		Timing		Responsibility	Plan Reference
		Year	Timeframe		
1	Review and endorse BMCP.	N/A	To be completed before the development starts.	DTP	N/A
2	Execution of agreement between the Proponent and Delivery Partner	N/A	To be completed before the development starts.	GPSA, Delivery Partner	Section 3.1.1
3	Identify initial group of potential enhancement sites for detailed investigation.	Year 1	To be completed within 12 months of BMCP endorsement.	Delivery Partner	Section 3.2.1
4	Undertake detailed assessment of potential enhancement sites, including on-site trials.	Year 1 to Year 5	Detailed investigations, including on-site trials where required, to commence in Year 1.	Delivery Partner	Section 3.2.3

5	Select four most appropriate sites for inclusion in Wetland Enhancement Program	Year 1 to Year 5	Site to be selected on a progressive basis as investigations and trials are completed. All sites to be secured by end of Year 5.	Delivery Partner	Section 3.2.3
6	Secure landholder agreements for selected enhancement sites.	Year 1 to Year 5	To be completed as wetlands are selected for inclusion on Program.	Delivery Partner	Section 3.2.3
7	Prepare Wetland Management Plans for selected Enhancement Sites	Year 1 to Year 5	Within 3 months of selection of sites.	Delivery Partner	Section 3.2.4
8	Submit landholder agreements to DTP and DEECA (in accordance with Permit condition 54(f))	Year 1 to Year 5	All agreements to be provided to DTP and DEECA by end of Year 5.	Delivery Partner	Section 3.2.3
9	Obtain relevant permits / consents to undertake restoration works.	Year 1 to Year 5	Within 6 months of selection of sites.	Delivery Partner	Section 3.2.5
10	Commence permanent restoration works, as required by the wetland management plan.	Year 1 to Year 5	Within 3 months of obtaining relevant permits/consents for works, unless limited by season.	Delivery Partner	Section 3.2.5
11	Implementation of wetland management measures.	Ongoing as required.	Ongoing.	Delivery Partner	Table 4-2
12	Commencement of wetland monitoring.	Commences Year 1 to Year 5.	Ongoing	Delivery Partner	Section 4.1
13	Undertake 5 yearly evaluation of the BMCP (including reporting). Report to be provided to both GPSA and DEECA.	Year 5 Year 10 Year 15 Year 20 Year 25 (and ongoing every five years should Project continue operation beyond 25 years)	Within three months of the end of Year 5, Year 10, Year 15, Year 20 and Year 25. This step may also be required to be undertaken out of cycle (see section 5.2). If required, this will be undertaken within two months after the evaluation has been triggered.	Delivery Partner	Section 4.8

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14	Implement adaptive management/ contingency measures.	As required	As determined through evaluation in step 14.	Delivery Partner	Section 4.7
15	Final report on BMCP performance. Report to be provided to DEECA.	Year 25+	Within six months of completion of wind farm operations on site.	Delivery Partner and GPSA	Section 4.8

3.4 Roles and Responsibilities during Implementation

The responsibility in meeting the objectives of the Wetland Enhancement Program rests ultimately with GPSA, with the Delivery Partner assuming responsibility for the day-to-day implementation of the plan.

Oversight of the implementation of this BMCP will require ongoing liaison between:

- GPSA;
- The Delivery Partner; and
- The regional office of DEECA (formerly DELWP); or
- Rightful successors of any of the above parties.

Reporting will be in accordance with the monitoring, evaluation and reporting framework in Section 4 of this BMCP. Reports will be prepared by the Delivery Partner before submission to GPSA and DEECA.

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4 MONITORING, EVALUATION AND REPORTING

This section of the BMCP describes the framework for monitoring, evaluation and reporting on the performance of the program. Monitoring and reporting will relate to:

- Progress and performance of Wetland Enhancement Sites;
- Brolga breeding and fledging at Enhancement Sites;
- Brolga breeding at wetlands within 10km of the Project;
- Brolga mortality on the Project site;
- Overall BMCP performance; and
- Application of contingency and adaptive management measures (if required).

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4.1 Wetland Enhancement Site Monitoring and Reporting

The Delivery Partner will be responsible for ensuring that their employees and/or independent experts are engaged and available to undertake the wetland monitoring of vegetation regeneration, inundation and Brolga breeding and recruitment at the wetlands selected for restoration.

Evaluation of progress against the BMCP's objectives requires a range of information to be gathered each year by the Delivery Partner at each selected enhancement site.

In Years 1 to 5, monitoring will focus on progress in restoring water levels and extent in an effort to encourage aquatic vegetation establishment, subject to landholder negotiation and specific commencement dates. Making provision for this amount of time is critical for enabling a sensitive negotiation to gain access to the best possible sites for Brolga. Reporting as outlined in Table 4-1 and Table 4-2 will commence when enhancement works commence at each enhancement site.

The monitoring program is presented in Table 4-1, relating to the wetland restoration and management monitoring, and Table 4-2, relating to monitoring of Brolga utilisation of the wetlands and breeding activities.

All observations will be undertaken using optical aids, such as 10x binoculars or 20x spotting scope/telescope from at least 300 metres from the breeding birds.

The data collected will be recorded in a standardised manner, as defined in the wetland management plan.

Table 4-1 - Wetland restoration and management monitoring program

Measure	Method	Timing	
		Years 1 to 5	Years 5 to 25 (or earlier if breeding attempt observed)
Water extent	Mapping extent using LiDAR-derived DEM, calibrated through manual on-ground extent checks (using GPS).	Commence continuous data capture using water level data-loggers from first fill to drying.	Concurrently with Brolga utilisation and breeding monitoring (Table 4-2) including: • Monthly during breeding season; or • Fortnightly from first observation of breeding behaviour.

Water depth and duration	Depth gauges (co-located with a water level data logger, for manual checking/calibration) are placed in each wetland feature within a complex / site at a number of locations, including the deepest point.	Opportunistic recording of depth by photograph of the gauge board, at least twice annually (these visits are when the logger data will be downloaded).	Concurrently with Brolga Utilisation and Breeding monitoring (Table 4-2) e.g.: • Monthly during breeding season; or • Fortnightly from first observation of breeding behaviour.
Vegetation	Data on habitat components collected as per the Roberts *et al.* (2017) DST method.	Annually in December (date subject to avoiding disturbance to breeding Brolga).	Annually

Monitoring of wetland recovery will be done using the latest approach developed by DELWP, namely the Wetland Vegetation Recovery Decision Support Tool (DST) (Roberts et al. 2017). The DST is a useful tool for evaluating site management plans and is flexible enough to focus on providing habitat for any particular species including the Brolga. Importantly, it is a decision support tool rather than a measurement alone, something more relevant to the adaptive management framework of this BMCP. Key physical indicators are also proposed to be monitored (area, depth, extent and depth of inundation) against the habitat objectives in this BMCP. Improvements in the overall quality and value of wetlands will also be noted in wetland assessments and included in the relevant reports. Each wetland involved will have its current and predicted hydrological regime modelled and documented.

