To: Executive Director Biodiversity Division

VICTORIA State Government | Environment, Land, Water and Planning

APPROVAL OF A BROLGA BREEDING HABTIAT BUFFER OPTION FOR WIND ENERGY FACILITIES

Core message **Internal Memo**

Biodiversity Division is preparing new standards, *Brolga Assessment and Mitigation Standards* (draft standards) to minimise the potential impact of wind energy facilities on the Brolga population by protecting breeding habitat from chick hatching to fledgling. Biodiversity Division previously proposed a 450 metre foraging area buffer and an additional 300 metre disturbance buffer around wetlands that are Brolga breeding habitat (Option A-2). Movement corridors between breeding wetlands within a breeding wetland group must also be buffered. Forest, Fire and Regions Group (FFRG) is concerned that the 450 metre foraging area buffer is too small and will not protect all pre-fledged Brolga chick movements. Additional buffer options have been investigated for your consideration and approval. It is recommended that you approve a 600 metre foraging area buffer and the 300-metre disturbance buffer. Should you approve this option, the final breeding habitat buffer will be 900-metres instead of the initially proposed 750 metres. Additional options are also provided for your consideration.

Timing As soon as possible, in order to update the draft standards prior to commencing final approval process to release the draft standards for public consultation.

Recommendations

1. Approve a breeding habitat buffer of 900-metres, comprised of a 600-metre foraging area buffer and a 300 metre disturbance buffer (Option B-2 in Table 1, **Attachment 2**).

☒ Approved ☐ Not approved ☐ Returned for review

2. If Recommendation 1 is not approved, then choose from the following options (summarised in Table 1):

   Option A-1: 450 metre foraging area buffer, no 300-metre disturbance buffer.

   Option A-2: 450 metre foraging area buffer plus 300-metre disturbance buffer.

   Option B-1: 600 metre foraging area buffer, no 300-metre disturbance buffer.

   Option C-1: 700 metre foraging area buffer, no 300-metre disturbance buffer.

   Option C-2: 700 metre foraging area buffer plus 300-metre disturbance buffer.

   Option D-1: 800 metre foraging area buffer, no 300-metre disturbance buffer.

   Option D-2: 800 metre foraging area buffer plus 300-metre disturbance buffer.

☐ Approved→ Chosen option: _____ ☐ Not approved ☐ Noted ☐ Returned for review

Comments

s33: personal

Decision Maker **Executive Director Biodiversity Division** **Date** **11/8/2020**

From Biodiversity Division

Reviewed by: s Signature s33: personal Date: 6/8/2020

Endorsed by: s Signature Date:

From	BIODIVERSITY DIVISION
Title	APPROVAL OF A BROLGA BREEDING HABITAT BUFFER OPTION FOR WIND ENERGY FACILITIES

Key Information

The proposed draft Brolga standards

1. The Victorian Government is growing the renewable energy sector and has legislated a Victorian Renewable Energy Target of 50 per cent by 2030. This is driving development of wind energy facilities (wind farms), and much of this development is in south-west Victoria where wind resources are high (see Figure 1 in **Attachment 1**). South-west Victoria is also where most of the Victorian Brolga population exists.
2. There is limited evidence of the impacts of wind farms on Brolga breeding or flocking success. The key threats to the species are understood to be habitat loss and predation by the European red fox.
3. However, there is concern that unmitigated expansion of wind farms within the distribution of the Victorian Brolga population, especially in their main distribution in south-west Victoria, has the potential to impact breeding and flocking success and exacerbate the species' conservation decline.
4. Potential impact is due to the Brolga's low breeding success (in particular, a low success rate in surviving from egg incubation to fledging), the species is believed to be susceptible to human disturbance, and additional habitat loss. There is also evidence of Brolga mortalities from collisions with powerlines.
5. Biodiversity Division has led the development of new standards (draft standards) to replace the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population* (DSE 2011; interim guidelines).
6. To maximise fledging success, the draft standards prohibit wind farms (and associated infrastructure) within a certain distance of any suitable Brolga breeding wetlands, referred to as the 'breeding habitat buffer'. This is applied to maximise the potential success of chicks surviving from egg incubation to fledging.
7. The breeding habitat buffer requirements have been informed by key findings of Veltheim et al. (2019), which outline the important habitat elements of pre-fledged chicks. Specifically, the buffers are designed to protect three key habitat elements related to pre-fledging movements:
   - The wetlands used for the nest, egg incubation and night roosting.
   - The non-wetland areas around breeding wetlands used for foraging.
   - The non-wetland areas used as movement corridors between nesting and night roost wetlands.
8. Brolga families roost and forage together, so the findings of Veltheim et al. (2019) are considered to represent the movements of the adult pair during the pre-fledging period. Therefore, the proposed buffer requirements are also assumed to protect the habitat of the adult pair during this pre-fledging period.
9. Biodiversity Division proposed a breeding habitat buffer of 750-metres, consisting of:
   - A 450 metre foraging area buffer – based on the finding by Veltheim et al. (2019) that pre-fledged chicks moved 442 metres on average, to and from night roosts to day foraging areas.
   - An additional 300 metre disturbance buffer - based on anecdotal observations of brolgas changing their behaviour when approached within 300 metres (also a requirement in the interim guidelines). This additional 300 metre buffer is added as a precautionary measure to protect disturbance of movements made at the edge of the foraging area buffer. There was no consensus from the Brolga Technical Reference Group (TRG) on the need for the 300 metre disturbance buffer, however, Biodiversity Division decided to retain this a requirement a precautionary measure to minimise potential human disturbance during construction and maintenance of the wind farm.
10. In addition, for a 'group of breeding wetlands' (defined as suitable breeding wetlands within two kilometres of each other), the movement corridors between the wetlands in the group are included in the breeding habitat buffer. This is because the pre-fledged chicks have been shown to move up to 1,964 metres to and from night roost wetlands.
11. **Attachment 1** provides further context, including a map of the Brolga area of interest and renewable energy zones (Figure 1), an illustration of the foraging and disturbance buffer applied to a single breeding wetland (Figure 2) and an example breeding habitat buffer for grouped wetlands (Figure 3).

12. When developing the breeding habitat buffer requirements, Biodiversity Division incorporated the average movement distance into the buffer design because it was assumed that pre-fledged chicks are unlikely to move the maximum distance of 1,964 metres (as found in Veltheim et al. 2019) at isolated breeding wetlands. It was assumed that longer distances are made by pre-fledged chicks that use more than one wetland for night roosts (i.e. movements beyond the average movement distance are the movements made to other wetlands), which would be protected by the requirement to buffer groups of breeding wetlands. This aligned with simulations run by Biodiversity Division to test this assumption.

Internal comments on the draft Brolga standards

13. The draft standards were provided to the Planning Group, Barwon South West FFRG and Grampians FFRG for comment.

14. FFRG raised two concerns in relation to the proposed foraging area buffer requirements:

    - **Concern 1**: That the draft foraging area buffer may not adequately consider the scientific uncertainty regarding adult Brolga home range requirements prior to chick hatching. FFRG is concerned impacts on adult Brolgas prior to chick hatching may impact on breeding success. This uncertainty arises because of the small sample size for the pre-fledged chicks that used a single wetland (n=2) and lack of published data for adult movements prior to egg hatching. s33: personal confirmed that her data does not assess adult Brolga foraging distance prior to chick hatching (i.e. during nesting and egg incubation).

    - **Concern 2**: The proposed breeding habitat buffer requirements may not protect all pre-fledged chick movements because the proposed buffers are based on the average distance moved (450 metres), rather than the range of movements. FFRG has indicated that the buffer requirements should protect a more conservative per centage of movements rather than the average distance moved, as a precautionary approach. Specifically, FFRG raised a strong concern about this for the chicks that use isolated breeding wetlands due to the small sample size.

15. Biodiversity Division re-engaged FFRG to discuss key concerns and to resolve a way forward. It was agreed that Biodiversity Division undertake further simulations using additional buffer options identified by FFRG and provide you this memo and attachments for your final decision.

16. This brief proposes several options and seeks your decision on which option is preferred. The draft standards will be updated before they are released for public comment to reflect your decision. The concerns raised by FFRG are discussed and additional analysis and options (to retain the current approach or a revised breeding buffer) are provided below and in **Attachment 2**.

Concern 1: Scientific uncertainty regarding adult Brolga home range requirements

17. FFRG raised concerns that the limited data on chicks who used a single wetland mean the results could not be relied on to determine the foraging area buffer for chicks who use a single wetland. As such, as a precautionary approach FFRG suggests the foraging area buffer should be larger than what is currently proposed in the draft standards (450 metres) for isolated suitable breeding wetlands.

18. However, further simulations (**Attachment 2**) demonstrate that the chicks appeared to use similar core home range areas at single versus multiple wetland groups, but if there was an available wetland within two km, they often move to these wetlands. To account for this, the proposal in the draft standards requires movement corridors between suitable Brolga breeding wetlands to be buffered as well (see paragraph 10).

19. The further simulations indicate that this approach, combined with an appropriate foraging area buffer, protect chick movements when using a single wetland and multiple wetlands.

20. FFRG has also stated that use of the average pre-fledged chick movement data does not address the limitations of the Veltheim et al. (2019) as outlined in the paper: "*This study was limited to pre-fledged chick movements at breeding sites. We recognise that breeding adults may range further to forage during nest building, incubation and telemetry of breeding adult pairs are recommended, to identify if larger buffers are required to avoid potential disturbance and mortality effects from turbines during the entire breeding season from nest building and egg incubation, to chick fledging.*" Because of these limitations, FFRG recommends a more conservative proportion of chick movements should be buffered rather than using an average and consider that doing so would address these limitations.

21. Biodiversity Division has focused the design of the buffer requirements on the habitat requirements of pre-fledged chicks (see paragraph 7) because fledging success is low. While Biodiversity Division is aware of non-published Brolga flight data, collected by ecological consultants, this data has not been scientifically reviewed and there are no records of brolga turbine collision mortalities (as per Moloney et al. 2019). However, there are records of brolga collision mortalities with powerlines (in Herring 2005). Powerlines are also listed as a threat to the species in the Brolga Action Statement (DSE 2003). Biodiversity Division assumes that the draft standards will manage the potential collision mortality because powerlines must be excluded from areas included in any breeding habitat buffer.

Concern 2: Breeding habitat buffer options analysis

22. This analysis steps through two key decisions required to determine an appropriate foraging area buffer distance:

    - *Which of the Veltheim et al. (2019) data sets is appropriate to underpin the analysis of foraging habitat buffer requirements? Three options are available:*
        i. *Distance moved from night roosts.*
        ii. *50 per cent utilisation distribution (UD) home range estimates.*
        iii. *95 per cent UD home range estimates.*
    - *Which foraging area buffer would protect about 90 per cent of chick movements based on the selected dataset above?*

23. For context, other options (other than using a set breeding habitat buffer distance) were explored by the Brolga TRG, such as a probabilistic habitat model to simulate Brolga movements in the context of specific landscapes. Further information on these options and the reasons for why they were not pursued are provided in **Attachment 3**.

Which of the Veltheim et al. (2019) data sets is appropriate to underpin the analysis of foraging habitat buffer requirements?

24. It is not recommended to use option (i) *Distance moved from night roosts* or option (ii) the *50 per cent UD.* While no concerns were raised by the Brolga TRG, further analysis in June 2020 has revealed the distance moved from night roosts considered the first recorded movement from night roost during the day. This does not consider all daytime movements.

25. The UD modelling provides an estimated home range area for each chick by predicting the probability of a chick's use of an area around a wetland. The 50 per cent UD represents the chicks 'core' movements (where they are likely to be 50 per cent of the time) but does not account for a significant proportion of potential movements while foraging during the day.

26. As such, for the purpose of this analysis the foraging area buffer distances have been assessed using the 95 percent UD, as agreed with FFRG in June 2020. That is, almost any potential chick movement while foraging during the day. Noting, the chicks roost in a breeding wetland at night.

Which foraging area buffer would protect about 90 per cent of chick movements based on the 95 per cent UD?

27. Simulations assessed whether the proposed 450 metre foraging area buffer was appropriate to protect chick movements for foraging and wetland night roosts at both isolated and grouped wetlands. Grouped wetland simulations include the movement corridors between wetlands within two kilometres. However, due to concerns raised by FFRG (as outlined above) further simulations have been conducted using the 95 per cent UD data. For reference, the 50 per cent UD is also shown on the simulations. The detailed results are presented in **Attachment 2.**

28. Table 1 (below) summarises the simulation results and provides several options for the foraging buffer for your consideration and approval. These are summarised in the table below. This brief also seeks your approval to include the additional 300 metre disturbance buffer, the total buffer distance is provided in the final column.

29. A foraging buffer distance beyond 900 meters is not proposed as an option as these options are significantly larger than the home range findings for each pre-fledged chick (**Attachment 2**). This additional restriction on

the wind energy industry would not provide additional protection for the pre-fledged chicks. As shown in the simulations, the longer-range movements are protected by the inclusion of the movement corridor between grouped wetlands into the breeding habitat buffer.

30. A foraging area buffer distance of 600 metres is recommended plus a 300 metre disturbance buffer (900 metres total breeding habitat buffer). FFRG supports this recommendation. It is recommended because:
    - This distance protects between 89 to 100 per cent of the foraging habitat and movements within the 95 per cent UD home range for all chicks in the Veltheim et al. (2019) study.
    - While there was no consensus at the Brolga TRG, retaining the 300 metre disturbance buffer reflects a precautionary measure to minimise potential human disturbance during construction and maintenance of the wind farm.
    - Protection of approximately 90 percent or more of the 95 per cent UD is assumed to provide adequate protection to maximise fledgling success.
31. Note, an assessment of the regulatory impact of the draft standards has not been undertaken due to data limitations (knowledge of all wetlands that would meet the habitat criteria set out in the draft standards). Further analysis will be investigated to understand this. It is expected that industry will also provide more detailed feedback during public consultation. This data limitation does not prevent this decision because the objective is to maximise fledging success by protecting Brolga breeding habitat.

Table 1: Breeding habitat buffer options. Each option provides an alternative foraging area buffer with or without the additional 300 metre disturbance buffer.

Option	Foraging buffer option	Analysis **Note: the figures referenced are provided in Attachment 1**	Buffer option including 300-metre disturbance buffer
A-1	450 metres (Current proposed)	This option protects habitat for: - 100 per cent of the home range area for five pre-fledged chicks (see Figures 1, 2, 6, 7, 9) - Between 90-99 per cent of home range area for an additional four chicks (see Figures 3 - 5, 8) - 87 per cent of the home range area for one chick (see Figure 10). - 78 per cent of the home range area for one chick (see Figure 11).	750 metres (Option A-2)
B-1	**600 metres**	**This option protects habitat for:** - **100 per cent or more of the home range area for nine chicks (see Figures 1 - 9)** - **95 per cent of the home range area for an addition one chick (see Figure 10)** - **89 per cent of the home range area for one chick (see Figure 11).**	**900 metres** **(Option B-2)**
C-1	**700 metres**	**This option protects habitat for:** - **100 per cent of the home range area for nine pre-fledged chicks (see Figures 1, 2, 3, 4, 5, 6, 7, 8, 9)**	**1.0 km (Option C-3)**

		- **Between 94 per cent and 99 per cent of home range area for an additional two chicks (see Figures 10-11).**	
D-1	800 metres	This option protects habitat for: - 100 per cent or more of the home range areas for 10 chicks (see Figures 1 - 10) - 98 per cent of home range area for one chick (see Figure 11).	1.1 km (Option D-2)
E-1	900 metres	This option protects habitat for: - 100 per cent or more of the home range for 11 chicks (see Figures 1-11).	1.2 km (Option E-2)

Next steps

32. The draft standards will be updated to reflect your approved buffer option. They are proposed for release for public comment in late August 2020. The draft standards will be provided to the Planning Group for implementation in late 2020, following finalisation from public comment.
33. A detailed explanatory document is being prepared to accompany the public release of the draft standards. s33: personal will be engaged to review the explanatory document prior to public release to ensure the assumptions and data interpretation is appropriately conveyed in the document.

Context

34. The Brolga is a listed threatened species under the *Flora and Fauna Guarantee Act 1988* and is facing a high risk of extinction in Victoria (DSE, 2013). Brolgas are a wetland dependent species. Wetlands are dynamic habitat types which vary significantly seasonally and between years, depending on rainfall.
35. In 2011, the Department prepared the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population* (Interim Guidelines, DSE 2011) while further research on the species was undertaken. The Interim Guidelines require either a 3.5km buffer (3.2km plus 300m disturbance buffer) or proponents can propose an alternative buffer following further assessment and analysis. Planning Panels Victoria has **approved buffers of 1km (including the disturbance buffer) for Golden Plains Wind farm and 1.13km for Mount Fyans Wind farm.**
36. The average movement data used to determine the proposed foraging buffer distance in the Draft Standards is taken from Appendix B in Veltheim et al. (2019). This is based on 400 GPS points. Each point represents a snapshot of the captured movement of one GPS-tracked pre-fledged chick. It is based on the distance between a night-time GPS fix and the first available day-time GPS fix. These movements provide an indication of the distance chicks moved away from night roosts each day to forage or disperse to other night roosts (where multiple roosts were used).

References

37. Reference list provided in **Attachment 2**.

Consultation

Biodiversity Division developed the draft standards in collaboration with an Internal Working Group comprised of a Biodiversity Division representative, an FFR Grampians representative and an FFR BSW representative.

Biodiversity Division met with FFR Grampians and FFR BSW on 12 June, 18 June and 25 June to discuss the issues raised by both regions about the proposed buffer requirement.

s33: personal was consulted to clarify our understanding and interpretation of the PhD thesis data.

