Avifauna Impact Management Plan for Onderstepoort 1 Solar Facility

Rustenburg Local Municipality, North West Province, South Africa

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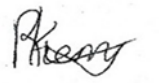
Reviewer	Dr Ryno Kemp (SACNASP 117462/17)	
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, Amended. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.	

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1 Introduction

The Biodiversity Company was commissioned to develop an Avifauna Management Plan in compliance with the requirements of the Environmental Authorisation (EA), as outlined in the Environmental Impact Assessment Regulations (No. R. 982–985, issued by the Department of Environmental Affairs on 4 December 2014). This plan specifically addresses the Onderstepoort 1 Solar Facility, as identified in the Avifauna Impact Assessment Report (TBC, 2023), and aligns with the National Environmental Management Act (Act No. 107 of 1998).

The following parameters were outlined for inclusion in the avifauna management plan. These parameters informed the structure of the management plan.

- The avifauna management plan is required to have two components:
    - Avifauna fatality monitoring; and
    - Monitoring of priority bird species as per Birdlife South Africa guidelines.
- The plan should provide an approach that replicates the data collected during the initial avifauna surveys, detail regarding the frequency and duration of fatality monitoring, a reporting structure, and a feedback mechanism (with critical thresholds) for implementing management if fatalities are not decreasing; and
- Fatality monitoring can be undertaken by the developer with quarterly audits by the avifauna specialist.

The provided final layout of the Onderstepoort 1 Solar Facility is presented below (Figure 1-1). This is the relevant area for the avifauna management plan.