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Table 4-2 - Wetland performance targets

Monitoring measure	Key indicator	Performance Target	Key Milestone		Contingency
			Years 1 to 5	Years 5 to 25	
Wetland Restoration and management					
Water extent, depth and duration.	Ecologically effective inundation of each wetland during average and above average years.	Minimum 30cm inundation across at least 75% of the wetland/complex, and sustained for at least 130 days in later winter and spring.	Re-establishment of required inundation regime.	Required inundation occurs on average at least every second year.	Review invert level of wetland outlet and adjust if required using sand bags or similar. Adjust further in later years of program if rainfall patterns change due to climate change.
Vegetation	Extent and percentage cover of suitable aquatic vegetation (i.e. rushes and sedges).	a) 80% or greater aquatic vegetation cover over 40% of the wetland basin within two fillings. b) 80% of greater aquatic vegetation cover over 60% of the wetland within four fillings. c) No decline in the extent and cover of aquatic vegetation after the fourth filling.	a) At the end of the second wetland filling. b) At the end of the fourth wetland filling. c) Ongoing.	Targets b) and c) achieved.	Develop and implement wetland replanting plan.
Vegetation	Results from the DST method.	DST assessment shows improvement in meeting habitat objectives	Annual and ongoing	Annual and ongoing	Adjust relevant wetland management parameters to ensure effective habitat rehabilitation.
Brolga utilisation and breeding activities					
Brolga use of the wetland	Brolga present and engaging in courting/pairing behaviour.	Brolga present.	Brolga present from year 4.	Brolga present from year 5 onwards and then most years during suitable conditions.	Explore options to use attractants. Investigate possible disturbances/predator behaviour deterring birds. Evaluate restored water depth and vegetation to understand whether it fulfils requirements for a brolga

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Monitoring measure	Key indicator	Performance Target	Key Milestone		Contingency
			Years 1 to 5	Years 5 to 25	
					breeding site.
Nesting behaviour	Brolga pair building nest and laying eggs.	Nest present, eggs laid.	Brolga present from year 4	Nest present from year 5 to 7, then on average at least every second year.	Provision of supplementary nest material if required (e.g. hay). Investigate possible disturbances/predator behaviour deterring birds. Investigate water levels and adjust wetland restoration and management actions if necessary. Investigate the need to increase wetland area (or number of wetlands in cluster).

The Delivery Partner's wetland monitoring report(s) will be provided directly and concurrently to both DEECA and the GPSA. This will allow DEECA to receive timely data directly from its source and so it can have confidence in its accuracy.

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4.2 Brolga Breeding and Fledging at Wetland Enhancement Sites

During the Brolga breeding season (July to November), monthly on-site monitoring will confirm whether Brolga are utilising the enhanced wetlands and exhibiting courting/pairing behaviour in accordance with the performance targets as outlined in Table 4-3. Where possible, these monitoring visits will coincide with the wetland monitoring outlined in Section 4.1 to avoid unnecessary disturbance to Brolga. Monitoring will occur between July and November in average rainfall years, and will be extended until January if rainfall exceeds the average in spring and summer given that Brolga may attempt late-season breeding if conditions are favourable.

If Brolga nesting or breeding behaviour is observed at a particular wetland, fortnightly monitoring will commence at that wetland and will continue until the end of November if no hatching event has been observed. Fortnightly monitoring will be extended until February if rainfall exceeds the average in spring and summer and wetland conditions (i.e. inundation levels) remain suitable for breeding.

If a chick hatches at a wetland, weekly monitoring will commence which will ascertain the stage, progress and outcomes of hatching, chick rearing and fledging. This monitoring will continue until the chicks reach 6-8 weeks of age.

At 6-8 weeks or age, chicks will be captured and fitted with individual coloured bands and a GPS transmitter to monitor their survival, fledging and recruitment into the adult population, thus fulfilling the intent of the plan. A GPS transmitter allows for completely remote tracking and eliminates any further potential disturbance to the chick and adult pair, thus increasing chances of fledging. It also provides confirmation the bird is recruited to the adult population and provides vital information should the bird not successfully recruit. Such information can then be used to fine-tune the BMCP's actions.

Capture of Brolga chicks and fitting of GPS transmitters will be undertaken in close collaboration with Dr. Inka Veltheim, who successfully applied this methodology during her PhD work and provided advice that informed this BMCP. Dr. Veltheim's advice letter detailing the methodology and risk assessment for the capture of chicks and fitting of GPS trackers is included in Dr. Inka Veltheim advice regarding GPS tracking of pre-fledged Brolga .

A copy of all GPS monitoring data will be provided to DEECA for inclusion in Victoria's Biodiversity Atlas (VBA).

For the purpose of reporting and evaluation under this BMCP, a chick will be considered fledged once it has left the breeding site at an age of 11-14 weeks after hatching.

Table 4-3 - Brolga breeding performance targets

Monitoring measure	Key indicator	Performance Target	Key Milestone	Contingency
Fledged young	Number of young successfully fledged.	Young successfully fledged at the average rate of about one every second year across each wetland in the plan from year 7.	One fledged chick every second year from years 7 to 25.	Investigate and control any predation of eggs and young birds. Refine water regime management to ensure appropriate conditions long enough to produce fledglings. Investigate the need to increase wetland area (or number of wetlands in cluster). Investigate and eliminate potential risk of collisions with fences and powerlines near wetland.

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Monitoring measure	Key indicator	Performance Target	Key Milestone	Contingency
				Investigate influence of rainfall on fledging success
Birds recruited to adult population	Number of birds successfully recruited to adult population.	Bird successfully recruited to the adult population at the average rate of about one every 5 year across each of the wetlands in the plan from year 7.	One bird recruited every 5 year from year 7 to year 25.	Review GPS tracking data Investigate possible disturbances or impediments to recruitment Seek independent review of work Review assumptions in Section 2.2 of the BMCP and if assumptions are incorrect, consider additional sites.

4.3 Brolga breeding at wetlands within 10km of the Project

As detailed in the Golden Plains Wind Farm Bat and Avifauna Management Plan (BAMP), suitable breeding wetlands within 10 kilometres of the wind farm will be searched once per month during the breeding season. These 27 wetlands are shown on the plan in Attachment C to this BMCP. Breeding and/or flocking at any of these wetlands will trigger detailed surveys at the wetland where the activity was detected. Further details are provided in Section 5.3 of the BAMP.

4.4 Brolga breeding at Wetland 25

The Minister's Assessment of the EES noted that the proximity of the proposed terminal station location to the adjacent breeding wetland (known as Wetland 25) was of concern and recommended the terminal station be screened by vegetation to minimise disturbance to brolga breeding at the wetland. In addition, the Minister noted that *"Brolga use of the wetland should be monitored and if successful breeding does not occur within the first five breeding seasons after construction of the terminal station commences, additional provision for the effective loss of the wetland as a Brolga breeding site should be made through the project's Brolga compensation plan."*

Wetland 25 will be monitored as part of the monitoring program outlined in Section 4.3. Should a successful breeding event not occur at Wetland 25 within five years after construction of the terminal station commences, one additional wetland will be added to the Wetland Enhancement Program.

4.5 Brolga mortality on the Project site

Detailed assessments and monitoring have been undertaken by Nature Advisory during the planning stage of the Project to identify all breeding wetlands, movement areas and flocking sites on or near the Project site.

Monitoring and reporting of impacts to Brolga during operation of the wind farm will be implemented in accordance with the BAMP, which prescribes monthly searches of all turbine areas for the life of the Project. Impact triggers and the need for further investigations including the decision-making framework required are defined in the BAMP and detailed in Section 2.4 and Table 4-4 of this Plan.

4.6 Assessment of BMCP Performance

GPSA will use the data provided under Sections 4.1 to 4.5 of this BMCP to meet its public reporting requirements (at year 1, 2, 5, 10, 15, 20 and 25). This will enable the required five-yearly evaluation against the BMCPs performance targets and determination of whether the BMCP targets are being met.

Evaluation of the BMCP will be undertaken at key milestones to ensure that the objective of the BMCP is adjusted in response to the Brolga monitoring (Section 2) and that contingency measures can be implemented to ensure it meets

the 25-year zero net impact objective.

The first evaluation will be undertaken at the end of Year 1 by GPSA, and will report on the progress under the BMCP, including:

- Date of execution of agreement between GPSA and the Delivery Partner;
- Summary and outcome of the actions undertaken thus far under the BMCP
- A report from the Delivery Partner addressing progress on the Wetland Enhancement Program:
  - ❖ Summary of wetland selection process;
  - ❖ Summary of landholder agreements and corresponding Wetland Management Plans (excluding names, addresses and other sensitive/private information); and
  - ❖ Details of restoration works and management measures undertaken where relevant.