Attachments

No.	Attachment name
1	Context diagrams
2	Options analysis table and figure simulations of each breeding buffer option.
3	Approaches to the proposed buffering methodology explored by the Brolga TRG.

Attachment 1. Context diagrams

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

Context

The figure below overlays the indicative Renewable Energy Zones (REZs; light green) over the Brolga area of interest (dark green) within Victoria. The draft Brolga standards will apply to wind energy permit applications in the Brolga area of interest. The REZs are: "*areas where clusters of large-scale renewable energy can be developed to promote economies of scale in high-resource areas and capture geographical and technological diversity in renewable resources"* (AEMO, 2019).

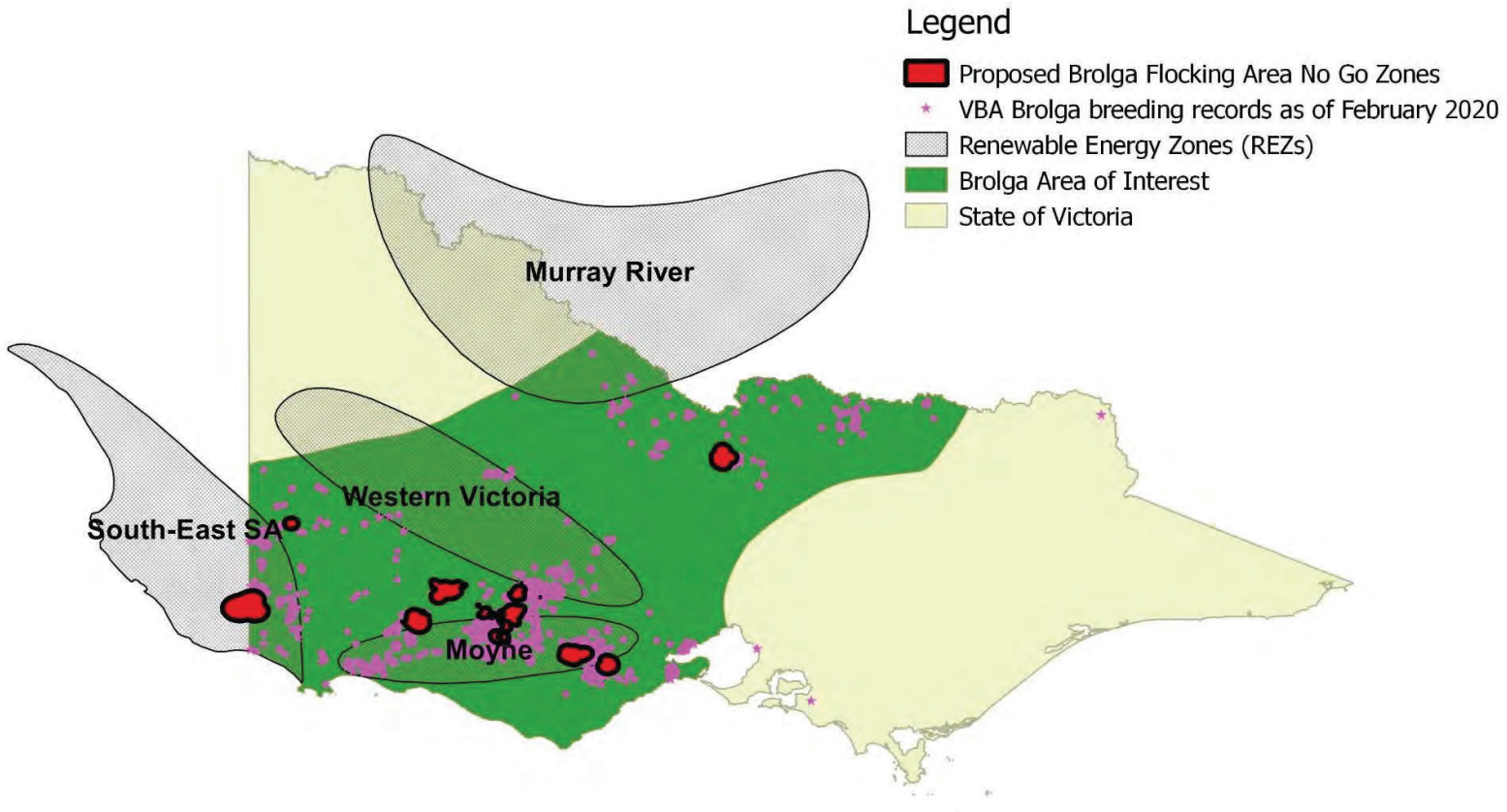

Figure 1: Indicative REZ areas (light green; source: AEMO, 2019) overlaying the Brolga Area of Interest (dark green). Only the REZ areas that intersect with the Brolga area of interest and that are indicated as REZ for wind farms are presented on this map. Please refer to AEMO 2019 for the full all REZ areas in Victoria. This map also shows the proposed Brolga Flocking Area No-go Zones where wind farms will be prohibited (red areas) and the Brolga breeding records from the VBA (pink stars).

Attachment 1. Context diagrams

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

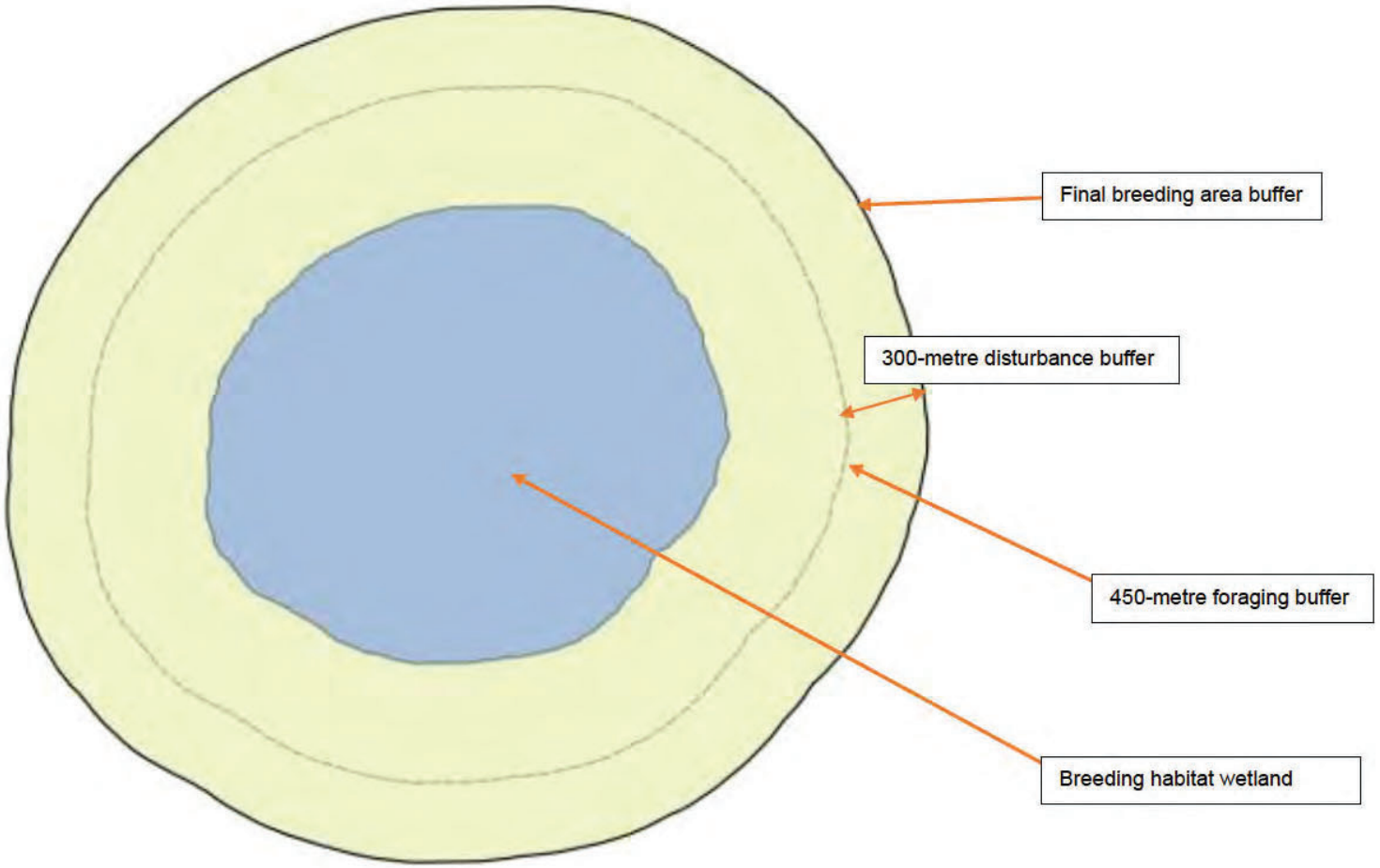

Figure 2. Diagram depicting the breeding habitat buffer for an isolated breeding habitat wetland with the proposed s30: foraging buffer and 300-metre disturbance buffer.

Attachment 1. Context diagrams

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

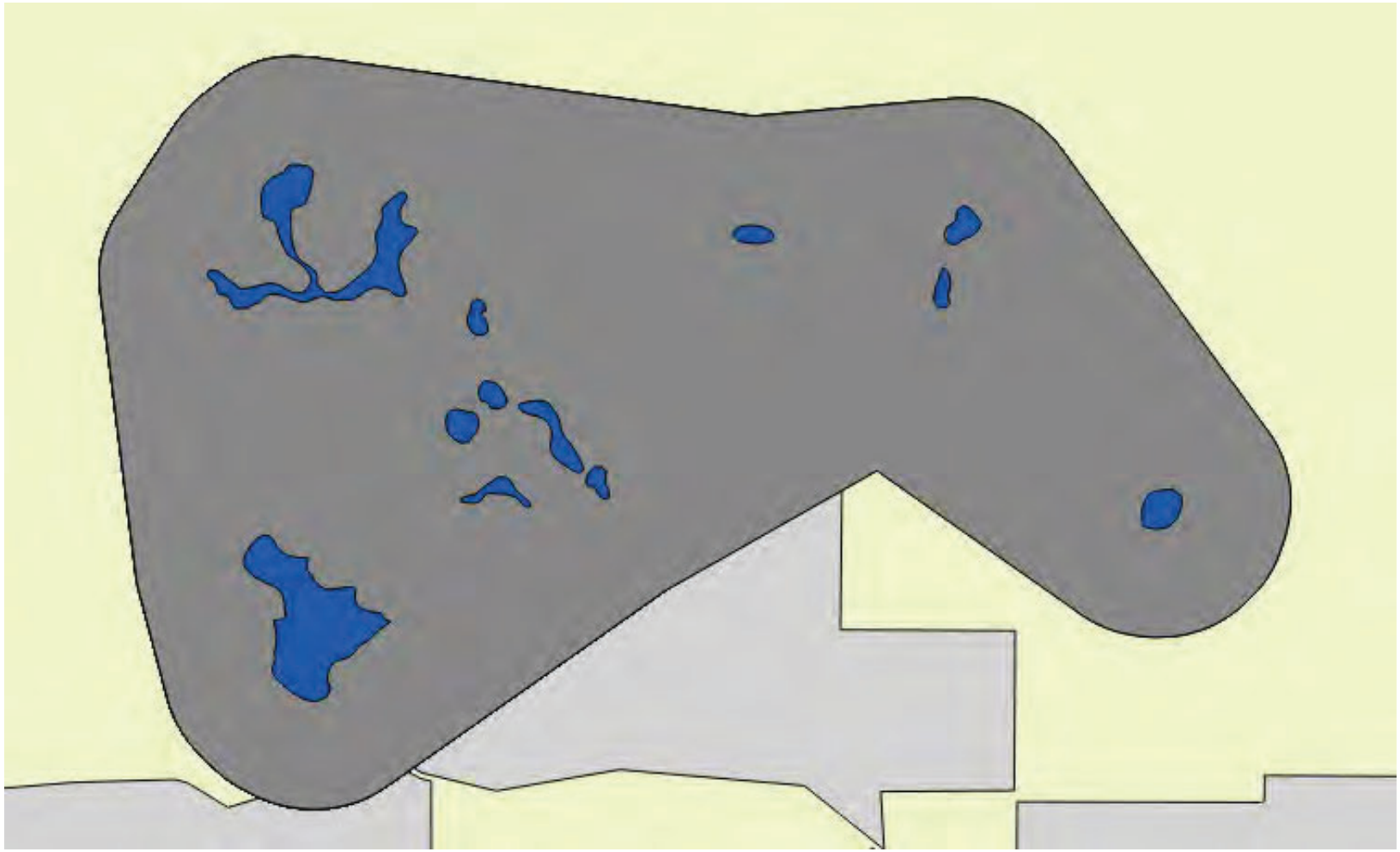

Figure 3. Diagram depicting the breeding habitat buffer for a group of breeding wetlands with the proposed s30: foraging buffer, 300-metre disturbance buffer and areas between wetlands buffered to protect movement corridors.

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

Purpose

Following internal feedback and concerns raised by Forest, Fire and Regions Group (FFRG), Biodiversity Division agreed to undertake further simulations for additional foraging buffer distance options requested by FFRG:

- 450 metres (current proposed)
- 600 metres
- 700 metres
- 800 metres
- 900 metres
- 1000 metres
- 1600 metres
- 2000 metres
- 2400 metres

As agreed by FFRG and Biodiversity Division, the simulations were undertaken against the 50% UD and 95% UD home range outputs for the 11 pre-fledged chicks from Veltheim et al. (2019).

Contents

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

Table 1. Summary table of the simulation findings.

Chick #	Minimum buffer option that captures 100% of the 95% Utilisation Distribution[1] home range polygon	Minimum buffer option that captures 90-99% of the 95% UD home range polygon	Minimum buffer option that captures 80-90% of the 95% UD home range polygon	Minimum buffer option that captures 70% of the 95% UD home range polygon
1 – see Figure 1	450m	-	-	-
2 – see Figure 2	450m	-	-	-
3 – see Figure 3	600m	450m (97% of the 95% UD)	-	-
4 – see Figure 4	600m	450m (98% of the 95% UD)	-	-
5 – see Figure 5	600m	450m (95% of the 95% UD)	-	-
6 – see Figure 6	450m	-	-	-
7 – see Figure 7	450m	-	-	-
8 – see Figure 8	600m	450m (93% of the 95% UD)	-	-
9 – see Figure 9	450m	-	-	-
10 – see Figure 10	800m	600m & 700m (95% and 99% of the 95% UD)	450m (87% of the 95% UD)	-
11 – see Figure 11	900m	700m & 800m (94% and 98% of the 95% UD)	600m (89% of the 95% UD)	450m (78% of the 95% UD)

Table 2. The average area of the home ranges covered by each buffer option.

Buffer option	Average area protected*	Standard deviation for column 2
450m	95%	7%
600m	99%	3%
700m	99%	2%
800m	100%	1%
900m	100%	0%

*The average area protected across all the 95% UD home ranges for the 11 pre-fledged chicks.

[1] **What is 'Utilisation Distribution' (UD)?**
Utilisation distribution (UD) was calculated in Veltheim et al. (2019) using the Brownian Bridge Movement Model (BBMM).
50% UD (the core HR) – Pre-fledged chicks are predicted to be found in this area 50% of the time.
95% UD – Pre-fledged chicks are predicted to be found in this area 95% of the time.

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

Table 3. Brolga breeding buffer options analysis.

This table provides a detailed analysis of the benefits and limitations of each of the buffer options that have been identified for your consideration.

PLEASE NOTE: The additional 300-metre precautionary disturbance buffer was not included on the simulations to avoid complexity and confusion on the layout of the figures.