At the end of Year 5, Year 10, Year 15, Year 20 and Year 25 evaluation of the BMCP will be undertaken by the Delivery Partner. An evaluation of the BMCP outside of the 5-yearly cycle (e.g. earlier than Year 5) may be triggered if:

- Prolonged drought stops wetland filling and Brolga breeding for two or more years; and/or
- on-site monitoring results show that project impacts are above the predicted impacts (see Golden Plains Wind Farm – Brolga collision likelihood table (Symbolix 2020)).

The BMCP will be evaluated against the performance targets set out in Table 4-3. The performance targets are based on the number of fledging young produced as a result of this BMCP and the number of Brolga impacted on the project site.

Table 4-4 also defines contingency measures that will be implemented should the evaluation find that the BMCP is not meeting the performance targets, or Project impacts are higher than those indicated at each key milestone.

The evaluation will be presented in a report that includes:

- A summary of the results of wetland monitoring for the previous five years;
- Evaluation of the effectiveness of the wetland management measures and breeding success, and recommendations on contingency measures (including changes to the wetland management plans), if required;
- Evaluation of the impact of drought conditions and climate change on the rate at which the required number of fledglings can be produced;
- Results from the on-site impact monitoring outlined in Section 4.5, including comparison of the number of Brolga impacted by the project versus the number of fledglings produced by this BMCP and an assessment of whether the project's overall impact corresponds to the estimated impacts;
- Findings of the evaluation of the BMCP against the performance targets; and
- Conclusion on the progress of the BMCP in achieving a zero-net impact objective.

An outline of the performance targets is included in Table 4-4 below. Recommendations on an adjustment to the aim of the BMCP if impacts to Brolga are above those predicted.

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Table 4-4 - BMCP performance targets

Key Indicator	Performance Target		Key Milestone	Contingency
	Project impacts	Benefits of offsets		
Cumulative benefit of offsets exceeds the minimum required to offset the impact of the Project.	Not more than three Brolga impacted.	At least three Brolga offsets generated by the Wetland Enhancement Program.	Year 10	Additional wetland(s) may be required if performance target not met.
	Not more than four Brolga impacted.	At least four Brolga offsets generated by the Wetland Enhancement Program.	Year 15	Additional wetland(s) may be required if performance target not met.
	Not more than five Brolga impacted.	At least five Brolga offsets generated by the Wetland Enhancement Program.	Year 20	Additional wetland(s) may be required if performance target not met.
	Not more than six Brolga impacted.	At least six Brolga offsets generated by the Wetland Enhancement Program.	Year 25	Additional wetland(s) may be required, or plan to be extended beyond Project life until performance target is met.

4.7 Contingencies and Adaptive Management

The performance of the BMCP will be constantly monitored against the targets detailed in Table 4-4. Should targets not be met, or if the impact on the Brolga population is found to be greater than the modelled estimate, the program will be reviewed and the most appropriate contingency measures from Table 4-2, Table 4-3 and/or Table 4-4 will be implemented. Should further remedial, on-ground action be determined necessary through the evaluation process, additional wetland restoration works will follow the same principles as outlined in Section 3.2 and in Table 3-1. This will be necessary if at the key milestones either:

- The benefits of Brolga recruitment from the restored wetlands is not yet at the level required to meet the modelled impact of the wind farm; or
- The operating wind farm has resulted in detected mortality rates that exceed the modelled impact and that are not adequately offset by compensation programs.

The implementation of any contingency measures will be detailed in each progress report. Any amendment outside this process will be undertaken in consultation with DEECA's Environment Portfolio and approved by the responsible authority.

4.8 Reporting Schedule

Reporting will be undertaken in accordance with the schedule outlined below.

Table 4-5 - Reporting Schedule

Report	Frequency	Responsibility	Audience	Plan Reference

Wetland Monitoring and Enhancement Report	Annual, commencing year 3	Delivery Partner	DEECA, GPSA	Section 4.1
Brolga Monitoring Report	Annual, commencing year 3	Delivery Partner	DEECA, GPSA	Section 4.2
On-site Impact Reporting	Refer to BAMP			
BMCP Progress Report (Interim)	Year 0, 1, 2, 5, 10, 15, 20 and 25.	Delivery Partner	DEECA, GPSA, Public release	Section 4.6
BMCP Progress Report (Final)	Following completion of wind farm operations on site.	Delivery Partner	DEECA, GPSA, Public release	Section 4.6

Monitoring and reporting under this plan will cease when the Project ceases operations on site, provided that:

- the BMCP has been implemented to the satisfaction of DEECA Environment Portfolio; and
- the BMCP has, at a minimum, achieved a zero net impact on the Victorian brolga population.

Following completion of wind farm operations, the GPSA will submit a final BMCP Progress Report confirming that the BMCP's performance targets have been met. The Responsible Authority will provide written acknowledgement that the BMCP has been successfully implemented and the Project has satisfied conditions 54 and 55 of the Permit.

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5 REFERENCES

Barrett, G, Silcocks, A, Barry, S, Cunningham, R and Poulter, R 2003. *The New Atlas of Australian Birds*. Birds Australia, Melbourne.

Brett Lane & Associates Pty Ltd (BL&A) 2018a, *Golden Plains Wind Farm Environmental Effects Statement – Brolga Impact assessment*, Report for West Wind Energy Pty. Ltd. BL&A, Hawthorn East, Victoria.

Brett Lane & Associates Pty Ltd (BL&A) 2018b, *Golden Plains Wind Farm Environmental Effects Statement – Biodiversity assessment – Volume A: Main Report*, Report for West Wind Energy Pty. Ltd. BL&A, Hawthorn East, Victoria.

Department of Sustainability and Environment (DSE) 2012. *Interim Guidelines for the Assessment, Avoidance, Mitigating and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population,* Victorian Government (DSE), Melbourne.

Du Guesclin, P 2003. *Action Statement No 119. Brolga Antigone rubicunda*. Department of Sustainability and Environment, Victoria, Australia.

Herring, M. 2001. *Ecology and conservation of the Brolga and other threatened waterbirds in southern NSW and northern Victoria,* Honours thesis, Charles Sturt University - Albury NSW. 2000

Herring M 2005, *Brolga breeding habitat – managing wetlands on your farm*, Murray Catchment Management Authority, NSW.

Herring M 2007, Brolga breeding habitat – managing wetlands on your farm, Murray Catchment Management Authority, NSW.

Marchant and Higgins 1993. *Handbook of Australian, New Zealand and Antarctic Birds, Volume 2: Raptors to Lapwings. Oxford University Press*, Melbourne.

McCarthy, M. 2018. *Results for the Brolga PVA for Turbine Layout at Golden Plains*. Report for BL&A. School of Biosciences, The University of Melbourne, Melbourne, Victoria.

Myers, A. 2001. *Factors Influencing the Nesting Success of Brolgas, Grus rubicundus in Western Victoria.* Hons. Thesis. Deakin University, Warrnambool.

Roberts J, Casanova MT, Morris K and Papas P 2017. Vegetation recovery in inland wetlands: an Australian perspective. Arthur Rylah Institute for Environmental Research. Technical Report Series No. 270. Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

Sheldon R 2005, Breeding and flocking: comparison of seasonal habitat use by Brolga Grus rubicunda in south western Victoria, Aust. *Field Ornithology* 22:5-11.

Symbolix 2017. *Turbine collision risk model results - Golden Plains Wind Farm*. 21 April 2017, Version 1.0. Report for Brett Lane and Associates. Williamstown North, Victoria.

Symbolix 2018. *Updated brolga collision risk for Golden Plains Wind Farm – 27 wetlands*. 17 July 2018, Version 1.0. Report for Brett Lane and Associates. Williamstown North, Victoria.

Veltheim, I., Chavez-Ramirez, F., Hill, R. and Cook, S. 2015, Assessing capture and tagging methods for brolgas, Antigone rubicunda (Gruidea), Wildlife Research – Management and Conservation, Volume 42 Issue 5.

Veltheim, I. 2020, Letter of advice on brolga pre-fledged chick GPS tracking, Biosis Ref. 31295, Melbourne, February 2020.

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6 APPENDICES

Appendix A Golden Plains Wind Farm – Collision Risk Modelling (CRM) (Symbolix 2020)

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symbolix

Updated brolga collision risk for Golden Plains Wind Farm

Prepared for Nature Advisory, 19 November 2020, Ver. 1.81

1 Purpose

This memo updates the turbine and powerline collision risk estimates presented in Symbolix (2018b), Symbolix (2018a), Symbolix (2019), Symbolix (2020a), Symbolix (2020b), Symbolix (2020c), Symbolix (2020d), and Symbolix (2020e).

It highlights the relevant changes to the inputs and presents updated results for the revised turbine collision risk, based on updated turbine layout (resulting from the EES outcomes) and one set of revised parameters:

- 165m rotor diameter and 140m hub, and 215 turbines

2 Turbine collision risk

2.1 Changes to input data

There are no changes to the methodology presented in the original report (Symbolix 2018b).

The model inputs are as summarised in Table 4 of that report, except for

- the update to the spatial wetland data, which now includes 27 wetlands (not 26) as outlined in Symbolix (2018a);
- change to the shape of the powerline; and
- revised turbine layout consisting of 215 turbines, and a new height profile.

Figure 1 shows the placement of all wetlands alongside the 215 turbine layout analysed below.

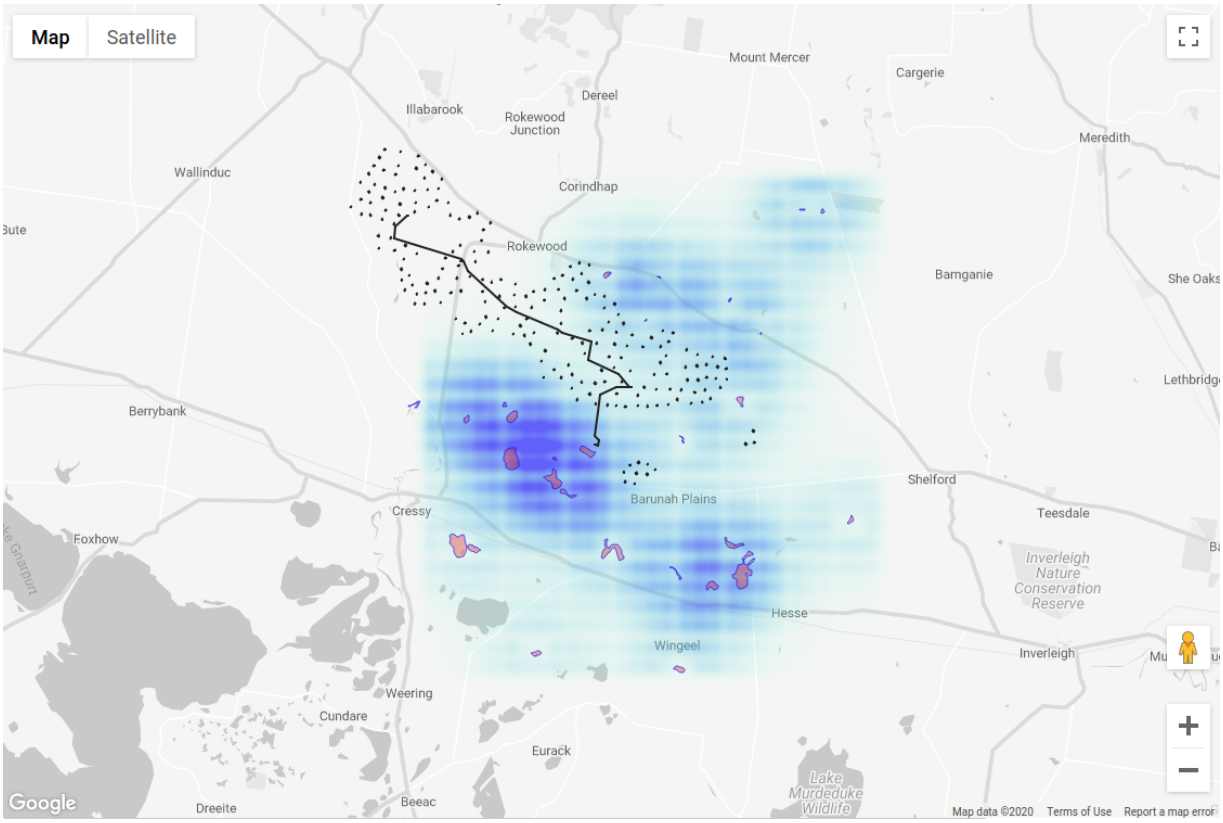

Figure 1: Heatmap denotes the relative risk profile of all wetlands combined. Also includes powerline (thick black line), wetlands (red indicates potential breeding), and the 215 turbines included in the turbine layout considered in this memo (black circles).

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2.2 Updated scenario results (165m rotor diameter, 140m hub height)

This scenario predicts a long-term average annual collision risk of 0.222 brolga flights per year at the 90% avoidance rate (Table 1).

Table 1: Scenario: 165m diameter rotor, 140m hub height, 27 wetlands: long-term annual average flight collision risk estimate by time of year, and annually.

avoidance	breeding_season	flocking_season	annual_collisions
0.90	0.062	0.161	0.222
0.95	0.031	0.080	0.111
0.99	0.006	0.016	0.022

3 Powerline collision risk

The powerline model results have not changed, with an estimated rate of 0.001 collisions per year.

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References

Symbolix. 2018a. "Updated Brolga Collision Risk for Golden Plains Wind Farm - 27 Wetlands." *Technical Report Addenda*, no. Version 1.1.

———. 2018b. "Brolga Collision Risk at Golden Plains Wind Farm." *Technical Report*, no. Version 2.7 (March).

———. 2019. "Updated Brolga Collision Risk for Golden Plains Wind Farm." *Technical Report Addenda*, no. Version 1.0 (November).

———. 2020a. "Updated Brolga Collision Risk for Golden Plains Wind Farm." *Technical Report Addenda*, no. Version 1.3 (February).

———. 2020b. "Updated Brolga Collision Risk for Golden Plains Wind Farm." *Technical Report Addenda*, no. Version 1.4 (February).

———. 2020c. "Updated Brolga Collision Risk for Golden Plains Wind Farm." *Technical Report Addenda*, no. Version 1.5 (May).

———. 2020d. "Updated Brolga Collision Risk for Golden Plains Wind Farm." *Technical Report Addenda*, no. Version 1.6 (May).

———. 2020e. "Updated Brolga Collision Risk for Golden Plains Wind Farm." *Technical Report Addenda*, no. Version 1.7 (September).

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Appendix B Golden Plains Wind Farm – Brolga collision likelihood table (Symbolix 2020)

Based on 90% avoidance, 165m diameter rotor, 140m hub height

0.223 average (90% avoidance)