	Buffer option with rationale	Benefits	Limitations
A-1	**450-metre foraging buffer.** **Rationale**: This buffer is based on movement data comprising approximately 400 location points sampled across the 11 pre-fledged chicks. **Option A-2:** 750 metres with 300-metre disturbance buffer.	**General** - This distances it is not skewed by longer distance movements made by pre-fledged that used multiple wetlands. These longer distance movements are assumed to represent the movements made between the multiple wetlands used, which would be buffered through inclusion of the movement corridor buffer. - In this context, this option is a less restrictive regulatory requirement to the industry compared to other options outlined in this table. **Isolated breeding wetlands (sample = 2)** Pre-fledging habitat protected: - 100% of the pre-fledged chick's 95% UD home range for one chick Figure 2 (chick 2). - 87 % of the pre-fledged chick's 95% UD home range for the other chick Figure 10 (chick 10). **Grouped breeding wetlands (sample = 9)** Pre-fledging habitat protected: - 100% of the pre-fledged chick 95% UD home range for four chicks. - Between 90% and 99% of the pre-fledged chick 95% UD home range for four chicks.	- The movement data provides only a snapshot view of chick movements, based only the night-time GPS fix and the first available day-time GPS fix. In contrast, the UD home range polygons, provide a more detailed picture of the extent of actual and modelled pre-fledged chick movements. s33: has recently advised that the movement data is not absolute, and that it is known that some pre-fledged chicks made movements that were not recorded by the GPS-data. - The small sample size (n=2) of the pre-fledged chicks that used a single wetland in the study limits our knowledge of the home range sizes variabilities of pre-fledged chicks that use a single wetland during fledging. **Grouped breeding wetlands (sample = 9)** - For one chick, this buffer protects only 78% of the pre-fledged chick 95% UD home range.
B-1	**600-metre foraging buffer.** **Rationale**: The distance that covers majority of the 95%UD for	- This distances it is not skewed by longer distance movements made by pre-fledged that used multiple wetlands. These longer distance movements are assumed to represent the movements made between the multiple wetlands used, which would be buffered through inclusion of the movement corridor buffer.	- This buffer option does not protect all pre-fledged chick movements as modelled in the UD home range outputs produced by Veltheim et al. (2019). - The small sample size (n=2) of the pre-fledged chicks that used a single wetland in the study limits our

Attachment 2. Breeding buffer options analysis

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	most pre-fledged chicks in the study by Veltheim et al. (2019). **Option B-2: 900** metres with 300-metre disturbance buffer.	- A less restrictive regulatory requirement compared to the other buffer options outlined in this table which protects the home range habitat for most chicks, and a significant portion of the home range for the remaining three chicks. **Isolated breeding wetlands (sample = 2)** Pre-fledging habitat protected: - 100% of the pre-fledged chick 95% UD for one chick (as does the 450-meter buffer) (Figure 2). - 95% of the pre-fledged chick 95% UD home range for the other chick (Figure 10). **Grouped breeding wetlands (sample = 9)** Pre-fledging habitat protected: - For eight out of the nine pre-fledged chicks, this distance buffers 100% of the pre-fledged chick 95% UD home range – refer to the figures for chicks 1, 3 - 7 and chick 9.	knowledge of the home range sizes variabilities of pre-fledged chicks that use a single wetland during fledging. **Grouped breeding wetlands (sample = 9)** - For one out of the 9 pre-fledged chicks that used grouped wetlands, this distance protects 89% of the 95% UD home range outputs (Figure 11 – chick 11).
C-1	**700-metre foraging buffer.** **Option C-2:** 900 metres with 300-metre disturbance buffer.	**Isolated breeding wetlands (sample = 2)** Pre-fledging habitat protected: - 100% of the pre-fledged chick 95% UD for one chick (Figure 2). - 99% of the pre-fledged chick 95% UD home range for the other chick (Figure 10). **Grouped breeding wetlands (sample = 9)** Pre-fledging habitat protected: - For eight out of the nine pre-fledged chicks, this distance buffers 100% of the pre-fledged chick 95% UD home range – refer to the figures for chicks 1, 3 – 7, chick 9.	- This buffer option does not protect all pre-fledged chick movements as modelled in the UD home range outputs produced by Veltheim et al. (2019). **Grouped breeding wetlands (sample = 9)** - For one out of the 9 pre-fledged chicks that used grouped wetlands, this distance protects 94% of the 95% UD home range output for that chick (Figure 11)

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D-1	**800-metre foraging buffer for isolated breeding wetlands.** **Option D-2:** 1100 metres with 300-metre disturbance buffer.	This option could be used for isolated wetlands as a more precautionary approach due to the small sample size of 2 chicks in the Veltheim et al. (2019) study used a single wetland. **Isolated breeding wetlands (sample = 2)** Pre-fledging habitat protected: - 100% of the pre-fledged chicks 95% UD home range (Figures 2 – chick 2 and Figure 10 – chick 10). **Grouped breeding wetlands (sample = 9)** Pre-fledging habitat protected: - 100% of the pre-fledged chicks 95% UD home range for eight chicks (Figures 1, 3 to 9). - 98% of the pre-fledged chicks 95% UD home range chick 11 (Figure 11).	- This buffer option does not protect all pre-fledged chick movements as modelled in the UD home range outputs produced by Veltheim et al. (2019). **Grouped breeding wetlands (sample = 9)** - For one out of the 9 pre-fledged chicks that used grouped wetlands, this distance protects 98% of the 95% UD home range outputs (Figure 11).

E-1	**900-metre foraging buffer.**
	
	Rationale: The buffer that covers 100% of all the 11 pre-fledged chick home range polygons.
	
	Option E-2: 1200 metres with 300-metre disturbance buffer.
		- A conservative buffer option that protects all pre-fledged chicks' movements as found in Veltheim et al. (2019).
		
		- A larger buffer size would increase certainty that all potential habitat requirements are protected due to limitation in understanding:
		  - The findings of Veltheim et al. (2019) are based on a study of pre-fledged chicks undertaken in an above average rainfall season. It is feasible (although no evidence available to support this) that pre-fledged chicks may range further in drier years. Therefore this conservative buffer option may be more appropriate in this context.
		
		  - This conservative buffer option may also be appropriate in the context that the it is unknown the home range area that adult Brolgas require for pre-hatching breeding activities (e.g. nest building).
			- This option provides a very conservative and precautionary buffer, as for many chicks it protects significantly more habitat than what was used (see Figures 1-11). It is unclear whether such a conservative approach to the protection of habitat, and the regulatory burden this imposes on the industry, is warranted.

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

		- This buffer option would be a restrictive requirement in landscapes that contain wetland complexes, which are considered to provide more important Brolga breeding habitat (compared to landscapes where wetlands are more dispersed and isolated). In this context, this regulatory requirement may send a signal to the industry to consider landscapes with more dispersed and isolated breeding wetlands which are likely to provide less important brolga breeding habitat (Veltheim et al. 2019 found that most pre-fledged chicks used multiple wetlands prior to fledging– see Figures 1, 3-9 for context).	

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

Simulation figures

Figures 1 to 11 below provide simulation outcomes for the nine buffer options.

Each buffer option has been applied to the 50% and 95%UD home range polygons findings for 11 pre-fledged chicks from Veltheim et al. (2019).

References

Department of Environment and Sustainability 2012, *Interim guidelines for the assessment, avoidance, mitigation and offsetting of potential wind farm impacts on the Victorian brolga population*, Victorian Government, East Melbourne.

Department of Environment and Sustainability 2013, *Advisory list of threatened vertebrate fauna in Victoria*, Victorian Government, East Melbourne.

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 of Environment*. Arthur Rylah Institute for Ecological Research, Heidelberg.

Veltheim, I, Cook, S, Palmer, GC, Hill, R & McCarthy, M 2019, 'Breeding home range movements of pre-fledged brolga chicks, Antigone rubicunda (Gruidae) in Victoria, Australia – Implications for wind farm planning and conservation'. Global Ecology and Conservation, **vol. 20**, e00703.

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

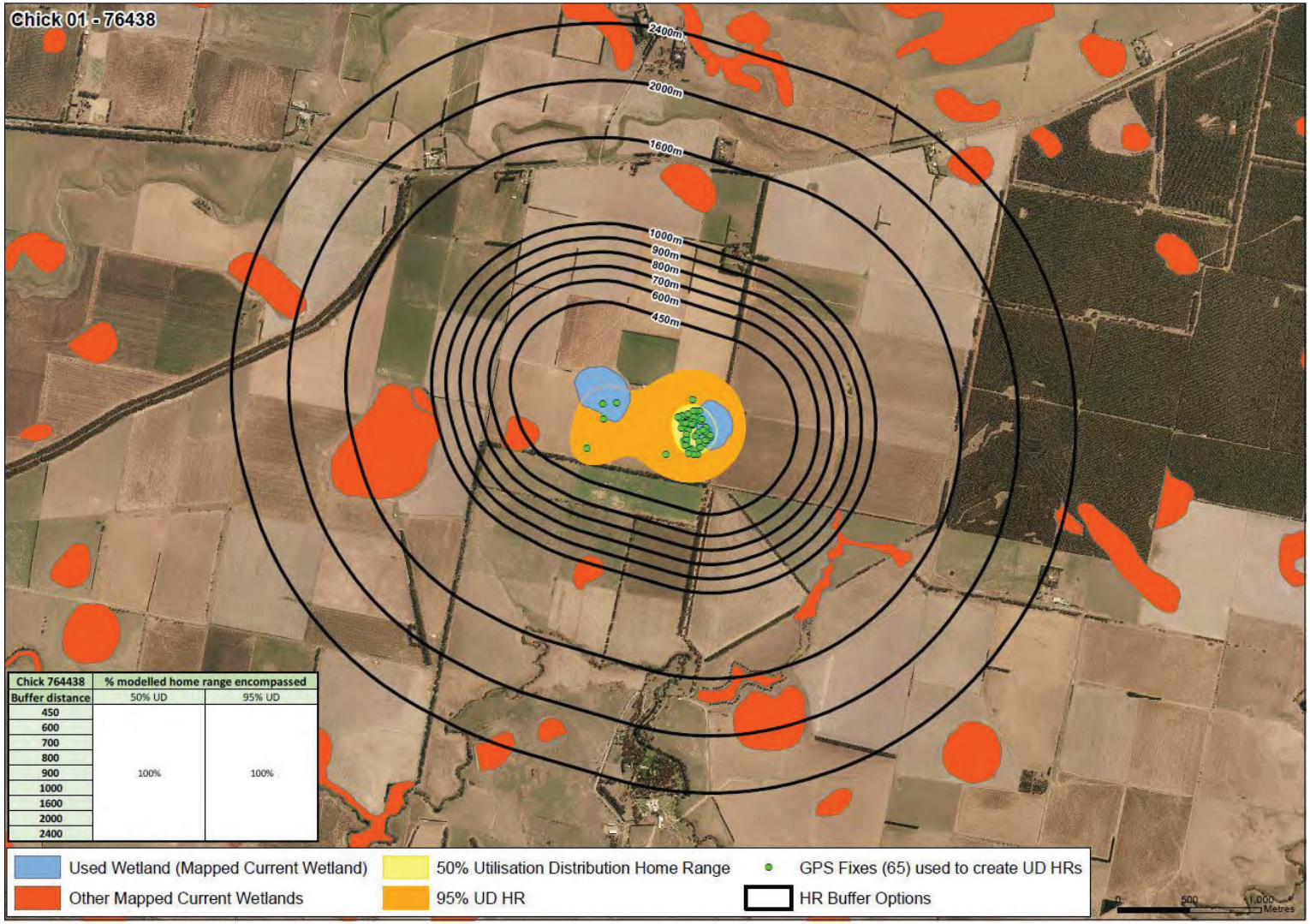


Figure 1. Buffer option simulations for Chick 1 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

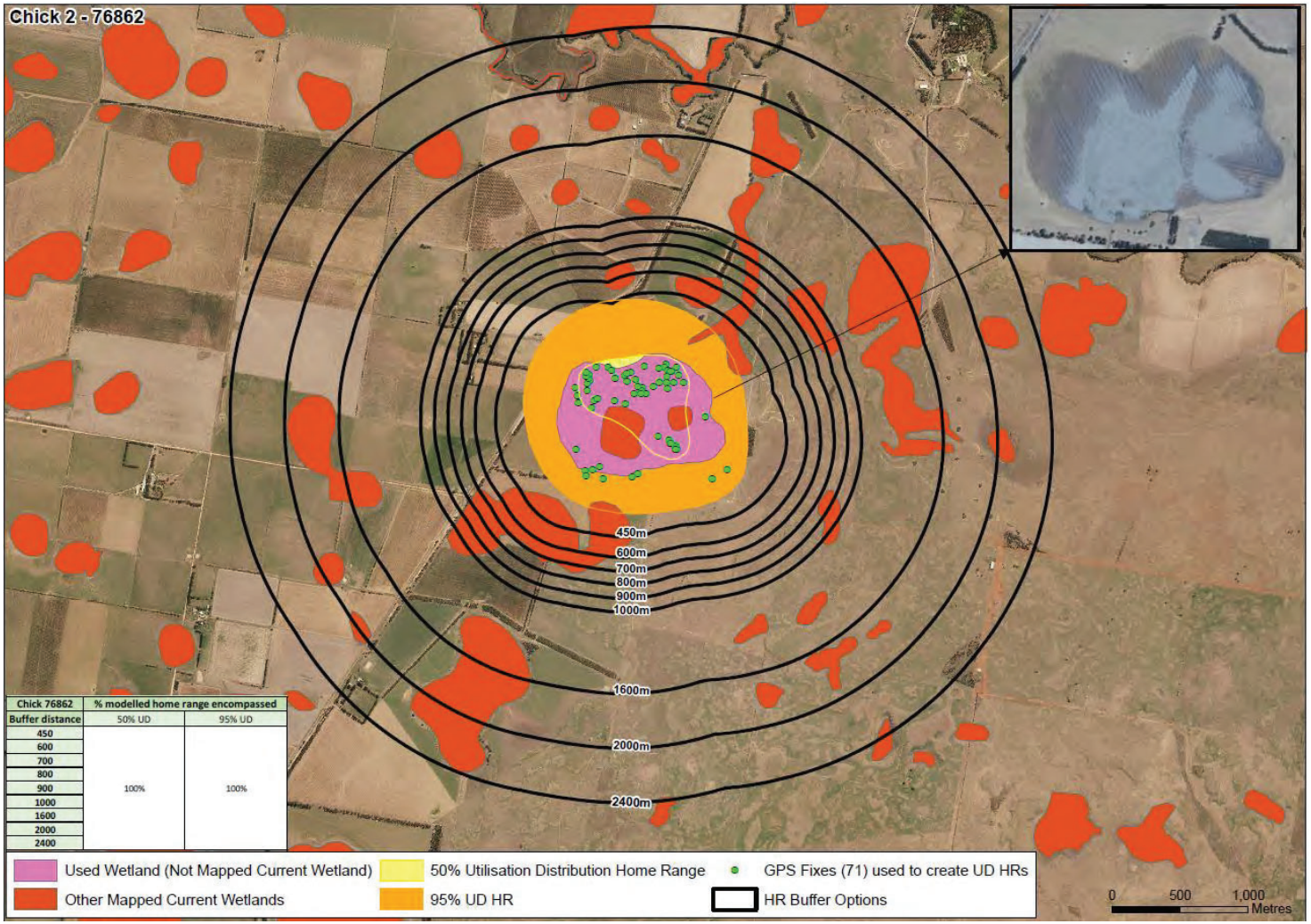


Figure 2. Buffer option simulations for Chick 2 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

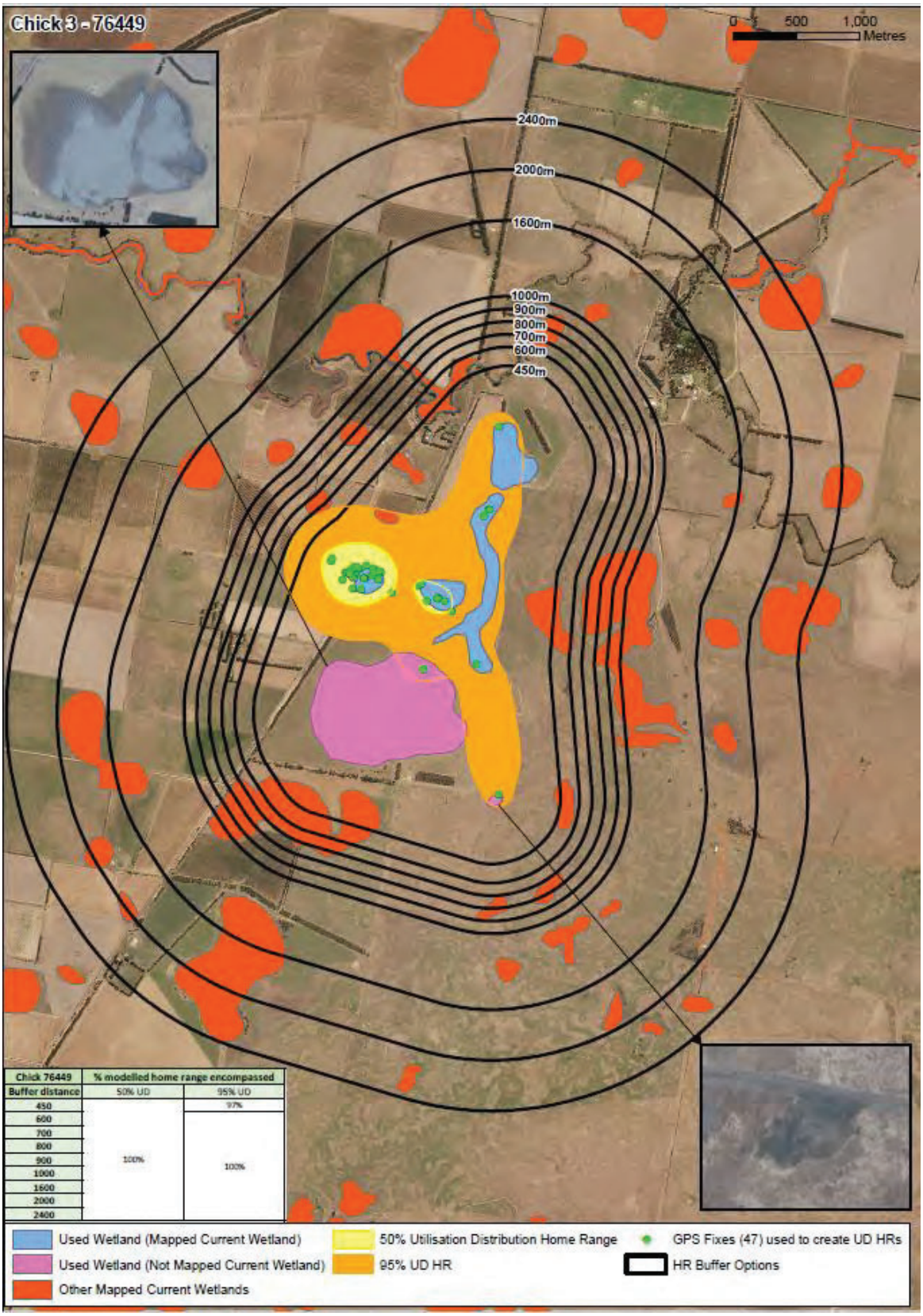


Figure 3. Buffer option simulations for Chick 3 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

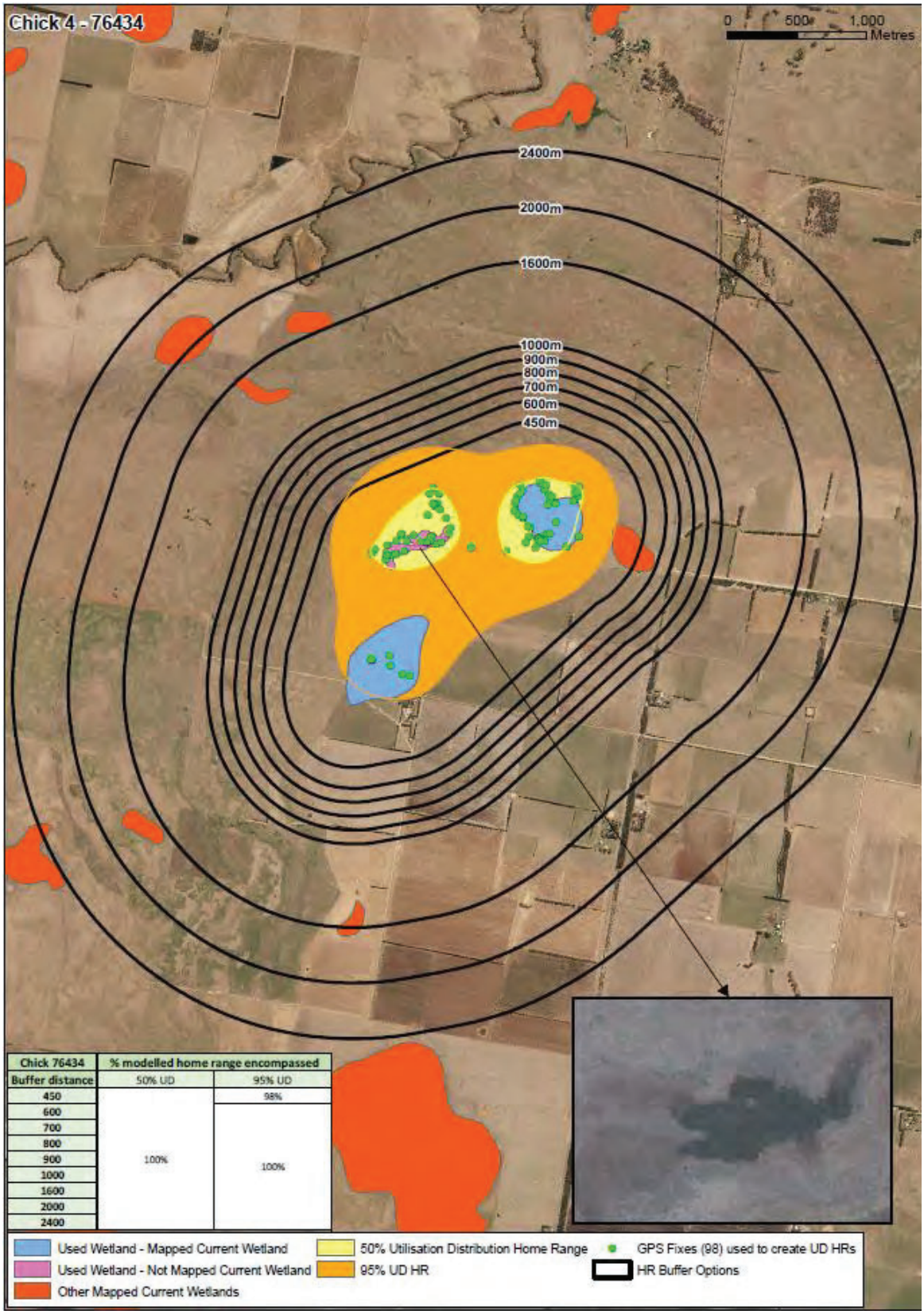


Figure 4. Buffer option simulations for Chick 4 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

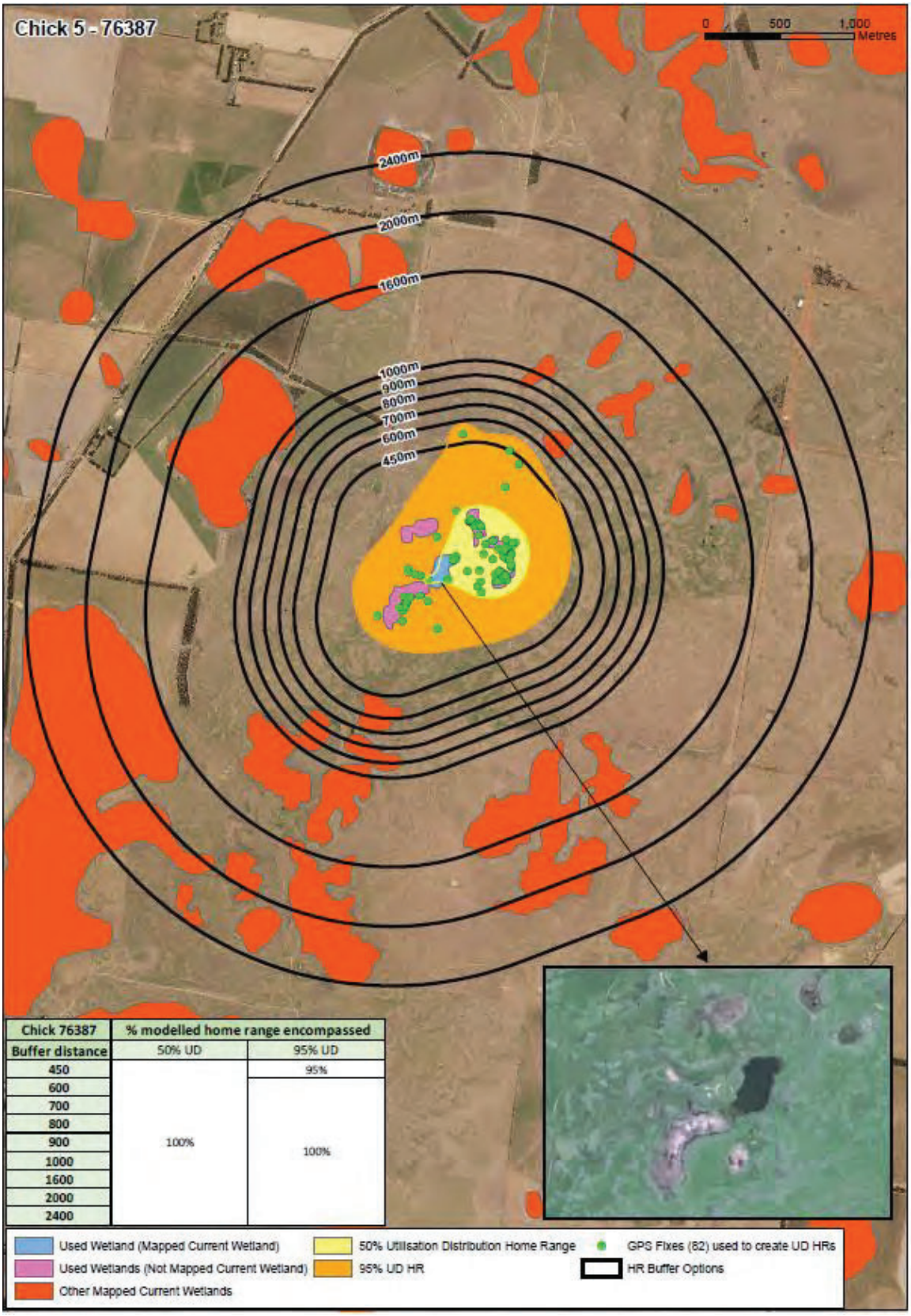


Figure 5. Buffer option simulations for Chick 5 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

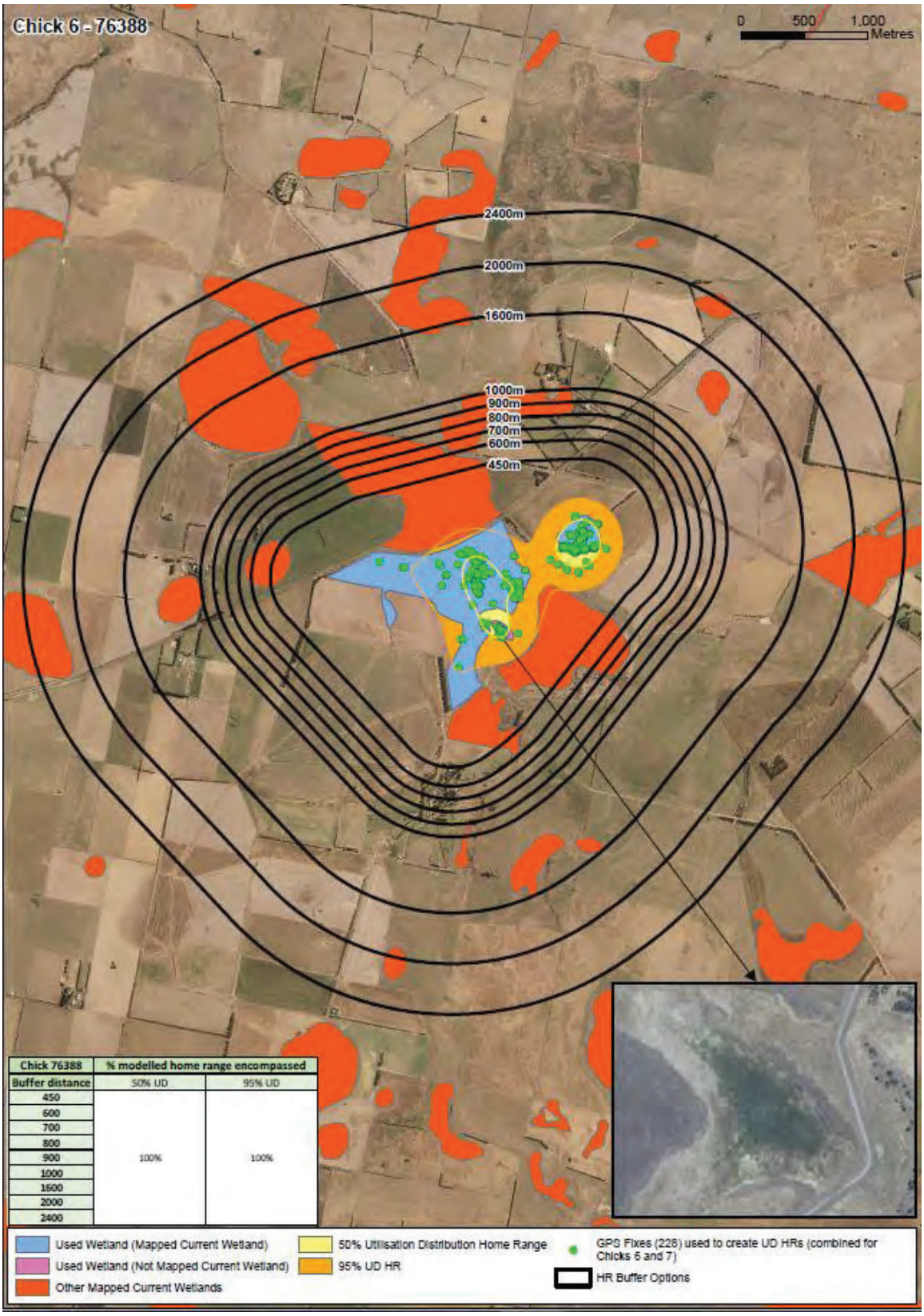


Figure 6. Buffer option simulations for Chick 6 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

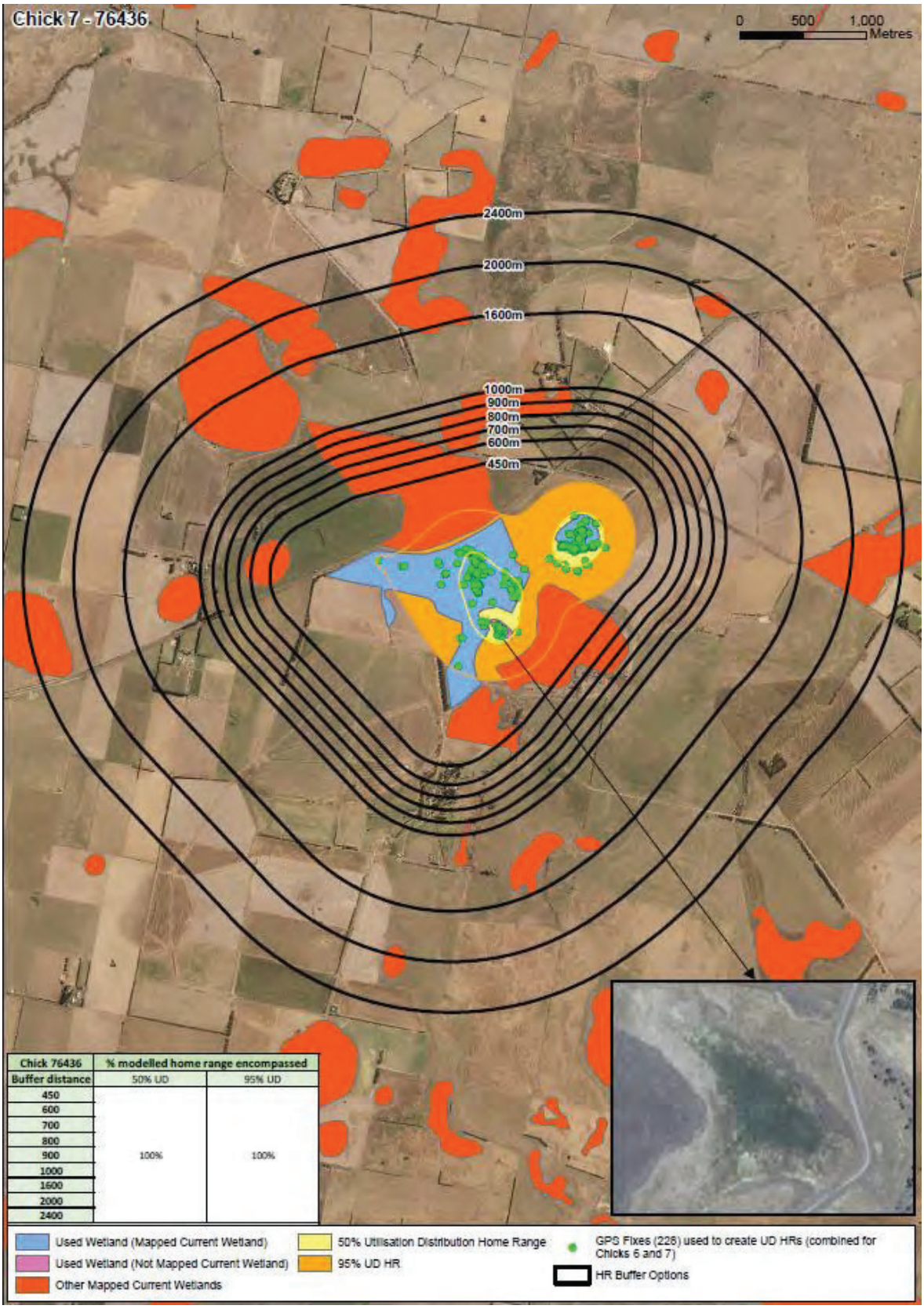


Figure 7. Buffer option simulations for Chick 7 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

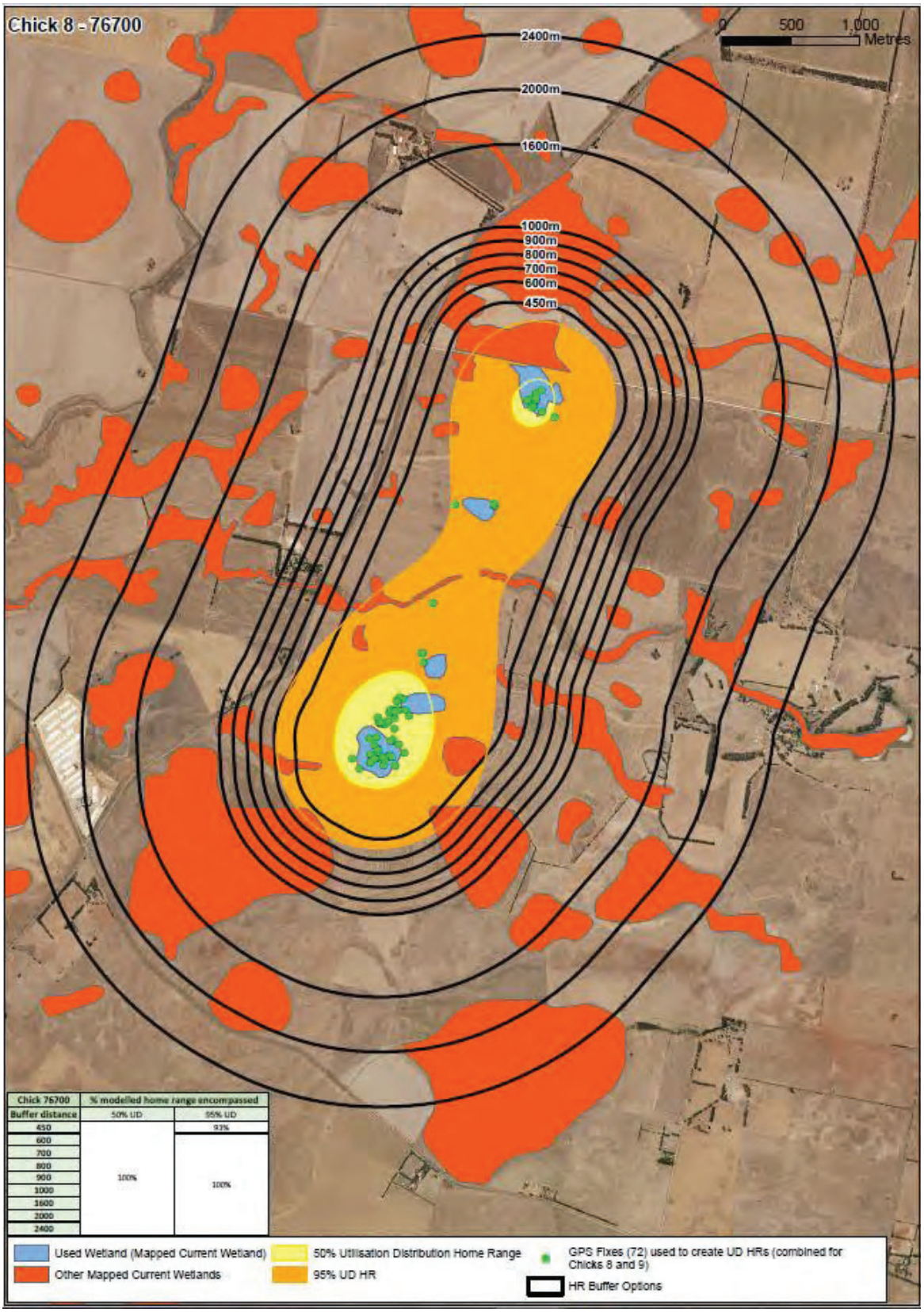


Figure 8. Buffer option simulations for Chick 8 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