Years \ Mortalities	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	80.0%	17.9%	2.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	64.0%	28.6%	6.4%	1.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	51.2%	34.3%	11.5%	2.6%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4	40.9%	36.6%	16.3%	4.9%	1.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	32.7%	36.6%	20.4%	7.6%	2.1%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6	26.2%	35.1%	23.5%	10.5%	3.5%	0.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	20.9%	32.7%	25.6%	13.3%	5.2%	1.6%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8	16.7%	29.9%	26.7%	15.9%	7.1%	2.5%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	13.4%	26.9%	27.1%	18.1%	9.1%	3.7%	1.2%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10	10.7%	23.9%	26.7%	19.9%	11.1%	5.0%	1.9%	0.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	8.6%	21.0%	25.9%	21.2%	13.0%	6.4%	2.6%	0.9%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12	6.8%	18.4%	24.6%	22.0%	14.7%	7.9%	3.5%	1.4%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	5.5%	15.9%	23.1%	22.4%	16.2%	9.4%	4.6%	1.9%	0.7%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14	4.4%	13.7%	21.4%	22.3%	17.5%	10.9%	5.7%	2.5%	1.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	3.5%	11.7%	19.7%	22.0%	18.4%	12.3%	6.9%	3.3%	1.4%	0.5%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
16	2.8%	10.0%	17.9%	21.3%	19.1%	13.6%	8.1%	4.2%	1.9%	0.7%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	2.2%	8.5%	16.2%	20.5%	19.4%	14.8%	9.3%	5.1%	2.4%	1.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18	1.8%	7.2%	14.5%	19.4%	19.5%	15.7%	10.5%	6.1%	3.0%	1.4%	0.5%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	1.4%	6.1%	12.9%	18.3%	19.4%	16.5%	11.7%	7.1%	3.8%	1.8%	0.8%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20	1.1%	5.1%	11.4%	17.0%	19.0%	17.0%	12.7%	8.1%	4.5%	2.2%	1.0%	0.4%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	0.9%	4.3%	10.1%	15.8%	18.5%	17.4%	13.6%	9.1%	5.3%	2.8%	1.3%	0.6%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
22	0.7%	3.6%	8.9%	14.5%	17.8%	17.5%	14.4%	10.1%	6.2%	3.4%	1.7%	0.7%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	0.6%	3.0%	7.7%	13.3%	17.0%	17.5%	15.0%	11.0%	7.1%	4.0%	2.1%	1.0%	0.4%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	0.5%	2.5%	6.7%	12.0%	16.2%	17.3%	15.5%	11.9%	8.0%	4.7%	2.5%	1.2%	0.6%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	0.4%	2.1%	5.8%	10.9%	15.2%	17.0%	15.8%	12.6%	8.8%	5.5%	3.1%	1.6%	0.7%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Quantile
- 95%
- 99%
- Outside 99%

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Appendix C Location of potentially at-risk Brolga breeding, migration and flocking activities near Golden Plains Wind Farm

Figure 6-1: Brolga breeding records and wetlands

Source: Brett Lane & Associates, Golden Plains Wind Farm Environment Effects Statement – Brolga Impact Assessment, Report No. 16164 (2.12), March 2018. Updated by GPSA with Nature Advisory in April 2023 to include one additional wetland likely to support brolga breeding that had been identified during the EES process.

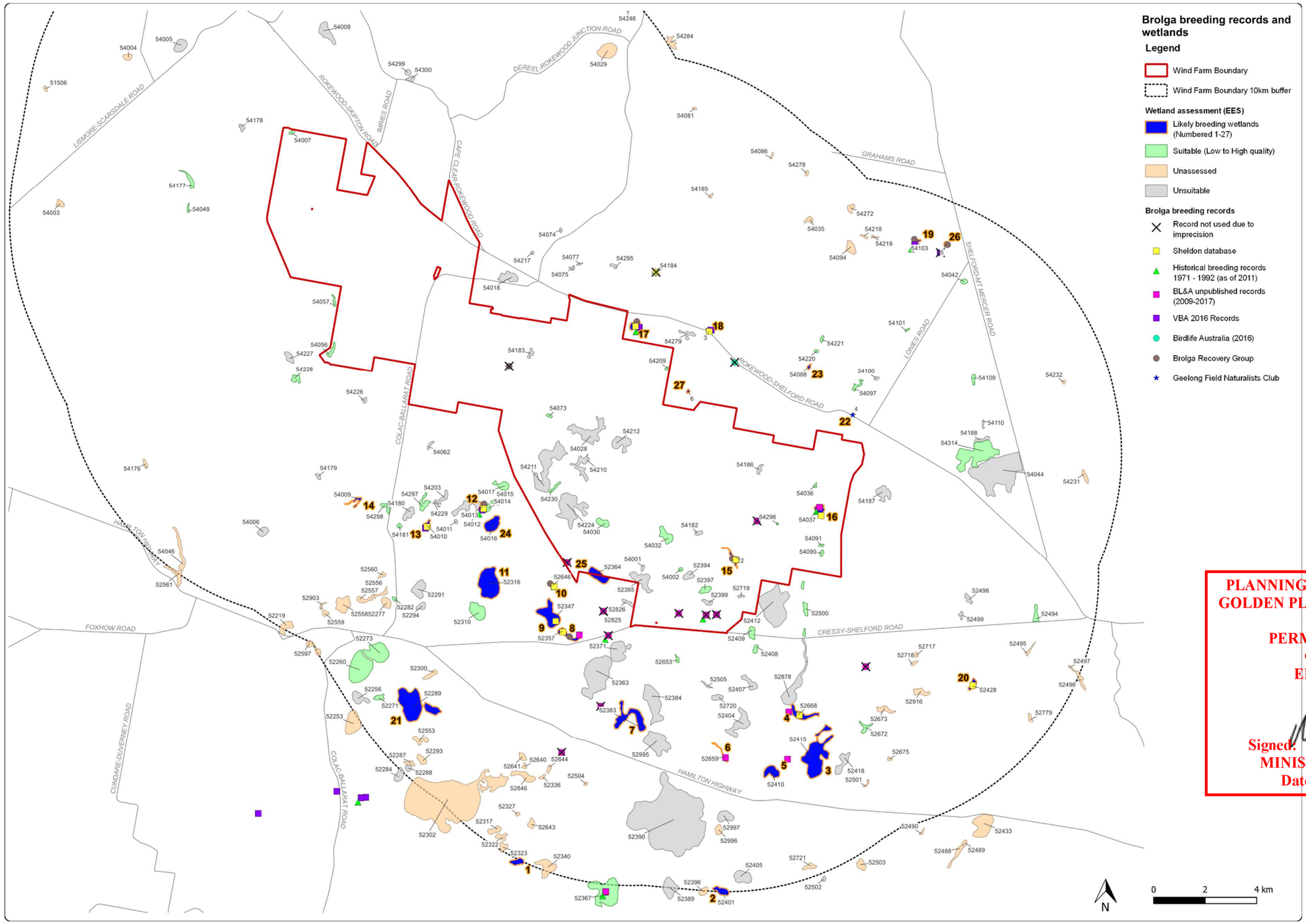

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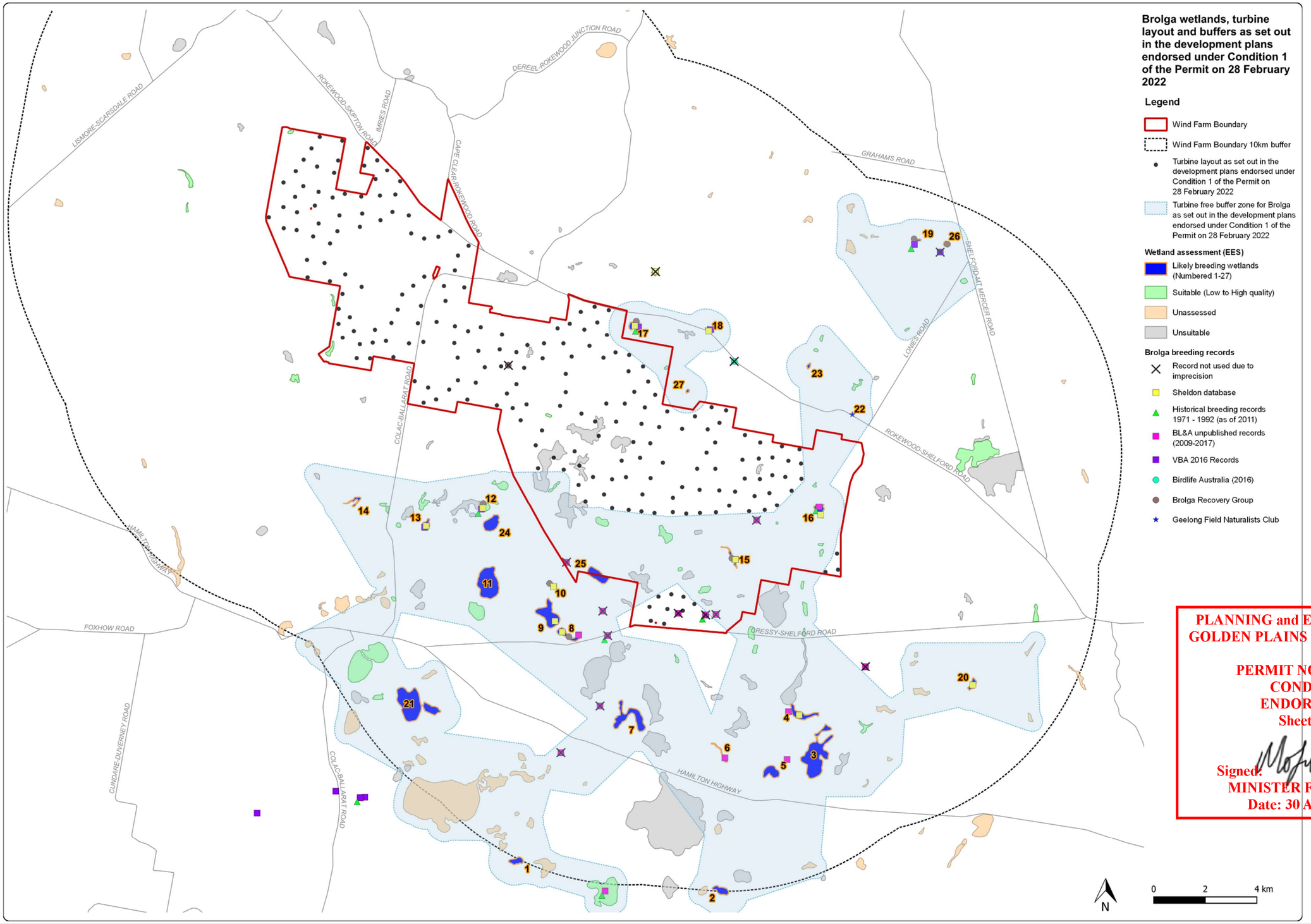
Figure 6-2: Brolga breeding wetlands and turbine free buffers