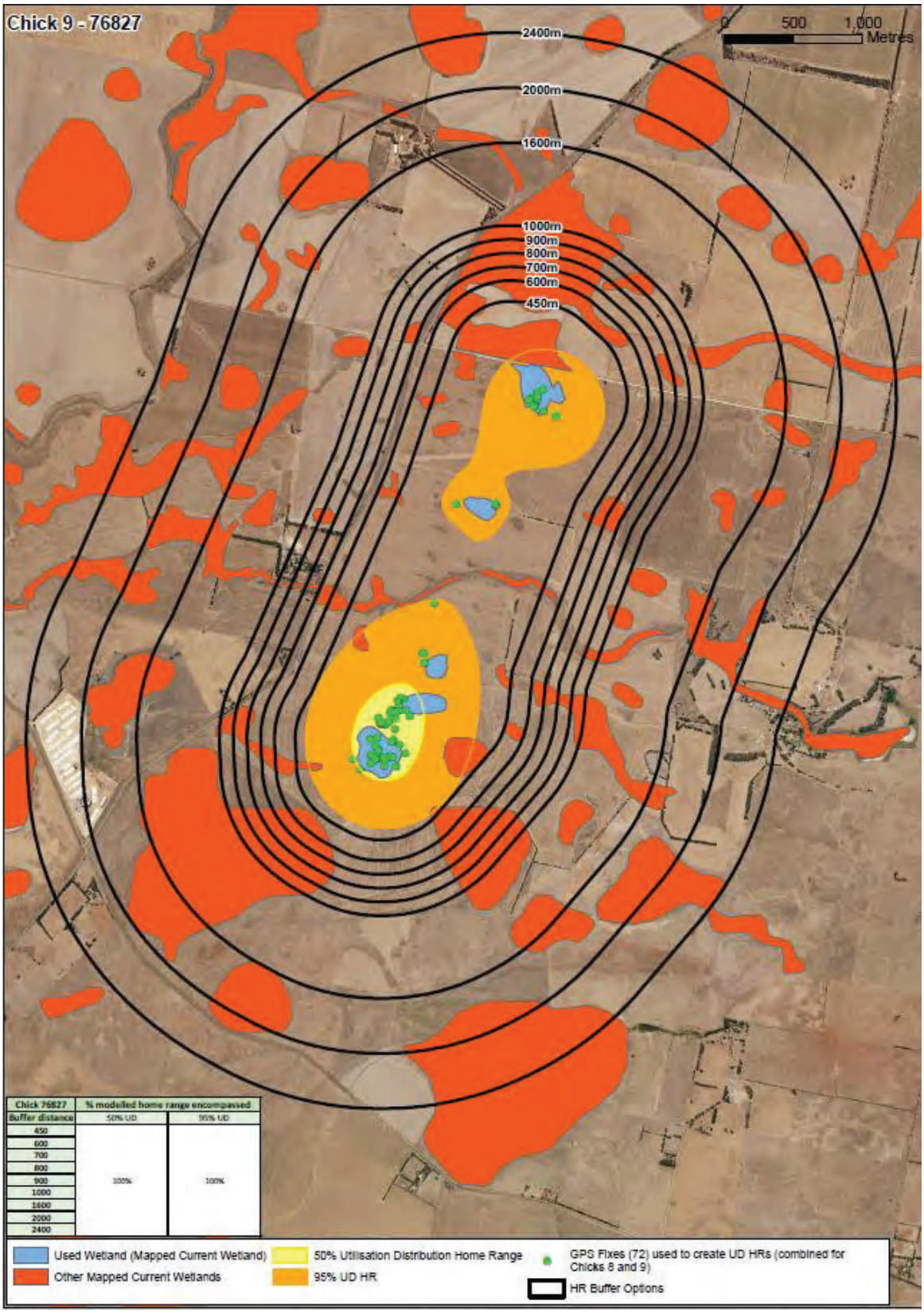


Figure 9. Buffer option simulations for Chick 9 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

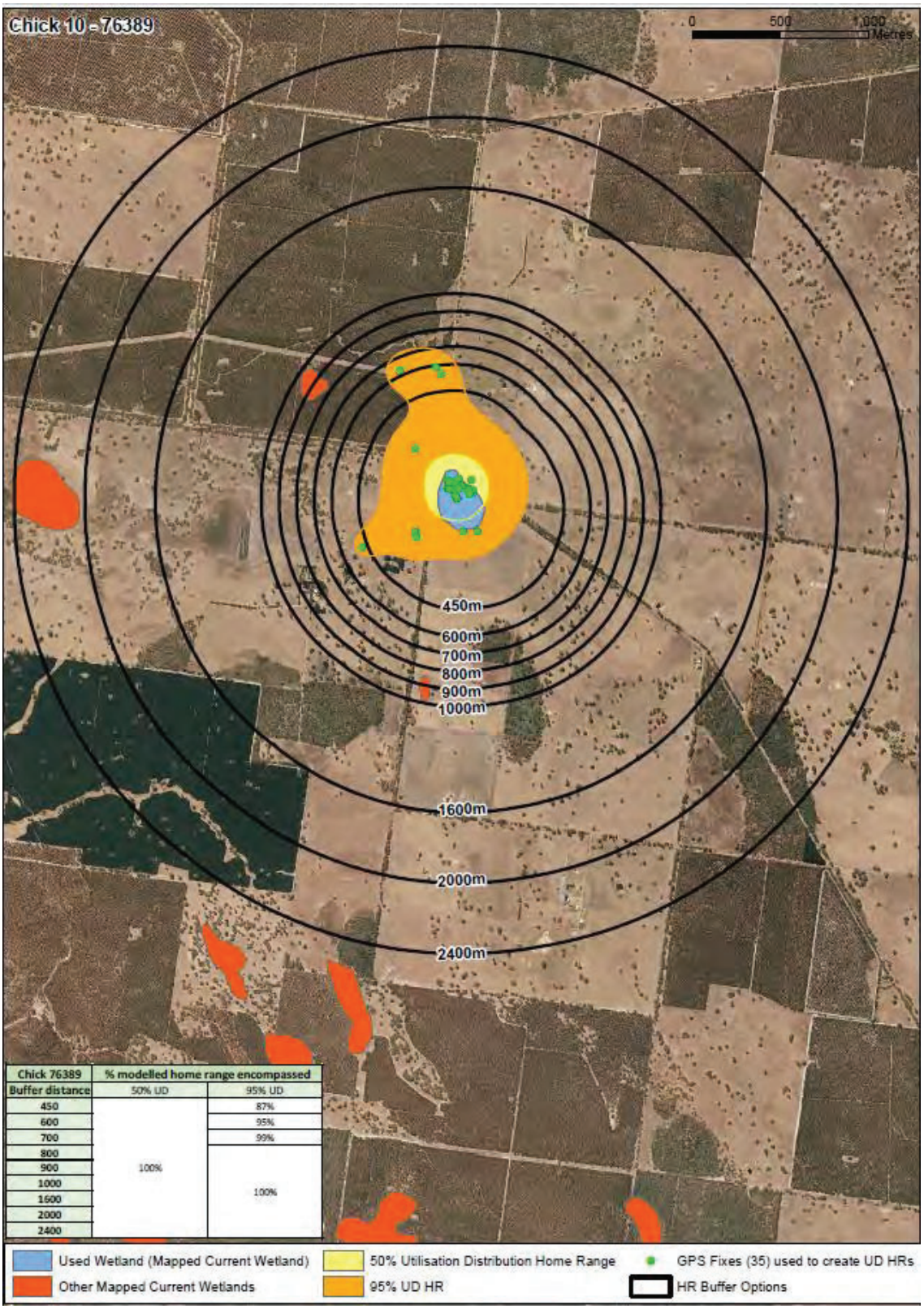


Figure 10. Buffer option simulations for Chick 10 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

Attachment 2. Breeding buffer options analysis

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

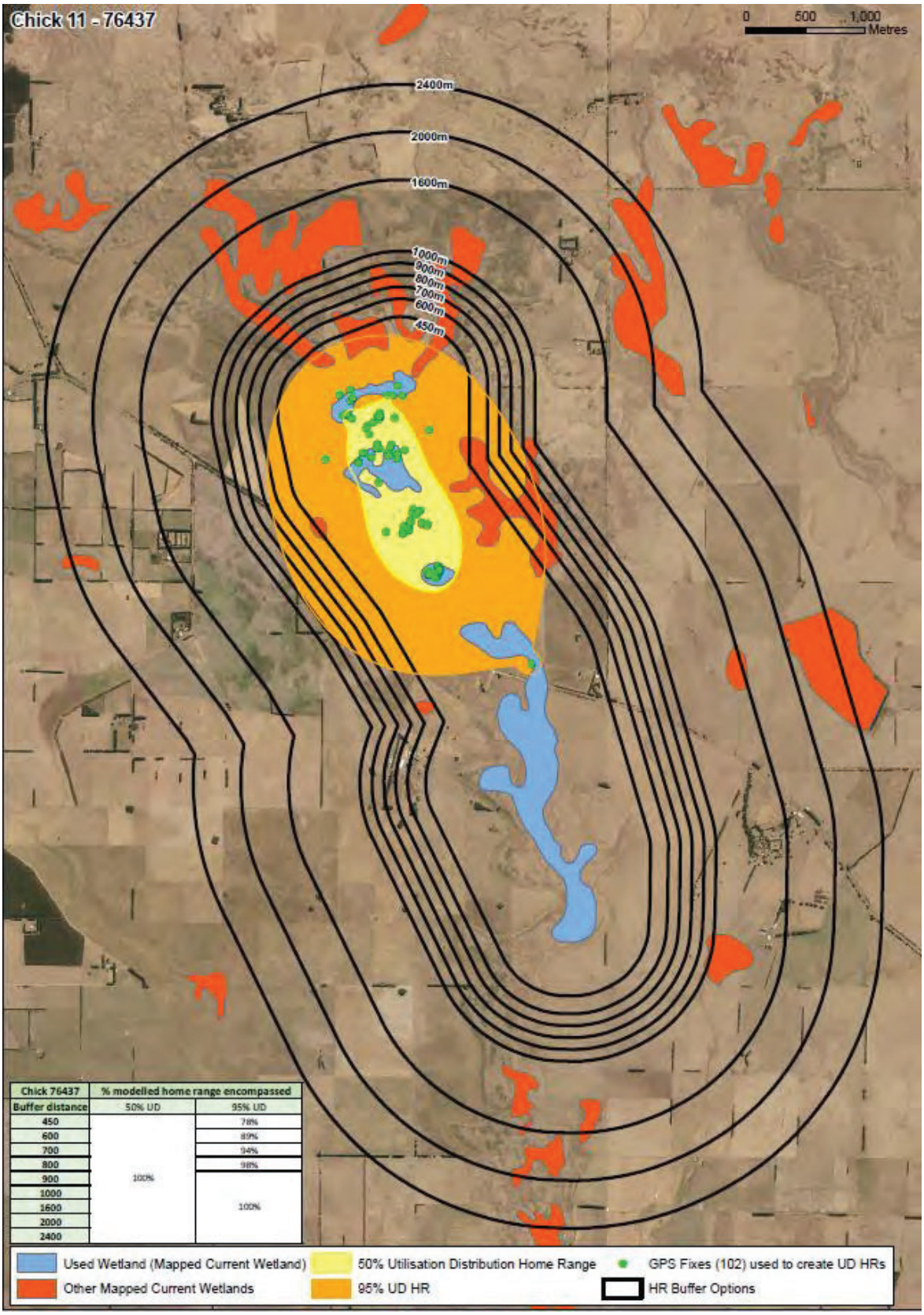


Figure 11. Buffer option simulations for Chick 11 compared to the 50%UD and 95%UD home range polygons for this chick (from Veltheim et al. 2019).

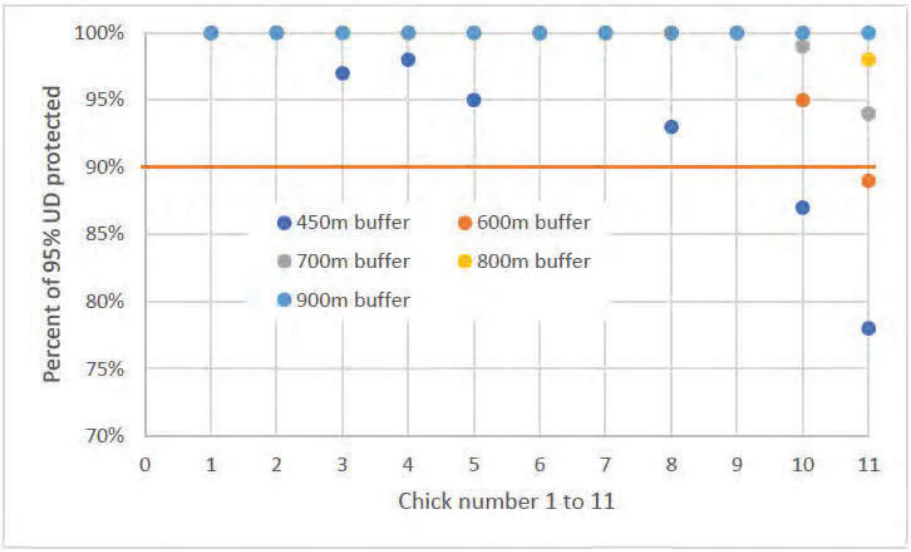


Figure 12. Scatterplot of the per centage (%) of each chick's 95% UD home range estimates that are protected by each buffer option (450m, 600m, 700m, 800m and 900m). The red line represents protection of 90% of the home range estimate for each chick.

Attachment 3. Buffer options tabled at the TRG workshops in 2019

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

Breeding area buffer options that were tabled at the Brolga Technical Reference Group workshops 2019

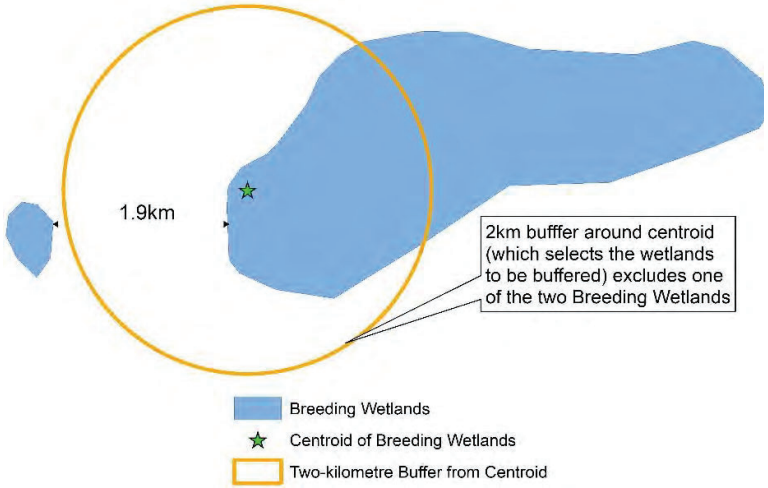
The following options were considered early in the review process and were tabled at the Technical Reference Group for technical input.

Table 1. The buffer options that were presented to the Technical Reference Group in July and August 2019 for comment.

#	Buffer option	Brief description	Biodiversity Division rationale for not pursuing this option further
1	Continue with the buffering approach outlined in the Interim Brolga Guidelines.	The Interim Guidelines require a default 3.5km buffer around a known breeding site (those with a record or survey observation).	This option was discounted from consideration at the TRG workshops because it is not underpinned by the home range outputs findings of Veltheim et al. (2019). No further consideration was given to this option.
2	Known breeding site focus.	This method is based an approach that takes the buffer point from the known nest site wetland (i.e. a wetland that has a nest site record/survey observation)	This option was not pursued because of the approach taken to move from record/observation to a habitat criteria-based approach. In addition, this approach relies on knowing which wetland is the nest site record (it takes this wetland as the starting point for the buffer). The nest record site is not always known so this buffer option is problematic.
3	Centroid method	This option is based on the method used in Veltheim et al. (2019) which used a centroid of the night roosts as the starting point for identifying the home range Utilisation Distribution areas for each pre-fledged chick.	This option was presented as an option to the TRG. However, following the TRG workshops, further simulations were undertaken, and it was determined that a centroid approach cannot be adopted to the buffer requirements in the standards because: - The findings of Veltheim et al. (2019) were based on the use of GPS trackers attached to pre-fledged chicks. This means the study had GPS data on which wetlands were used by the pre-fledged chicks to be able to calculate a centroid. - It is not feasible to require that wind energy facility permit applicants must undertake GPS tracking studies to determine the wetlands within their assessment area that are used by pre-fledged chicks. Nonetheless, if GPS tracking studies were a requirement, it would only provide an indication of the wetlands used in the breading season(s) that the GPS studies were undertaken and would not provide an indication of the wetlands suitable for breeding that may be used in future breeding seasons. - In addition, simulations of a centroid method determined that this approach can result in breeding wetlands being excluded from turbine-free buffers, especially where large wetlands are present. This can be overcome by basing the centroid on the centre point of the source wetland and the points of surrounding wetlands closest to the source wetland; however, this is also a deviation from the approach adopted in Veltheim et al. (2019) and requires that the source "nest" wetland to be known, which is not always possible. The diagram below illustrates this problem.

Attachment 3. Buffer options tabled at the TRG workshops in 2019

Brief: Approval of a brolga breeding buffer option for wind energy facilities.

			
4	Probabilistic model.	A modelled buffer based on s33: data with many simulated Brolga movements in a context specific landscape	- The option was not pursued because a clear scope of the requirements to the model was not clarified and it was discounted as an option due to time and resource constraints. - Limited budget was available for the completion of this review process. The budget that was available was used to identify flocking home range outputs for the key brolga flocking areas in Victoria to inform the buffer requirements are these important areas.

CONSOLIDATED DELWP COMMENTS ON THE DRAFT BROLGA STANDARDS

RESPONSE CATEGORY LEGEND	
Editorial (to be addressed	Note: editorial issues to be addressed during
Clarification required	
Response outlined in explanatory	
Issue requires further discussion	
Small/moderate change or	
No explanation or solution; no	
No change to standards; response	

Issue ID	DELWP GROUP	Name	Section of the draft standards	Comment or suggested edit	Suggested solution(s) in the comment, if stated	Response category	Biodiversity Division - response
1	PLANNING	s33: personal	Introduction and throughout	I'm accustomed to species names being given a capital letter – I'd prefer to see "Brolga", throughout.		Editorial	Agreed, the draft standards have been amended.
2	PLANNING	s33: personal	Whole document	There is nothing in this document regarding cumulative impacts and nothing regarding Brolga compensation packages, as there is in the Interim Guidelines. Why not? It is not appropriate to omit important content like that without an explanation. Is there any evidence that there is no barrier impact from adjoining wind farms?		Response outlined in explanatory document	**Cumulative impact:** Addressing cumulative impacts at a project approval level is very difficult because it is challenging to determine a tipping point where any additional approvals would be refused. The intention of the standards is not to require applicants to undertake inividual assessments of the cumulative impact of their proposal in relation to all other proposals. As a whole, the proposed controls outlined in the standards have been designed to protect Brolga against potential cumulative impacts from wind farms, to ensure the species does not become more threatened from the impacts of wind farms. The standards do this through through controls to buffer breeding and flocking areas to protect the species from additional habitat loss. If future scientific information reveals unforeseen cumulative impacts then the controls should be reviewed in light of any new information. **Compensation plans:** please refer to the explanatory document.
3	PLANNING	s33: personal	Introduction	"Unmitigated expansion of wind energy facilities within the distribution of the brolga habitat has the potential to exacerbate the species' decline by impacting breeding and flocking success." This is because development is currently mitigated although (this is the update). Its there any stats we have here? Eg, since XXXX there has be XXX collisions / loss of breading site etc – because of wind energy facilities?	Suggest replacing with "the siting and design of wind energy facilities within the distribution of brolga habitat must be carefully managed to avoid the species' decline by impacting breeding and flocking success."	Response outlined in explanatory document; no amendment to the standards	There are stats in relation to wind turbin impacts. There have been no Brolga wind turbin collisions deteted. See summary report (https://www.planning.vic.gov.au/__data/assets/pdf_file/0020/435260/Summary-of-ARI-report-investigation-of-existing-post-construction-monitoring-data.pdf) and full report: (https://www.ari.vic.gov.au/__data/assets/pdf_file/0024/435309/ARI-Technical-Report-302-Investigation-of-existing-post-construction-monitoring-at-Victorian-wind-farms.pdf?_ga=2.179743212.956630240.1601418618-852297153.1601294661)

4	PLANNING	s33: personal	Purpose	*The objective of the standards is that the Victorian brolga population does not become more threatened, at the state-wide level, from the impacts of wind energy facilities.* s30: internal workings		No change to standards; response provided.	Noted. This policy objective was endorsed by the Renewable Energy Taskforce in December 2018. No change has been made.
5	PLANNING	s33: personal	Regulatory context	"Turbines, buildings, transmission lines, anemometers and other structures that are used to connect to the wind energy facility must be excluded from all buffer areas".	Suggest this sentence be amended to cover all above ground infrastructure. An underground power cable and rarely use access track could occur within the buffer area without an impact to brolga and would significantly reduce cost for proponents.	No change to standards; response provided.	Noted. Construction and maintenance of underground infrastructure would damage brolga habitat. Biodiversity Division's position is that this should not be permitted within breeding habitat buffers. No change has been made.
6	PLANNING	s33: personal	Purpose	The sentence referred to by s33 is ambiguous. Does it refer to flocking buffers, breeding wetland buffers, or both? Works in each of those buffers might be ok at different times of the year, so long as the disturbance is not apparent when the sites are used by Brolga.		No change to standards; response provided.	Noted. Construction and maintenance of underground infrastructure would damage brolga habitat. Biodiversity Division's position is that this should not be permitted within breeding habitat buffers. No change has been made.
7	PLANNING	s33: personal	Regulatory context	**A transitional provision** (referenced here and contained in the VPPs) would be important for applications that have been lodged or permits approved and waiting for endorsed plans.		No change to standards; response provided.	Agreed, this has been prepared.
8	PLANNING	s33: personal	Reg cont	Does the clause really require a list of listed fauna (not flora) and an assessment of all listed species? And species of fauna is a funny expression. Most writers would say Fauna species.		Editorial	This section of the standards has been amended to refer to the complete wording of the clause, for clarity.
9	PLANNING	s33: personal	Reg cont	*. . . requirements for brolgas.* Do you mean Brolga (i.e. requirements for the species) or brolgas (i.e. requirements for individuals)?		Editorial	Agreed, clarified in the standards.
10	PLANNING	s33: personal	Brolga area of interest map	Would be good for this to be available to the public on the **VicMap data set.**		Small/moderate change or response required; further discussion not required	Agreed. Data will be publicly available on DataVic. Biodiversity Division will investigate creating a VicMap dataset.
11	PLANNING	s33: personal	Brolga area of interest map	Is it possible to explain what lines the boundaries of the area of interest follow, where they're not the coast or State boundaries? For example, Hume Freeway? It would be better for the map to depict a definitive boundary rather than havigg people trying to scale off such a small-scale map.		No change to standards; response provided.	Noted, a spatial file of the map will be available for public use, as oppose to using the map directly. This will be outlined in the explanatory document and the standards.

12	PLANNING	s33: personal	Flocking buffer areas map	Would be good for this to be available to the public on the **VicMap data set.**		Small/moderate change or response required; further discussion not required	Agreed. Data will be publicly available on DataVic. Biodiversity Division will investigate creating a VicMap dataset.
13	PLANNING	s33: personal	Flocking buffer areas map	Hard to tell at this scale whether the Dundonnell/ Lake Gellie/ Pura Pura flocking area is mapped? Is mapping available at large enough scale for determining whether nearby proposals avoid or infringe on the mapped buffers? What formula was used for mapping? Some "buffers" seem very small, eg Lake Bolac, speck north of Penshurst.		No change to standards; response provided.	Yes, these flocking areas are mapped. a spatial file of the map will be available for public use, as oppose to using the map directly. This will be outlined in the explanatory document and the standards.
14	PLANNING	s33: personal	Flocking buffer areas map	. . . developments must be avoided in these areas.	This and other references to the flocking buffer area should say 'developments are not permitted in these areas'.	Small/moderate change or response required; further discussion not required	Agreed. The standards have been amended to state facilities are 'prohibited' in these areas.
15	PLANNING	s33: personal	Figure 3	What does the term "assessment area" mean?	I see it is defined at the top of p. 9, but it needs to be in the Definitions, and cross-referenced from here.	No change to standards; response provided.	This is identified in the definitions. It is the area which the assessment set out in the standards must be applied.
16	PLANNING	s33: personal	Figure 3	Who is the arbiter of breeding wetlands? How are they defined? This seems very open to poor practice, or worse.		No change to standards; response provided.	The standards include a definition of breeding wetlands and require the relevant evidence to be provided upon application for assessment. DELWP is investigating an option to model this assessment for all wetlands and produce and standard layer, however it is unclear yet whether this is achievable and as such, proponents will be required to engage an expert to undertake this assessment against the criteria set out in the standards.
17	PLANNING	s33: personal	Breeding wetland		I think we need to specify a date, no later than the date of publication of the **draft** standard. Otherwise the standard itself will lead to wetlands being drained pre-emptively so that they don't meet the definition.	Small/moderate change or response required; further discussion not required	Amendment made to the standards to state ten years is 'from the date of application'.
18	PLANNING	s33: personal	Breeding area	I'm happy with the flexibility, but where does the standard explain how breeding areas must be mapped for project design? If it's not going to be here, there needs to be a cross-reference.		Small/moderate change or response required; further discussion not required	The size and shape of a breeding area is landscape specific. In effect, the 'breeding area' is the area that is buffered and is determined through the 'Breeding habitat buffers' section. This section of the standards has been amended to clarify this.
19	PLANNING	s33: personal	Flocking area buffers	What "buffer" has been provided? The existing guidelines specify five km from flock roost sites. Although this section is headed "Flocking area buffers, the text just describes what a flocking area is. Need to explain transparently how flocking areas have been mapped, then what size buffer has been applied to arrive at the polygons mapped in Fig. 2.		Small/moderate change or response required; further discussion not required	Agreed. The name will be updated to remove the term buffer. An explanatory document is being created, which will include this. The flocking areas have already been buffered based on research for each flocking site. This is reflecting in the 'no-go' area.

20	PLANNING	s33: personal	Brolga Breeding/Brolga Flocking	I assume from your descriptions that Brolga disperse from their flocking areas to breed and then concentrate back into the flocking areas as the landscape dries into summer. Does the wind industry pose any threat to the species for these migrations? Either way, I think the guidelines should not just be silent.		Response outlined in explanatory document	There is no scientific data that there is any impact. Other data collected to date through wind farm proposals does not indicate this to be a risk. An explanatory document is being prepared.
21	PLANNING	s33: personal	Second Figure 3	Caption should go below the figure and be corrected. What are UD contours?		Editorial	Agreed, amended.
22	PLANNING	s33: personal	Third Figure 3	Update figure number. Is there any science behind the 5km buffer? Do we have evidence that there is no effect of windfarms on Brolga breeding/ flocking beyond 5km, or the converse?		Response outlined in explanatory document	This buffer distance has been recommended by s33: perso
23	PLANNING	s33: personal	Step 2 – Overlay the flocking area buffers map	"These mapped areas must be avoided. Turbines, buildings, anemometers, transmission lines and other structures used in connection to the wind energy facility must be excluded from the flocking area buffers."	Suggest this sentence be amended to cover **all above ground infrastructure.**	No change to standards; response provided.	See response to issue number 5.
24	PLANNING	s33: personal	How do I manage incorrectly mapped wetlands?	This has caused significant grief in the past.	"Photographs or contours are required as evidence." If contours are required I would suggest making it clear on what you want – eg 0.5m contours etc....	Small/moderate change or response required; further discussion not required	Amendments to this section to clarify evidence requirements. This process is not part of the Interim Guidelnes. It is based on an existing process that is used in the native vegetation regulations. There have been no implementation issues to date with this process when used for the native vegetation regulations.
25	PLANNING	s33: personal	How do I manage . . .	Seems a little loose that the proponent can declare a mapped wetland non-existent by producing a photograph. Where/when was the photo taken?		Small/moderate change or response required; further discussion not required	Agreed. Amendment made to include a requirement that the photo is date-stamped with GPS point location.
26	PLANNING	s33: personal	Step 4	If we are going to make this specification, DELWP must ensure that all Brolga records that have been submitted to VBA are validated and entered as a top priority. s30: internal workings	DELWP needs to be able to unequivocal that all valid records submitted are in the database.	No change to standards; response provided.	Noted, no amendment made. Further disucssion with VBA will occur through implementation. The VBA website states: "All new records submitted are forwarded to the appropriate expert to verify. DELWP completes the expert review cycle approximately every four months. After this time all newly approved records are available in the VBA reports area and new VBA spatial datasets will be released". See: https://www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas.

27	PLANNING	s33: personal	Guidance note on breeding records	"While it is not a requirement of these standards, DELWP recommends that applicants engage with the community in the early stages of the permit application process, to encourage community members to submit records that are not in the VBA or Birdata"	**(Point 1)** Not clear if they submit these 'community records' to the proponent or to VBA / Birdata? I think this is clarified in the appendix but should also be clear here. **(Point 2)** Also, this section is a little contradictory – only on these data bases yet ask the community for their records. I can see situations where DELWP, panels and VCAT may have to make a judgement call on a record (this would be no improvement from status quo). **(Point 3)** Perhaps the consultation process should advise 'community records' to be submitted to VBA/Birdlife for verification – but how long will this take – months? **(Point 4)** I don't know but this section should be very clear with steps etc.	Small/moderate change or response required; further discussion not required	(Point 1) Amended this section to make it clear that community members must submit records to the VBA or Birdata, not to the proponent. (Point 2) The purpose of this guidance note is to encourage proponents to work with landholders to submit records that may be missing from the VBA or Birdata. The Draft Standards make it a requirement that only records from the VBA and Birdata are accepted, therefore removing the issue that records will have to be considered by panels/VCAT. Community members routinly submit records to VBA and Birdata. (Point 3) Please see response to issue 36. (Point 4) Noted.
29	PLANNING	s33: personal	Guidance note on breeding records	s30: internal workings In any case, under Appendix 2, the records would not be accepted unless accompanied by photos, which would apply for very few landholders' records.		No change to standards; response provided.	It is understood that this is part of the consultation process by propoponents when preparing their application, and that proponents would do this to ensure issues do not arise at panel or other times.
30	PLANNING	s33: personal	Step 5	I'm getting confused. The definition given earlier of Brolga breeding wetland does not say anything about whether breeding has actually been recorded. Step 3 above refers to all mapped wetlands, Step 4 is all about Brolga breeding records. Step 5 is about the breeding wetlands to be buffered. What is the relevance of Step 4 if past breeding records are not part of the breeding wetland definition?		Small/moderate change or response required; further discussion not required	Agreed. The order has been updated. The purpose of obtaining breeding records is to identify which permenant wetlands are breeding habitat.
31	PLANNING	s33: personal	Step 5	Regardless of your criteria, who determines whether a wetland is a breeding wetland? (Who will say definitively if the wetland can hold water for four months in any given year)? And given the species' vulnerability, does it matter whether a wetland can be classified as a breeding wetland, or not? The onus should be on the proponent to prove that it is not/cannot be a breeding wetland, otherwise it should be buffered regardless.		Small/moderate change or response required; further discussion not required	This has been updated to clarify that DELWP make this decision. The delegation to exact team will be resolved through implementation plan. This is the process currently applied under the Native Vegetation regulations.

32	PLANNING	s33: personal	Buffer requirements	In these paras (step one and step two) suggest the sentence be amended to cover **all above ground** infrastructure.		No change to standards; response provided.	Noted. Construction and maintenance of underground infrastructure would damage brolga habitat. Biodiversity Division's position is that this should not be permitted within breeding habitat buffers. No change has been made.
33	PLANNING	s33: personal	Buffer requirements	Down from 3,500 m in the Interim Guidelines. This is a massive change.		No change to standards; response provided.	Noted. The distance outlined in the Interim Guidelines was prior to the research and analysis of monitoring at windfarms. This was often reduced through the negotiated option, with final buffers being anywhere from 700 to about 1.3km. s30: internal workings The new buffer design is not a simple radius, but a more tailored buffer design reflecting how Brolga chicks used habitat to forage while being raised to fledgling. See response to comments on buffer distance for further information on buffer design.
34	PLANNING	s33: personal	Buffer requirements	s30: internal workings		Further analysis undertaken	The TRG noted that using the PhD research data of s33: personal was appropriate for analysis. While the option was presented with not comments, based on internal feedback additional analysis using the home range estimates has been undertaken to determine the appropriate buffer distance and design to protect approximately 90 per cent or more of the 95% utilisation distribution breeding home range estimates for breeding Brolgas. The analysis shows, that because the buffer was 450 plus movement of chicks between wetlands up to 2km, this protected a significant proportion of chick movements. However, it was decided to protect approximately 90 or more (in all but two cases, 100% is protected, then 95% for one chick and 89% for the other). Simulations were run using the 600 metres for isolated wetlands and 600 metres plus movement corridors between suitable wetlands within 2km. I have attached an example and summary of results. The breeding habitat buffer consists of: •A 600 metre foraging area buffer that protects approximately 90 per cent or more of the breeding home range for breeding Brolgas. •An additional 300 metre disturbance buffer. This requirement is also set out in the interim guidelines and supported by evidence (see Table 2), including anecdotal observations that Brolgas change their behaviour when approached within 300 metres. The Brolga TRG did not provide a consensus on whether they thought this buffer should be retained or removed. Given the lack of evidence to support its removal, DELWP has been retained this as a precautionary measure to protect movements at the edge of the foraging buffer from human disturbance, including during wind farm construction and maintenance. •In addition, the breeding habitat buffer includes movement corridors between suitable breeding wetlands within 2,000 metres of each other (referred to as a group of suitable breeding wetlands). This distance is based on data from Veltheim et al. (2019) showing chicks moved up to 1,964 metres to and from night roost wetlands.