Source: Prepared by GPSA in April 2023.



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Appendix D Dr. Inka Veltheim advice regarding GPS tracking of pre-fledged Brolga chicks

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Dr Inga Kulik
Senior Ecologist & Project Manager
Nature Advisory
5/61-63 Camberwell Road
Hawthorn East, VIC 3123

Letter of advice on brolga pre-fledged chick GPS tracking

Project no. 31295

Background

Nature Advisory has recommended to the Department of Environment, Land, Water and Planning (DELWP), that pre-fledged brolga chick GPS-tracking be undertaken as part of Golden Plains Wind Farm's Brolga Monitoring and Compensation Plan (BMCP), which would allow monitoring of chicks until successfully fledged and recruited into the brolga population. DELWP has expressed concerns about ensuring the safety and welfare of brolga chicks if they were to be captured and fitted with transmitters.

DELWP acceptance of tracking methodology as part of this work requires information and evidence to demonstrate that capture and GPS-tracking related risks can be managed to reduce risk and injury to the individual brolgas.

Scope

Nature Advisory engaged Biosis Pty Ltd to provide expert advice on:

- The main risks associated with GPS- tracking and how to avoid and mitigate such risks;
- Costs of fitting brolga chicks with a GPS transmitter and monitoring up to – and post-fledging.

To address these requirements, the scope of works included a letter containing the following information:

- Outline of safe methods of capture, handling and GPS transmitter fitting on pre-fledged brolga chicks;
- Methods to avoid and mitigate risks of injury to the captured birds;
- Estimate of costs for GPS transmitters and associated data;
- Estimate of the number of person days required for monitoring site/s for capture and post-capture monitoring, data downloading and compilation;

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- Estimate of the number of person days required for safe capture, handling and GPS-transmitter fitting.

Exclusions

The scope excludes:

- Justification of using GPS tracking and banding to monitor brolga movements and survival;
- Estimates of the length of transmitter operational times – this will depend on the specific data and battery life requirements, and can be calculated once this information is known;
- Costs of
  - Preparing ethics and/or permit applications;
  - Equipment required for capture, handling and transmitter fitting;
  - GIS mapping or reporting;
  - Transmitter shipping and Australian customs charges;
  - Travel, vehicle and accommodation costs for undertaking field work;
  - Specific advice on the GPS transmitter specifications – this will be highly dependent on the question to be addressed by the study and will be a balance of the required information and length of the desired transmission (GPS location fixes vs. battery life);
  - Reporting.

Limitations

The mitigation measures to manage and control risks of injury and death to pre-fledged brolgas resulting from capture, handling, banding and transmitter fitting are based on Dr Inka Veltheim's research, and becoming highly experienced and competent in all aspects of brolga welfare during her PhD project. Dr Veltheim led the development and field work of all the capture, handling and transmitter fitting procedures, having initially tested capture, band and transmitter-fitting methods on captive brolgas. Having this experience, as well as an excellent knowledge of brolga behaviour (including ability to detect signs of stress and disturbance) have led to the successful and injury-free release of 21 pre-fledged chicks with bands and transmitters. The main limitation is uncertainty of similar injury and death-free success with other personnel undertaking a similar study.

Any risk associated with personnel inexperienced in the methods and procedures undertaking such work, could be mitigated through:

- Training by an experienced person;
- A strict adherence to methods used in Veltheim et al. (2015), which is based on knowledge of managing welfare risks to brolgas and other crane species;
- Ensuring that a highly experienced and qualified person in animal welfare is always present during capture attempts (>10 years of experience capturing, handling, tagging wildlife, including large birds).

Part 1 – Pre-fledged chick capture, handling, banding and transmitter fitting

Capture and handling disrupt the normal behaviour and impose a perceived predatory threat to brolgas. These activities thus cause distress to individuals. Cranes are susceptible to capture-related exertional myopathy (Hanley et al. 2005, Hartup 2006, Businga et al. 2007, Veltheim et al. 2015), a condition which adversely affects muscle function in animals. It can affect the animal's ability to fly, walk or run and can be fatal. Pursuit capture, restraint during handling, and high temperatures can increase stress and potentially result in exertional myopathy.

Active pursuit of pre-fledged chicks is one of the safest methods to capture brolgas, if done correctly (Veltheim et al. 2015). The method has been used widely on several crane species overseas (Melvin & Temple 1983, Alonso et al. 2008, Kanai et al. 2002, Krapu et al. 2011) and on sarus cranes and brolgas in Australia (Grant 2008, Veltheim et al. 2015). Veltheim et al. (2015) captured 21 ≥6 week old pre-fledged brolga chicks, with no capture and handling related injuries or mortalities. Leg-band mounted GPS transmitters were fitted on 12 of these chicks. Following the procedures outlined in this letter, there were no short-term or long-term welfare impacts on these individuals (Veltheim et al. 2015).

This part of the letter outlines:

- The risks to pre-fledged chicks during capture, handling, banding and transmitter fitting;
- Methodology to mitigate risks of injury and death to pre-fledged brolga chicks during the above activities.

The risk of injuries and death to pre-fledged brolga chicks from capture-related activities was assessed based on Veltheim et al. (2015) experience.

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Capture

Risks

Unfledged brolga chicks are vulnerable to predation and mortality due to their limited mobility and inability to fly to safe habitat, compared with adults and juveniles. A breeding pair with chicks roosts and moves within their breeding home range as a family unit and the adults' presence offers some protection for the chicks, particularly from predators. Known predators of chicks include birds of prey (little eagle, whistling kite, wedge-tailed eagle) and foxes (Herring 2001, DuGuesclin 2003, Herring 2005) and chicks can be preyed on if separated from parents (Herring 2005). Brolgas will attack foxes and exhibit a broken wing display to protect their chicks (anecdotal reports, Veltheim pers. obs.).