35	PLANNING	s33: personal	Buffer requirements: "An additional 300-metres is to avoid disturbance impacts".	As I have said repeatedly, s33: personal work identifies movements of unfledged chicks within a home range. It does not tell us anything about Brolgas' avoidance of wind farm infrastructure in choosing nesting sites. s30: internal workings		No change to standards; response provided.	The purpose of the disturbance buffer is from human disturbance. With respect to expanding to consider potential disturbance from turbine operation in selecting breeding wetlands, this is a current data limitation. However, there is evidence of Brolga breeding pairs returning to wetlands used in previous years within wind farms, however the brolga chick used a larger home range than previous years. It is unknown what caused the increase in home range. This data gap has been identified and explained in the explanatory document for public consultation. Also see response to comment below.
36	PLANNING	s33: personal	Ditto	I'm with s33: pers Where did this number come from? What is its intent? What do you mean by 'disturbance impacts'?		**No change to standards; response provided.**	This requirement been retained from the Interim Standards as a precautionary measure to protect movements at the edge of the foraging buffer from human disturbance, including during wind farm construction and maintenance. Evidence Veltheim (2018) observed that vehicles caused Brolgas to disperse from foraging areas to roosts or caused complete dispersal from a roost. Veltheim et al. (2015) found Brolgas were unlikely to return to areas previously used for capture. Veltheim et al. (2015) found breeding pairs with chicks dispersed when vehicles and people were present for chick capture. 'Human interference or disturbance' is outlined as a threat to the southern population of the Brolga in Meine and Archibald (1996). Navarette (2011) found that cranes within wind farms displayed more vigilant behaviour and less resting behaviour. It is assumed that Brolgas are as sensitive to disturbance as other crane species , including: • Cross-fostered Whooping Crane in Colorado (Shenk and Ringelman 1992) • Whooping Crane in the United States and Canada (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007) • Hooded Crane in China (Luo et al. 2012) The findings of Veltheim et al. (2015) indicate that human presence may cause disturbance and displacement to Brolgas from foraging habitat.
37	PLANNING	s33: personal	Figures 5, 6,	Could be a bit clearer with regard to grey shading etc...		Small/moderate change or response required; further discussion not required	Agreed, figure to be amended.
38	PLANNING	s33: personal	Figures 5, 6 & 7	If the critical distance is two kilometres, please use a scale bar marked in intervals of two km, not 2.5 km.		Small/moderate change or response required; further discussion not required	Agreed, figure to be amended.

39	PLANNING	s33: personal	s30: internal workings	Which average is this – mean/ median/ mode? Why adopt average rather than 80th percentile/ 90th percentile? There does not appear to have been a precautionary approach taken to ensuring that breeding sites for this threatened species are protected with an adequate safety margin. s30: internal worki		Further analysis undertaken	See response to issues number 34.
40	PLANNING	s33: personal	Step 7	Suggest the sentence under the figure be amended to cover **all above ground infrastructure.**		No change to standards; response provided.	Noted. Construction and maintenance of underground infrastructure would damage brolga habitat. Biodiversity Division's position is that this should not be permitted within breeding habitat buffers. No change has been made.
41	PLANNING	s33: personal	Glossary	Infrastructure-free buffer – suggest the definition be amended to reflect **above ground infrastructure**.		No change to standards; response provided.	See response to issue 40.
42	PLANNING	s33: personal	References	Please arrange in alphabetical order of lead author surname.		Editorial	Completed.
43	PLANNING	s33: personal	Appendix 2	s33: personal It is a readily identifiable species. Many records may come from landowners who will not fit into any of the listed categories. Is it expected that false records will be deliberately submitted? In any case, to the best of my knowledge, Birdata does not hold information about submitters that would enable such records to be separated from all other records submitted.		Response outlined in explanatory document	The interim guidelines require third-party records to have a dated photograh. The standards formalise this arrangement. These protocols have been endorsed by Birdlife and the VBA.
44	PLANNING	s33: personal	Regulatory context	Is there any commitment to how the document will be a statutory consideration? Will it be incorporated into the planning scheme? Will it be a policy document for Clause 52.32? Any clarity on this would be good. Importantly, the document is titled as a 'standard' rather than a 'guideline', which suggests it carries much more weight.		No change to standards; response provided.	The intention is to incorporate the document into the VPPs and must be complied with.
45	PLANNING	s33: personal	Regulatory context	Footnote 1 states: *'this requirement is not applicable to wind energy facility permits issued prior to 16 July 2019'*. I think this should be 15 March 2019, when Amendment VC157 was gazetted.		Small/moderate change or response required; further discussion not required	Amended to correct date.

46	PLANNING	s33: personal	Step 1 – Identify and map the assessment area	s30: internal workings		Small/moderate change or response required; further discussion not required	Agreed, figure to be amended.
47	PLANNING	s33: personal	Step 1	s30: internal workings		Small/moderate change or response required; further discussion not required	Agreed, figure to be amended.
48	PLANNING	s33: personal	Guidance note on breeding records	This contains statements recommending consultation *'in the early stages of the permit application process'* but also *'as part of pre-application consultation with community'* . It then says this engagement is important as it provides the opportunity to ensure that valid records missing from databases are considered in the early stages of the permit application process'. I think all references should be updated to 'pre-application' rather than 'in the early stages of the permit application process'. We want this work to be done before an application is lodged. If it is still being done after an application is lodged, it is too late.		Small/moderate change or response required; further discussion not required	Agreed, amended to 'pre-application'.
49	PLANNING	s33: personal	Guidance note on breeding records	Says that general information about pre-application consultation can be found in the DELWP Policy and Planning Guidelines. Also suggest referencing the DELWP Community Engagement and Benefit Sharing Guide.		Small/moderate change or response required; further discussion not required	Agreed, amended to reference the benefit sharing guide.
50	PLANNING	s33: personal	General comment	There are references to additional buffers such as 300 metres to avoid disturbance impacts. Is this from construction activities? Or from disturbance associated with ongoing, operational activities? The buffers seem to be mostly be associated with permanent, taller structures, but has suitable consideration been given to construction activities avoiding habitat? Or are construction impacts dealt with separately?		Issue requires further discussion and resolution	See response to issues 35 and 36. The intention is that the buffers are not impacted during consturction. Additional information will be provided in the explanatory document.

51	PLANNING	s33: personal	Breeding buffer requirements	In the examples for isolated breeding wetland, there is a 2km assessment area buffer. However, I can't find a reference in the remainder of the document why this is only 2km, when for a group of breeding wetlands, there is a 5km assessment area buffer. I might have missed something, but Step 1 (Identify and map the assessment area) in the Assessment standards suggests the assessment area in all instances should be a 5km buffer?		Small/moderate change or response required; further discussion not required	Agreed, figure to be amended to remove incorrect 2km buffer.
52	FFRG	s33: personal	Victorian Wetland Inventory (Current) data layer.	How are we dealing with wetlands that aren't on this layer and where there are clear errors (from the point of view of known wetlands and /or wetlands that are known breeding sites that aren't within the layer)? It will not be in the proponent's best interest to identify and highlight wetlands that aren't on the layer. Do we have any idea of how accurate the model is?	Recommendation: Require proponents to review aerials and consider other un-mapped potential breeding areas and incorporate this into Step 3. Ideally this information should be used to up-date the Current Wetland Layer	Small/moderate change or response required; further discussion not required	Agreed, the standards have been amended to include a process in the assessment standards that applicants must check for un-mapped wetlands.
53	FFRG	s33: personal	VBA records and Victorian Wetland Inventory (Current) data layer	How the standards are currently interpreted VBA brolga breeding records/sites will not be buffered unless they align with a mapped wetland on the Victorian Wetland Inventory Layer and the wetland is a permanent wetland or an ephemeral wetland that fits a criterion in the standards. This has the potential to leave many known VBA breeding records unbuffered. We don't believe this approach is acceptable especially considering other wetlands that don't have any evidence of brolga breeding will be buffered. The above is based on the following assessment of the VBA and CW layer – e.g. there are 714 breeding records on the VBA with an accuracy <100m. Only 391 lie within a CW on the layer. 509 are within 100m of a CW. What happens to the brolga breeding records from VBA/Birdata that are identified in step 4 that don't align with a permanent wetland or a wetland that fits the ephemeral criteria (but rather align with an ephemeral wetland that doesn't fit the criteria)?	s30: internal workings	Clarification required	Following further discussion on this issue, given the Delwp wetland layer is known to be missing some wetlands. A process has been included that propoents must use aerial/satellite photos to identify missing wetlands and include those as par to the analysis. An implementation plan will be prepared, including working with Water to update the wetland layer with missing wetlands. These discussions have not comenced.

54	FFRG	s33: personal	Breeding buffer requirements – 1 Isolated breeding wetlands	s30: internal workings	s30: internal workings	Issue requires further discussion and resolution	See resposne to comment 34.
55	FFRG			s30: internal workings		Issue requires further discussion and resolution	See resposne to comment 34.
56	FFRG	s33: personal	Buffering of all identified brolga breeding habitat	On the face of it the identification and buffering of all potential breeding wetlands (including sites that never have and never will support breeding brolgas) is an ultra-conservative approach that has the potential to significantly impact the wind farm industry in SW Victoria where 2/3 of the states wetlands occur. The one example I have seen of this approach being applied has resulted in a relatively low risk WF from a brolga perspective having 60-70% of its footprint being buffered out. Further analysis of this approach with existing WFs needs to be undertaken before the standards are progressed further.	Recommendation: We need to assess the implications of this step before considering the need for change. This could be done by applying the draft standards to an existing approved WF in house.	Issue requires further discussion and resolution	Agreed. Analysis of the risk posed by wind farms to breeding habitat combined with the known risk to the speices and policy objective have determine buffering habitat as oppos to where there are known records is appropriate. Note, some early analysis regarding permenant wetlands found this and the criteria was amended to where there was a breeding record for permenant wetlands. The same result does not appear to occur for termporal wetlands. We are currently obtaining case studies against wetlands that meet the habitat criteria. A case study of Golden Plains, assuming that the wetlands identified by BLA meet the habitat criteria, impacts 12 wind turbins. However, initial analysis (being confrimed) is that not all these wetlands meet the habitat criteria for breeding wetland.

57	FFRG	s33: personal	Removal of collision risk modelling, population impact assessment and offsetting	Rational for removing the key means for addressing residual risk (particularly from collision) and assessing cumulative impacts has not been provided. What are we doing to address residual risk? Why are we proceeding with a PVA project for other birds and bats when we are recommending an approach here that does not use PVA (when this is one of the species better suited to modelling and PVA)?	s30: internal workings	No change to standards; response provided.	The new breeding habitat buffer requirements are designed to protect against the key threats form wind farm infrastructure: the threat to flocking and breeding success due loss of breeding and flocking habitat and collision with powerlines in these areas. The Interim Guidelines required compensation plans to provide species-specific offsets for any birds that are predicted to collided (predicted through collision risk modelling) with wind turbines. Because there is no evidence of Brolga's colliding with wind turbines, the Draft Standards do not require compensation plans. The design of the no-go flocking areas and breeding habitat buffers avoid any residual impacts on Brolga flocking and breeding success. The CRM/PVA modelling was to underpin the compensation plan, as such is no longer required. For more information, see reports published under "Birds and Bats" on the planning wind energy page: https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/wind-energy-facilities. Direct link to reports: Summary: https://www.planning.vic.gov.au/__data/assets/pdf_file/0020/435260/Summary-of-ARI-report-investigation-of-existing-post-construction-monitoring-data.pdf Full ARI report: https://www.ari.vic.gov.au/__data/assets/pdf_file/0024/435309/ARI-Technical-Report-302-Investigation-of-existing-post-construction-monitoring-at-Victorian-wind-farms.pdf?_ga=2.179743212.956630240.1601418618-852297153.1601294661
58	FFRG	s33: personal	Purpose - The objective of the standards is that the Victorian brolga population does not become more threatened	s30: internal workings	s30: internal workings	Response outlined in explanatory document	The policy objective for Birds and Bats was presented to RETF in 2018 and approved. The objective does not mean a change in conservation status, this is too coarse a measure. The objective seeks to protect the conservation of the Victorian Brolga population. This is not as coarse as preventing a change in status, it speaks to preventing a impact on the population from wind farms that would affect their conservation.

59	FFRG		Additional brolga breeding records outside of VBA/Birdata Step 4 – Guidance note on breeding records	New brolga nest sites or brolga nest sites not on the VBA are routinely being found. Many are on private land and have never been mapped. Disincentive for landholders to report nest sites due to impact on ability to host turbines. Previous guidelines had specific guidance to proponents to collate these records, run surveys on properties, aerial surveys etc to address that uncertainty.	Need to include a process to include new records.	Clarification required	The new standards include guidance for propoents to enage communty etc. to submit records.
60	FFRG		Additional brolga breeding records outside of VBA/Birdata Step 4 – Guidance note on breeding records	Assessment standards Step 4 The position on engagement with the community re brolga breeding records represents a significant change in expectations, and of how we intend VBA to be utilised. This change must be highlighted and interpreted in the community effectively, to support community members entering records early and actively. The prospect remains that record holders could delay entering records into VBA or Birdata to a late point (eg during a Panel hearing) to the disadvantage of the proponent. **Need to identify a cutoff date**? Eg the application must consider all records included in VBA and Birdata as at the date of lodgement of the planning permit application? I.e. these Standards apply to community record holders as well as WEF proponents, regulators.		Small/moderate change or response required; further discussion not required	Agreed, standards amended to include cutoff date being the date of permit application.
61				s30: internal workings We are saying we will only consider VBA/Birdata and put the onerous on the proponent to find any other records (which isn't in their best interest but they do it because risk it bites them in panel hearing). We are however saying we will only consider VBA/Birdata. How do we deal with records that come up in a panel hearing and there is evidence proponent didn't engage extensively?		Small/moderate change or response required; further discussion not required	Agreed, standards amended to include cutoff date being the date of permit application.

62	FFRG	s33: personal	Assessment standards Step 3 - Consider all mapped wetlands in the assessment area	**(Point 1)** How confident are we that none of the types of wetlands that are excluded at this step due to their classification on the Currently Mapped Wetland Layer are not used by brolga? I've has a very quick check and out of about a dozen breeding records check two were within permanent or temporary saline wetlands. **(Point 2)** Exclude estuaries: Lake Connewarre? I've seen a chick there. Recorded in VBA? Acknowledge Lake Connewarre is excluded by other means (Ramsar site). **(Point 3)** How do we deal with "unknown" wetland types within the layer (which there are many)? **(Point 4)** I also doubt wetland layer is 100% accurate with the wetland classification.	**Recommendation**: DELWP conducted an assessment of VBA breeding records against wetland types in the Current Wetland layer to determine if criteria we are setting is correct and to also determine how many wetlands are of an "unknown" type.	Small/moderate change or response required; further discussion not required	**(Point 1)** Based on advice from the TRG and historic records, there is no evidence of brolgas breeding within these wetland types: - Permanent saline swamps - Temporary saline marshes, meadows and swamps - Estuaries - High country peatlands - Intertidal flats Regarding saline wetland types - during TRG workshop 2, some members noted that saline wetlands are unsuitable for breeding, however that it is not appropriate to include this in the definition, as defining 'saline' wetland would be difficult. This information is provided in the explanatory document. **(Point 2)** Lake Connewarre is not an estuary, according to the wetland layer it is 'coastal saltmarsh'. Yes there VBA records within Lake Connewarre. **(Point 3)** "Unknown" wetland types are not allowed to be exluded by this section and therefore must be assessed to determine if they meet the breeding habitat suitability. **(Point 4)** Noted. **Recommendation**: This was undertaken to determine the wetlands.
63	FFRG	s33: personal	All	Add section numbering to make it easier to reference specific sections of the document.		Editorial	Agreed.
64	FFRG	s33: personal	Table of Contents	Add 'Step 5' to the ToC. Also add other missing headings under 'Introduction' e.g. 'Purpose', 'Regulatory Context' etc.		Editorial	Agreed.
65	FFRG	s33: personal	All	Capitalise 'Brolga' throughout		Editorial	Agreed.
66	FFRG	s33: personal	Figures	Finalise figure numbering (3 x Figure 3)		Editorial	Agreed.
67	FFRG	s33: personal	Step 3	This section lists five wetland types that can be excluded from assessment, including 1) Permanent saline swamps and 2) Temporary saline marshes, meadows and swamps. The current wetland layer includes a number of other saline wetland types that might be worth noting.		Small/moderate change or response required; further discussion not required	Agreed, amended to refer to other wetland types for which there are no breeding record intersects.
68	FFRG	s33: personal	Figures	Finalise figure numbering (3 x Figure 3)		Editorial	Agreed.