The method of chick capture includes a team of people driving close to a wetland with known brolga pair and chicks, followed by running towards the chick. Chick capture causes disturbance to a brolga breeding pair and their chick, whereby the chick is separated from its parents. The breeding pair flies off when disturbed by people on foot, the chick is left behind in, or near, a wetland within their breeding home range. When disturbed, brolga chicks run for a short distance and hide in dense vegetation. Disturbance from human activities that separate the chicks from parents can potentially leave the chicks exposed and increase the likelihood of predation, injury or mortality of chicks. There may also be a risk that the young is abandoned, although this is unlikely based on capture of 21 ≥6 week old chicks in south-west Victoria (Veltheim et al. 2015). If chicks run towards fences during pursuit, they may get tangled, potentially resulting in leg and wing injuries. No predators or fence entanglement have ever been observed during chick capture and release (Veltheim et al. 2015).

Risk of injury or death to chicks, without mitigation: Medium

Mitigation

Capture-related risks can be avoided through:

- Catching chicks, which are at least 6 weeks old;
- Thorough familiarisation and reconnaissance of the capture site, including identifying:
  - location and movement of the pair and their chick;
  - capture team entry and exit points;
  - location for spotters (personnel stationed on the periphery of the capture site with a spotting scope);
  - identifying fences;
  - identifying any potential risks to adults when fleeing the site (risks to adults are considered very low, but need to be considered);
- Catching in poor weather conditions must not be undertaken – i.e. no captures in rain, hot (>26°C), or humid conditions;
- Reducing pursuit time:
  - thorough site familiarisation and risk identification as outlined above;

- Having a minimum of one, and preferably two, people with radios stationed at opposite or diagonal locations in relation to the capture site – these personnel will direct the personnel searching for the chick and keep an eye on the location of the adult pair as far as possible;
- Multiple personnel participating in the pursuit (minimum 2 people running, per chick), team leader with a radio to communicate with spotters;
- Pre-capture briefing with capture team personnel, clearly identifying roles of individuals during capture, and explaining the capture process;

- Stationing personnel at fencelines, if necessary;
- If driving close to a wetland or other habitat used by the breeding pair and their chick, car must stop if line of sight to the chick is lost – this avoids the potential risk of driving over the chick;
- Abandoning capture attempt if risks of predation or fence entanglement is observed, and determined to be too great for the welfare of the chick and/or the adult breeding pair;
- Abandoning capture attempt if a chick is not found within 10-15 minutes from the start of the pursuit.

Risk of injury or death to chicks, with mitigation: Low

Handling

Risks

Upon capture, a chick is fitted with a hood, which needs to be the right size for a brolga chick and include a hole for the beak to allow breathing. The hood calms the bird down during handling and processing, and reduces capture-related stress, which can be fatal. Cranes are prone to exertional myopathy due to capture-related stress (Hartup 2006, Veltheim et al. 2015) and all steps must be undertaken to avoid stress as this is one of the main risks of capture and handling.

Additional risks to the chick during handling include the possibility of the chick's feet and nails getting caught in personnel's clothing. This can be avoided by appropriate holding technique, avoiding contact with the bird's feet, keeping the bird calm (including avoiding and reducing noise during handling) and having one person closely watching the bird and removing the feet from clothing if they get caught.

Risk of injury or death to chicks, without mitigation: High

Mitigation

Risks of injuries and death due to handling can be avoided through:

- Having a team leader experienced in identifying signs of stress in cranes and managing the welfare of the captured individual;
- Pre-capture briefing with capture team personnel, clearly identifying roles of individuals during capture, and explaining the capture process, risks and procedures for managing the bird's welfare;

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- Restricting the time from capture to release to 25 minutes, which has been shown to reduce stress and capture related mortality in cranes (Veltheim et al. 2015, Hartup 2006);
- Ensuring correct handling methods are used, to reduce flapping, kicking and stress – this includes gently restraining wings and not restraining the legs (i.e. letting legs hang down);
- Handling and processing in the shade, away from wind and noise, and ensuring the team is calm and quiet throughout;
- Assigning a team member as a time keeper, and notifying the team at 15 and 20 minutes, of time remaining;
- A minimum team size of three people, with one person holding the bird, another fitting the transmitter and undertaking any other required procedures such as banding and morphometric measurements, and one person as the scribe and time-keeper;
- Prioritising tasks undertaken during handling, i.e. banding, transmitter fitting, morphometric measurements to ensure the most important tasks are undertaken first;
- Monitoring signs of stress, such as overheating, increased breathing rate or open-mouth breathing at all times during handling;
- Abandoning all processing if signs of stress, which may lead to injury or death, are noticed, and releasing the bird immediately.

Risk of injury or death to chicks, with mitigation: Low

Banding

Risks

Banding can cause leg injuries if the band is an incorrect size, or if a band is overlapped. Historically, Australian bird and bat banding scheme (ABBBS) metal bands that were too small were fitted on brolga chicks, which resulted in injuries and deaths (Veltheim et al. 2015). A study on brolgas in south-west Victoria demonstrated that fitting correct size bands can completely avoid this risk (Veltheim et al. 2015). Minor injuries can still occur during fitting, if band edge or pliers scratch the surface of the skin. No short-term or long-term adverse effects from minor injuries resulting from banding have been observed. Plastic colour-bands, which allow individual identification, have not caused any observed injuries on brolga chicks, or adults.

Risk of injury or death to chicks, without mitigation: Low

Mitigation

Risks of injuries and death due to banding can be avoided through:

- Catching chicks, which are at least ≥6 weeks old;
- Following recommendations in Veltheim et al. 2015:
  - ABBBS size 35 bands (these bands have no risk of overlapping);
  - 22 mm colour bands;

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- The metal band and colour bands must be fitted on the tibia (upper leg) and not use the same colours that have been previously fitted on brolgas in south-west Victoria;
- Having an experienced ABBBS A-class bander fit metal bands;
- Ensuring the right tools are used to close the band, including large ABBBS pliers and flat-nosed pliers;
- Cleaning any minor injuries with iodine antiseptic.

Risk of injury or death to chicks, with mitigation: Low

Transmitter fitting

Risks

Twenty-one ≥6 week old pre-fledged brolgas in south-west Victoria have been fitted with a 30g leg-band mounted GPS platform transmitter terminals (PTTs), with no injuries or deaths resulting from the PTTs or their attachment (Veltheim et al. 2015). The PTT is fitted onto one half of a 22 mm diameter plastic leg-band by the manufacturer. The two halves are attached to each other using stainless steel pop rivets (Figure 1). The same type and model PTT has been used on the endangered whooping crane chicks (*Grus americana)* (Pearse et al. 2018). Two of the PTTs fitted on brolga chicks have also fallen off the birds over time, several years post-capture. One individual has paired up, bred and successfully hatched a chick, indicating there are no short-term or long-term effects on the individuals from carrying this type of transmitter.

The transmitters are quick and easy to fit (maximum time 5 minutes), and no prior experience is necessary, though guidance from an experienced person is highly desirable and recommended.

Figure 1. Pre-fledged brolga chick released post-capture showing leg-band fitted GPS transmitter and colour bands (Veltheim 2018).

Risk of injury or death to chicks, without mitigation: Low

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Mitigation

Risks of injuries and death due to transmitter fitting can be avoided through:

- Having a person experienced in the method present to fit the transmitter, or to guide other personnel through the process;
- The colour-band for the transmitter must be 22 mm in diameter, as per Veltheim et al. (2015) and a different colour to those previously fitted on brolgas in south-west Victoria;
- The transmitter must be fitted on the tibia (upper leg).

Risk of injury or death to chicks, with mitigation: Low

Release

Risks

The main risks when releasing chicks, include potential abandonment by the breeding pair, predation or fence entanglement. Following the procedures set out below under 'mitigation'. Veltheim et al. (2015) had no abandonment, predation or fence entanglement. All 21 chicks survived to fledging and dispersed from their breeding home range.

Risk of injury or death to chicks, without mitigation: Moderate

Mitigation

Risks of injuries and death due to release can be avoided through:

- Prior to release all personnel (except person releasing the chick) must walk away from the release site, and in the opposite direction of release;
- Chick to be released near water (a drinking source), as far as possible;
- The area needs to be checked for presence of predators (birds of prey, foxes, dogs) prior to release;
- Release as close to where the chick was picked up from;
- Release away from fences;
- Avoiding disturbance to adult pair during release (the adults often stay nearby until the chick is released);
- Hood is removed just prior to release;
- The chick's legs are placed on the ground and the person releasing walks backwards slowly, in the opposite direction;
- Monitor the site from a distance to ensure parents reunite with the chick (minimum 500m, further is preferable, to avoid disturbance) and the birds resume normal activities (foraging, preening). If

parents are visibly wary, the person monitoring must move further away until the parents are seen walking back to the chick;

- The site should be checked again on the following day, to ensure chick is with the adult pair;
- In case the chick appears injured during release, or if the parents do not reunite with the chick, protocols must be developed for re-capture and transportation to a wildlife carer or a vet.

Risk of injury or death to chicks, with mitigation: Low

Part 2 – Costs associated with GPS transmitters

This section of the letter outlines:

- The best estimate approximate costs of leg-band fitted GPS transmitters and data, based on current information and currency exchange rate – precise costs can be calculated with more detailed information on transmitter and data requirements;
- Estimated person days required to capture and monitor individuals carrying a GPS transmitter.

Cost of GPS transmitters and data

A solar PTT will have a longer life than a battery PTT and is highly recommended when long-term monitoring is the objective. Full battery life calculations are not provided here, as this depends on the schedule and programming. As a guide, 30 g solar GPS PTTs collecting four location fixes a day in the Veltheim et al. (2015) study lasted approximately 2-4 years. The data captured fledging and dispersal for all individuals, and sub-adult and adult movements for a subset of the individuals. Colour band sighting have provided further information on survival, age at first pairing and breeding, even after the transmitters ceased operating.

Veltheim et al. (2015) used 30g solar GPS PTTs, manufactured by North Star Science and Technology. The engineer who made the PTTs for this study has since started his own company GeoTrak Inc.. The price provided here is based on a GeoTrack PTT (Table 1).

An alternative GPS transmitter model is provided here, for comparison (Table 1). These transmitters, manufactured by Ornitela, use the mobile phone network (GSM/GPRS/3G), whereas the GeoTrak transmitters use the Argos satellite system. Both transmitters are leg-mounted, and crane specific. Further background research would be required to investigate the suitability of Ornitela transmitter for pre-fledged brolga chicks.

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Table 1. Cost estimate of leg-mounted GPS transmitters suitable for ≥6 week old brolga chicks

Transmitter type[§]	Manufacturer	PTT cost*	Approximate data costs (per transmitter per year)	Location/fix type	Location and other information	Sensors
30g solar GPS PTT	GeoTrek	$5600[#]	$1000	GPS & Argos Doppler	Lat/Long, Date/Time, Course, Speed, Altitude	Battery voltage, activity, temperature, transmission counter, PTT Uptime
35g OrniTrack-L40 GPS-GSM transmitter	Ornitela	$1800^	$180	Medium	UTC date & time, GPS position, GPS altitude, speed, direction, HDOP, battery voltage, battery charging current, instant acceleration, temperature, magnetic field strength	Accelerometer, magnetometer, temperature, light intensity

[§]Weight is transmitter only, excluding weight of leg-band.

*Based on rate quoted on manufacturer's website, and converted using 16th January 2020 currency conversion rate. Rates quoted per unit. This does not include costs of mounting the PTT onto a leg-band.

[#]Base cost quoted on GeoTrek website (https://www.geotrakinc.com/products/solar/PTT-23g-solar.html); manufacturer provides discounts for bulk orders.

^As quoted on Ornitela website (https://www.ornitela.com/leg-mount-transmitter; https://www.ornitela.com/pricing).

Estimate of time required for site monitoring, capture, post-capture monitoring, data downloading and compilation

Table 2 outlines an estimate of the time required to undertake capture and monitoring activities associated with fitting GPS transmitters on pre-fledged brolga chicks, up to chick fledging.

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Table 2. Estimate of the number of person days required

Activity	Number of person days (minimum)
Pre-capture site monitoring of breeding site^	1
Capture, handling and GPS transmitter fitting*	3
Post-capture site monitoring (day following capture)	1
Weekly post-capture monitoring – data downloading, processing, compilation and mapping#	1

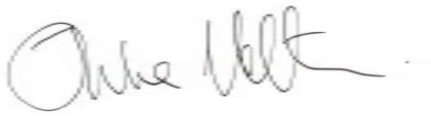
^Per breeding site.

*Based on minimum recommended number of personnel, required to be present during capture, handling and GPS transmitter fitting.

#Excludes reporting and searching for colour bands. Searching for colour bands is recommended if the transmitter ceases operating.

I hope the above information provided in this letter is sufficient and suitable for your current requirements. If you require any clarification or further information, please do not hesitate to contact me.

Yours sincerely,



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References

Alonso, J. A., J. C. Alonso, and G. Nowald. 2008. Migration and wintering patterns of a central European population of Common Cranes *Grus grus*. Bird Study 55:1–7.

Businga, N. K., J. Langenberg, and L. Carlson. 2007. Successful treatment of capture myopathy in three wild Greater Sandhill Cranes (*Grus canadensis tabida*). Journal of Avian Medicine and Surgery 21:294–298.

DuGuesclin, P. 2003. Flora and Fauna Guarantee Act Action Statement No. 119: Brolga *Grus rubicunda*. Victorian Department of Sustainability and Environment, Melbourne.

Grant, J. 2008. A bird in the hand – the first Australian Sarus Crane almost to be satellite tracked. Contact Call, Quarterly Newsletter of Birds Australia North Queensland June 2008,5.

Hanley, C. S., N. J. Thomas, J. Paul-Murphy, and B. K. Hartup. 2005. Exertional myopathy in whooping cranes (*Grus americana*) with prognostic guidelines. Journal of Zoo and Wildlife Medicine 36:489–497.

Hartup, B. K. 2006. Capture and safe handling of Whooping Cranes to avoid capture-related stress and injury. In 'Wisconsin Whooping Crane management plan' Appendix 4. (Wisconsin Department of Natural Resources: Madison, WI.).

Herring, M. W. 2001. The Brolga (*Grus rubicunda*) in the New South Wales and Victorian Riverina: Distribution, breeding habitat and potential role as an umbrella species. Honours thesis. Faculty of Science and Agriculture, School of Environmental and Information Sciences. Charles Sturt University Albury-Wodonga.

Herring, M. 2005. Threatened species and farming. Brolga: Management of breeding wetlands in northern Victoria. Report to the Department of Primary Industries and the Department of Sustainability and Environment. Arthur Rylah Institute for Ecological Research, Heidelberg.

Kanai, Y., M. Ueta, N. Germogenov, M. Nagendran, N. Mita, and H. Higuchi. 2002. Migration routes and important resting areas of Siberian cranes (*Grus leucogeranus*) between northeastern Siberia and China as revealed by satellite tracking. Biological Conservation 106:339–346.

Krapu, G. L., D. A. Brandt, K. L. Jones, and D. H. Johnson. 2011. Geographic distribution of the mid‐continent population of Sandhill Cranes and related management applications. Wildlife Monographs 175:1‐38.

Melvin, S. M., and S. A. Temple. 1983. Fall migration and mortality of interlake, Manitoba sandhill cranes in North Dakota. The Journal of Wildlife Management 47:805–817.

Pearse, A. T., M. Rabbe, L. M. Juliusson, M. T. Bidwell, L. Craig-Moore, D. A. Brandt, and W. Harrell. 2018. Delineating and identifying long-term changes in the whooping crane (*Grus americana*) migration corridor. PLoS One 13:e0192737.

Veltheim I, Chavez-Ramirez F, Hill R, & Cook S 2015. Assessing capture and tagging methods for brolgas, *Antigone rubicunda* (Gruidae). Wildlife Research 42: 373.

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Veltheim, I. (2018). Movements, behaviour and ecology of the brolga, *Antigone rubicunda*, at multiple spatial and temporal scales. PhD thesis. School of Applied and Biomedical Sciences, Faculty of Science and Technology. Federation University Australia, Ballarat, Australia.

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