69	**FFRG**	s33: personal	Table 1	The split between permanent and ephemeral wetlands introduces subjectivity. Given the existing reliance on the current wetland layer (e.g. being able to exclude certain defined wetland types from assessment), this could be resolved by defining ephemeral and permanent wetlands according to the layer attributes. If this approach isn't taken, there will need to be clear boundaries around what constitutes a permanent wetland as proponents will push to define and avoid buffering these features where breeding records are absent. Given that Brolgas may breed in the shallower areas of permanent wetlands and that these features are important during dry years, it may be worth just buffering them along with ephemeral wetlands.		Small/moderate change or response required; further discussion not required	Agreed, the standards have been updated to specificily list the wetland types that fall into each category.
70	**FFRG**	s33: personal	All	Include standard mitigation measures within the WEF site e.g. no grain feeding within 250m of turbines, monitoring of breeding activity and mitigation prior to blasting, powerline marking.		Issue requires further discussion and resolution	This is not a risk posed by Wind farms themsleves, but a broader risk to the Brolga population. It is not deemed appropriate to use the standards to mange non-wind farm risks.
71	**FFRG**	s33: personal	All	Consider documenting a formal review process (not just as new scientific info becomes available). This is important for avoiding ad-hoc submissions and attempts to apply reduced buffers.		Small/moderate change or response required; further discussion not required	Noted. The standards highlight that they should be reviewed or amended where new information comes to light. A formal review process is not deemed required.
72	**FFRG**	s33: personal	Breeding Buffer Requirements	Reference the QGIS plugins developed to autonomise the buffering process.		Small/moderate change or response required; further discussion not required	Agreed, QGIS plugin process now included in Appendix 3 (to be finalised once approved buffer option is known)
73		s33: personal	STEPS FOR MULTIPLE WETLANDS	I don't think we discussed this at the sci ref group either, so this seems to be new. Its consequently difficult to comment on. I'd be keen to see this process run over some real examples from s33: person data to see how well it represents what we know to have been the case.		Issue requires further discussion and resolution	See response to comment 34.

74		s33: personal	Uncertainty of the effectiveness of this approach	s30: internal workings	s30: internal workings	Issue requires further discussion and resolution	See response to comment 34.
75	FFRG	s33: personal	Summary of above comments	s30: internal workings A few key points: • The objective of no change in status is way too high a threshold. For example, if they are upgraded to Endangered which I think I concluded in the review, a change in status from Endangered to Critically Endangered would require a current population size of say 700 reducing to less than 250. • Cumulative impact: without fully compensating any unmitigated losses, each project will accumulate losses, and cumulative impact of multiple projects won't be avoided. s30: internal workings	Can confirm it's the TRG. Expert Panel is the term used for the group lead by s33: personal that developed the interim guidelines.	Response outlined in explanatory document	Point 1: See response to comment 58. Point 2: See response to comment 57. Point 3: The TRG did not have a descision making. As per the Terms of Reference, they role was to provide technical advice to DELWP. The design is based on presentations at the final TRG, presented by s33: perso .

76	**FFRG**	s33: personal		• These new guidelines are very conservative in one way, buffering all potential brolga breeding sites, but then use buffers that weren't discussed at the reference group and don't relate to s33: perso HR work logically or agree with the expert panel recommendations.		No explanation or solution; no response will be provided to this comment	The proposals outlined were discussed at the third TRG meeting. The proposals have been tested against s33: person data directly using her work and the published paper.
77	**FFRG**	s33: personal		Unmitigated risk (movements outside buffer areas) is not quantified, there is no PVA , and no offsets. How does the Brolga assessment relate to the PVA project?		No change to standards; response provided.	See resposne to comment 57.
78	**FFRG**	s33: personal	Purpose - These standards specify how permit applicants must identify breeding wetlands and apply buffers around them.	Need to be careful using the term breeding wetlands if proposing to buffer all candidate wetlands without prior knowledge of historical breeding.	If this is going to be the case change to "potential or suitable breeding wetlands"?	Small/moderate change or response required; further discussion not required	The definition of 'breeding wetland' on page 7 has been amended to refer to a wetland ..."*that is suitable for...*"
79	**FFRG**	s33: personal	Purpose - Turbines, buildings, transmission lines, anenometers and other structures that are used to connect to the wind energy facility must be excluded from all buffer areas	Proponent has recently requested putting a "temporary" quarry within a buffer. The intent of a buffer is to avoid impacts to breeding brolgas. Blasting and machinery/vehicle activity are likely to deter brolgas from using the buffered wetlands or disturb nesting brolga. There is also risk that quarrying activities may impact the hydrology of the breeding wetlands. The placement of a quarry within the buffer will also reduce the area of forage habitat and may impact movement corridors between adjacent wetlands.	<u>Recommendation:</u> If there is a reluctance to use "quarry" an alternative is to use the term large scale activities or something to that effect - "Turbines, buildings, *large scale activities* , transmission lines, anenometers and other structures that are used to connect to the wind farm facility..."	Small/moderate change or response required; further discussion not required	Agreed, amendements made throughout the draft standards to ensure that quarries are excluded from breeding habitat buffers and the no-go flocking areas.
80	**FFRG**	s33: personal	All	Suggest be consistent with using either power line or transmission line unless there is a clear difference between the two. Seems we are using them for the same purpose.		Editorial	Amended to power lines.

81	FFRG	s33: personal	Flocking areas buffer map	How are new flocking sites considered? For instance, Green Swamp (which may be part of the Willaura flocking area TBC) is a recently restored wetland that is now possibly a new flocking site (over 80 birds recorded there this autumn)?		Issue requires further discussion and resolution	This example is included in the map. The standards can be updated as we become aware of additional flocking areas.
82	FFRG	s33: personal	Conservation Status - (noting that this listing assessment may change through the implementation of the Common Assessment Method).	Likely this will be endorsed before the new standards so just need to ensure updated before standards are finalised.		Editorial	Noted.
83	FFRG	s33: personal	All – breeding season July - November	Why now November? Previous guidelines were Dec. Not sure of what A/S says. May not be an issue but just want to be consistent. s33: pers only uses reference to austral season for simplicity.		No change to standards; response provided.	December is the start of the flcoking season, breeding goes through November. This has been reviewed by s33: perso
84	FFRG	s33: personal	Flocking area	Suggest provide some further context around duration. It's not just 10 brolgas or more. They also need to be present for a certain period of time for a site to be considered a flocking site.		No change to standards; response provided.	This has been reviewed by s33: perso
85	FFRG	s33: personal	Step 1 - The assessment area is the proposed wind energy facility site with a five-kilometre buffer	Plus offsite transmission line? Or are transmission lines and proximity to breeding/flocking sites as a collision risk not being considered?		Small/moderate change or response required; further discussion not required	**The power line foot print must be included in the assessment area buffer. All maps to be updated to include this.**
86	FFRG	s33: personal	Step 6 – Outcome and next steps "...no breeding wetlands..."	Suggest change to "...no *known and/or suitable* breeding wetlands..."		Small/moderate change or response required; further discussion not required	Please see response in row 78.
88	FFRG	s33: personal	Breeding buffer requirements – Step 1	How do you determine which wetland to choose? Is the buffering outcome different if a different wetland is chosen first or does it not matter?		No change to standards; response provided.	No amendment - the buffering outcome is not influenced by which wetland is chosen first. The buffering process has been automated and is now included in Appendix 3.
89	FFRG	s33: personal	Step 4 - For each concave hull the 'Number of neighbouring points to consider' should be set to 850	Explanation of what this means would be useful.		Small/moderate change or response required; further discussion not required	Removed

90	FFRG	s33: personal	General comment	The document lacks any reference to collision associated with breeding sites. It implies buffering of breeding wetlands is purely about disturbance and hence does not cover risk from collision.		Response outlined in explanatory document	**See section**: "The risks that the draft standards address"
91	FFRG	s33: personal	General comment	Have or are the draft standards being circulated to the technical panel before they are socialised further, particularly externally? It's very important to get their feedback. s30: internal workings		Issue requires further discussion and resolution	**Direction from** s33: personal **and** s33: personal **to be sought on this.**
92	FFRG	s33: personal	Standards and original issues paper	s30: internal workings		No change to standards; response provided.	TBC
93	FFRG	s33: personal	Introduction - Flocking Areas buffer map and throughout.	Language: take care using the word 'avoid', as it can read as a qualitative, process step rather than an absolute, depending how it is used in different sentences. In the context of native vegetation 'avoid and minimise', we countenance the outcome where NV removal may not be able to be avoided. If we intend that no wind farm may be pursued within the flocking area buffers, then I recommend we say so, and avoid the word 'avoid'.		Small/moderate change or response required; further discussion not required	Amended to 'prohibited'.
94	FFRG	s33: personal	Figure 3, 5,	It may be preferable not to use a real WEF footprint currently under consideration.		Small/moderate change or response required; further discussion not required	**Agreed, figures to be amended.**
95	FFRG	s33: personal	Assessment standards Step 3	The Victorian Wetland Inventory (Current) was not prepared specifically for this use. Is its owner supportive of the use in the Standards?		No change to standards; response provided.	DELWP is the owner of this database. The database is publicly available for use.
96	FFRG	s33: personal	Assessment standards Step 3	Disregarding an incorrectly mapped wetland. The process contrasts with the parallel process set out in relation to the native vegetation regulations. This may lead to a wetland being regarded as native vegetation due to it being in the Current wetlands layer, while WEF infrastructure could be located here as it has been disregarded by this brief process.		No change to standards; response provided.	Noted, the criteria is based on the those under the native vegetation regulations. Some amendments have been made to this process in the standards as per concern raised in other comments (e.g. data-stamped photographs). It is more likely the other way around, where a wetland would not support native vegetation but is breeding habitat for the Brolga. Regarding process, the standards have been updated to match process whereby the wetland is disregarded with written approval by the Secretary to DELWP.
97	FFRG	s33: personal	Assessment standards Step 4	PVA		No change to standards; response provided.	Noted.

98	FFRG	s33: personal	Breeding and wetland buffer requirements	This section explains how breeding area buffers support fledging success. The description of flocking area buffers lacks a parallel explanation as to what they specifically protect. More generally, I'm not seeing an overall explanation about relative risks of ground movements, flights, and the logic for the buffers, for the average / critical reader. Even in relation to breeding buffers protecting fledging, nothing explains how the buffers achieve this purpose, given an average reader might observe that ground movements will not lead to strike. 300m disturbance component is explained, but the broader rationale is lacking.		Response outlined in explanatory document	
99	FFRG	s33: personal	Step 4 – Guidance Note on breeding records	s30: internal workings	s30: internal workings	No change to standards; response provided.	The standard going forward will be to rely on records that have been formally vetted.
100	FFRG	s33: personal	Buffer requirements	The Ministers Assessment following the Golden Plains Wind Farm Planning Panel states that a 700m buffer is likely to be too small. Based on the Planning Panels recommendations, the Minister required the BLA buffer model (a method which buffers groups of wetlands) be adopted. The method for wetland **clusters** in the Draft Brolga Assessment and Mitigation Standards is consistent with this finding, but the s30: interna buffer for **isolated** wetlands is not.	s30: internal workings	No change to standards; response provided.	The Minister's Assessment was undertaken prior to release of the home range analysis findings so the recommendations are from a different scientific understanding and context compared to current.
101	FFRG	s33: personal	Definition of a buffer (mentioned in a number of places in the document)	*These mapped areas must be avoided. Turbines, buildings, anenometers, transmission lines and other structures used in connection to the wind energy facility must be excluded from the flocking/breeding area buffers.*	Need to clarify whether roads are able to be within buffers or not. It is my understanding they can be, as many existing roads and tracks may already be there. Is there a need to avoid developing new roads?	Small/moderate change or response required; further discussion not required	Amended to prohibit access tracks/roads in buffer areas

102	FFRG	s33: personal	Brolga Technical Reference Group input and review	There has been a noticeable departure from the BTRG meeting minutes on buffer development: Particularly: · Modelled buffers – The BTRG considered s33: person data alone is not enough to apply it (a modelled buffer) state wide'. · Expert elicitation on an adequate buffer distance 1.4-2.4km was considered adequate (mean 1.8km).	s30: internal workings	Issue requires further discussion and resolution	Repeats other comments. s30: internal workings
103	FFRG	s33: personal (all minor edits)	Throughout whole document	Is it the 'flocking area buffers' or flocking buffer areas'? It changes throughout whole doc, is it the same or different?		Editorial	Amended.
104	FFRG	s33: personal	Page 2 - Purpose	First use of Acronym - Department of Environment, Land, Water and Planning (DELWP)		Editorial	
105	FFRG	s33: personal	Page 5	Acronym: IUCN is it - International Union for Conservation of Nature (IUCN)?		Editorial	
106	FFRG	s33: personal	Page 10	Add Acronym - Victorian Biodiversity Atlas (VBA)		Editorial	
107	FFRG	s33: personal	Page 10 - Step 4: Birdata (Birdlife Australia)		Suggest: Birdlife Australia's Birdata (Birdata)	Editorial	
108	FFRG	s33: personal	Page 10, How do I manage low accuracy breeding records?	*Low accuracy breeding records are defined as records with an accuracy of more than 100 metres and lack information to attribute the record to a wetland.* I find this hard to follow, suggest use definition on page 19;		Editorial	
109	FFRG	s33: personal	Page 10	DELWP recommends that this to be done as part of pre-application consultation with community and that it is considered as part of the consultation plan for the permit application...	I agree with s33: personal, there should there be a heading/section for the importance and reason for Community Engagement.	Response outlined in explanatory document	Repeats other comments, should have been consolidated prior to submitting to Biodiversity Division.
110	FFRG	s33: personal	Figure 1 page 3	even though it is obvious, to be correct you should include in the figure caption that the orange is the area of interest (either as a legend or in the caption text).		Editorial	
111	FFRG	s33: personal	Figure 2 page 4	do the Bool Lagoon flocking or breeding buffers extend at all into Victoria as it is quite close to the border.		Editorial	
112	FFRG	s33: personal	Table 1 Evidence requirements	Re the provision of evidence that a wetland fits the criteria *In the meantime, hydrological assessment would be required to satisfy the evidence requirements*	Are the proponents responsible for providing that evidence and is there a standard method for determining if it had water for 4 months any year over the last 10? Just thinking about what DELWPs answer would be if there was a dispute about the validity of evidence and how it was determined	Editorial	

113	**FFRG**	s33: personal	Step 3 page 15	I understand that other infrastructure like transmission lines cannot be within the buffer areas but is there any further guidance as to their locations? For example, the two buffers in step 3 – if they happened to be 2.5km apart and therefore not subject to the next step of concave hull would it be ok if they ran a large transmission line between them? Seems like the disturbance and collision risk of transmission lines is understated (see example picture below)		Editorial	
113	**PLANNING**	s33: personal	How do I manage incorrectly mapped wetlands?	Is there a process for feeding that back into the data record when errors are identified?		No change to standards; response provided.	There will be an internal process for providing this information to the Water Group as required. This process will be developed as part of the implementation plan for the standards.

Brolga Technical Reference Group

Terms of Reference

The Department of Environment, Land, Water and Planning (DELWP) is reviewing and finalising the - '*Interim Guidelines for the Assessment, Avoidance and Offsetting of Potential Wind Farm Impact on the Victorian Brolga Population*' (the Guidelines). There is a need to update the Guidelines based on the findings of a recently published PhD thesis on Brolga ecology.

The review will be managed by DELWP, with technical advice obtained from a Brolga Technical Reference Group (TRG). The revised Guidelines will be published by DELWP.

Purpose, role and time commitment of the TRG

The purpose of the TRG is to provide technical advice to DELWP as part of the review and finalisation of the Guidelines. The TRG will not have a decision-making role, it will be asked to provide technical advice to specific questions defined by DELWP.

The TRG is expected to operate for a maximum of four months, including three meetings and email communication between meetings. Each meeting will take the form of a chaired workshop and be approximately four to six hours. The meetings are anticipated to occur in June and July 2019.

Chairperson
DELWP will appoint a Chairperson for the term of the TRG. The Chairperson will be responsible for:

- Facilitating TRG workshops in accordance with these terms of reference;
- Ensuring TRG members are equal participants in discussion and assessment;
- Enabling discussion and supporting the panel to come to agreement on the advice to be provided to DELWP.

DELWP will provide secretariat support, including convening TRG workshops, circulating agendas and minutes, preparing and distributing supporting material and other administrative tasks.

Members
The TRG will include members with expertise in Brolga ecology and biology, wind farm impacts, collision risk modelling and Population Viability Analysis. TRG members will be responsible for:

- Adhering to these terms of reference;
- Providing objective advice to DELWP;
- Reviewing supporting material within the designated timeframes;
- Attending workshops in person
- Contributing in a professional and respectful manner.

DELWP reserves the right to invite other members to join the TRG if required to ensure diverse representation and adequate skill sets are maintained.

The TRG members will include:

The following DELWP staff will be observers and will provide secretariat support to the TRG:

s33: personal

Confidentiality

TRG members who are not public-sector employees will be required to sign a Deed of Confidentiality. Discussions and communications between members of the TRG, such as agendas, minutes, briefing material etc. are strictly confidential. Confidential material may only be used by TRG members for and in connection with the authorised TRG activities.

Conflict of interest

If a member of the TRG has a direct or indirect pecuniary interest in a matter being considered or about to be considered at a TRG workshop, and this interest appears to raise a conflict with the proper performance of the member's duties in relation to the consideration of the matter, the member must, as soon as possible, disclose the nature of the interest with the Chair.

Financial Reimbursement

TRG members external to DELWP are eligible to be reimbursed for reasonable travel and accommodation expenses as required, in accordance with DELWP's Expense Reimbursement Policy. Endorsement from DELWP must be attained prior to expenditure and all expense claims must be supported with valid receipts and/or invoices.

Manner of Consultation

Conduct of Meetings
Agendas and other related documents will be distributed to TRG members at least one week in advance of workshops. Minutes will be supplied for review and approval within one week of proceedings. The minutes will include the following:

- A statement of the status and purpose of the meeting
- Attendance list
- Declarations of any conflicts of interest;
- A record of all recommendations made by the TRG; and
- An action log (if required/applicable).

Communication
The Chair will have sole responsibility for reporting the advice of the TRG to the DELWP secretariat. The Deed of Confidentiality signed by non-public sector TRG members will prohibit the disclosure of all confidential information to external parties.