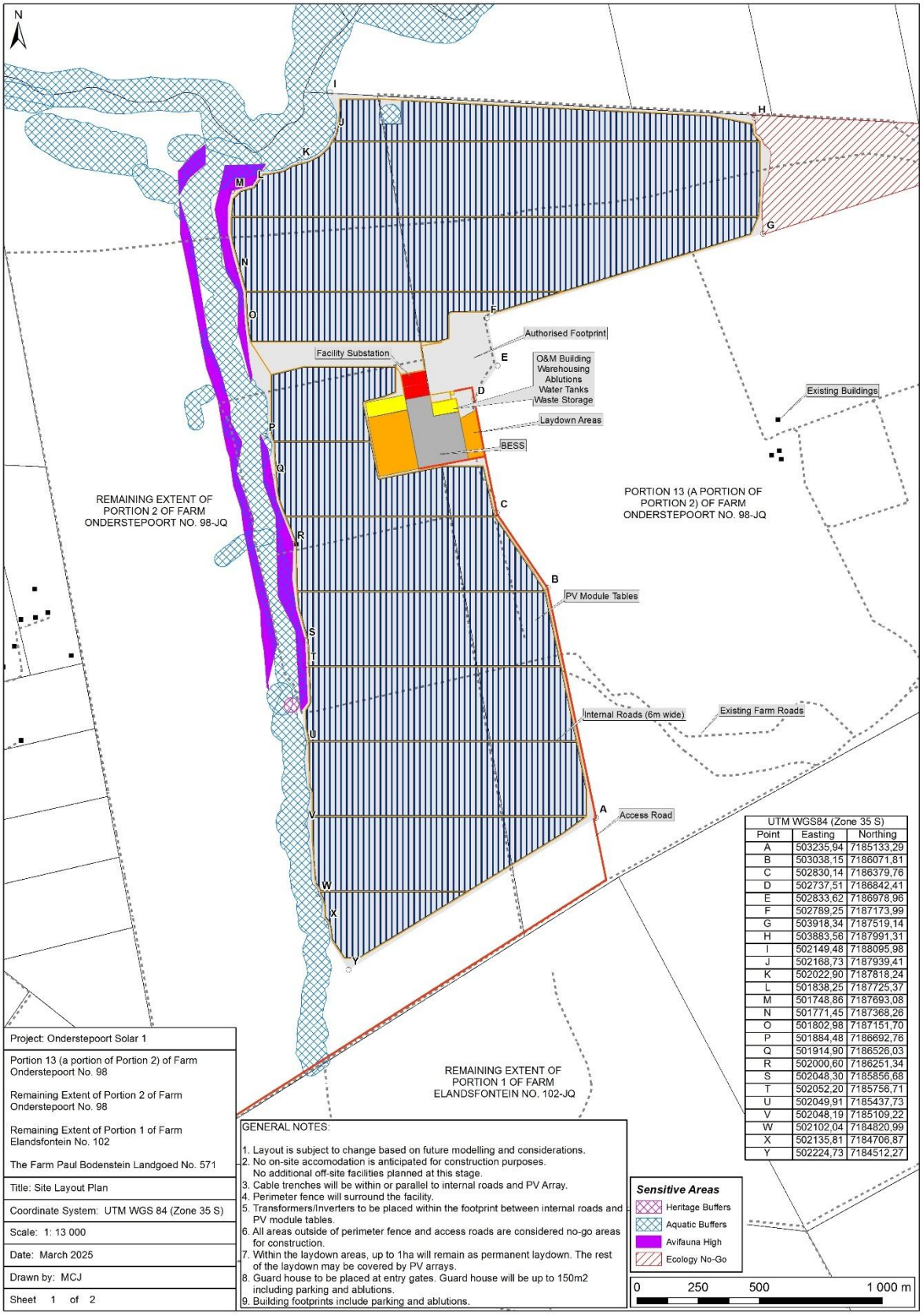


Figure 1-1 The final layout of Onderstepoort Solar 1.

2 Avifauna Monitoring

The monitoring below considers two core elements of managing the impacts on avifauna: direct mortality to avifauna caused by the development and indirect effects of the development on the local avifauna due to habitat loss and disturbance. These two elements are discussed in separate sections below but must be considered part of one integrated and interlinked plan.

The approach presented in this plan is primarily informed by the Best Practice Guidelines for Birds and Solar Energy presented by Birdlife South Africa (2017) together with specific considerations from the original avifauna impact assessment for this project (TBC, 2023).

2.1 Avifauna Fatality Monitoring

Solar developments may cause avifauna mortality primarily due to collision with infrastructure and electrocution from live components. To monitor the scale of this impact on the local avifauna, post-construction monitoring is required.

2.1.1 Post-construction bird fatality monitoring

The aims of the post-construction monitoring are to:

- Estimate the number and rate of fatalities;
- Describe the species composition, age and sex of fatalities;
- Document the circumstances surrounding fatalities to understand why they occurred and possible mitigations;
- Mitigate impacts by informing final operational planning and on-going management; and
- Inform future management decisions regarding the siting and operation of solar facilities in South Africa.

To achieve these aims, data need to be collected and reported on. These data can then be used to provide feedback on whether the current operation of the facility is effectively mitigating impacts and assess whether additional management actions are required.

2.1.1.1 Data collection

Data on the number and identity of casualties, as well as the effectiveness of the searching, need to be collected. These data then need to be analysed to estimate the fatality rate. These data may be collected by the developer and audited by an independent avifaunal specialist.

2.1.1.1.1 Carcass searches

Regular systematic searches for carcasses must be conducted. Initially they must be done every two weeks. The search frequency may change depending on findings from the scavenging and detection rate data. An observer must walk the entire perimeter of the fencing and actively search for any bird carcasses. The area covered by solar hardware must be divided into four equal sections (e.g. two sections in the north array and two sections in the south array) (Figure 2-1). Each time, one section must be thoroughly searched for bird carcasses, checking under, around and on each solar element. The visibility underneath the elements, depending on the ground cover, must be scored on a consistent scale. Feather sprays, blood spatter or imprints of birds on the surface of the panels must also be documented.

Each time a carcass is located, or evidence of a bird fatality is observed, the data listed in Table 2-1 must be collected. The frequency of the assessment can be reduced to monthly searches once the first quarterly assessment has been completed. The monthly searches must be done for the first year, after which the frequency can be adjusted by the avifauna specialist based on the outcomes of the first years results.

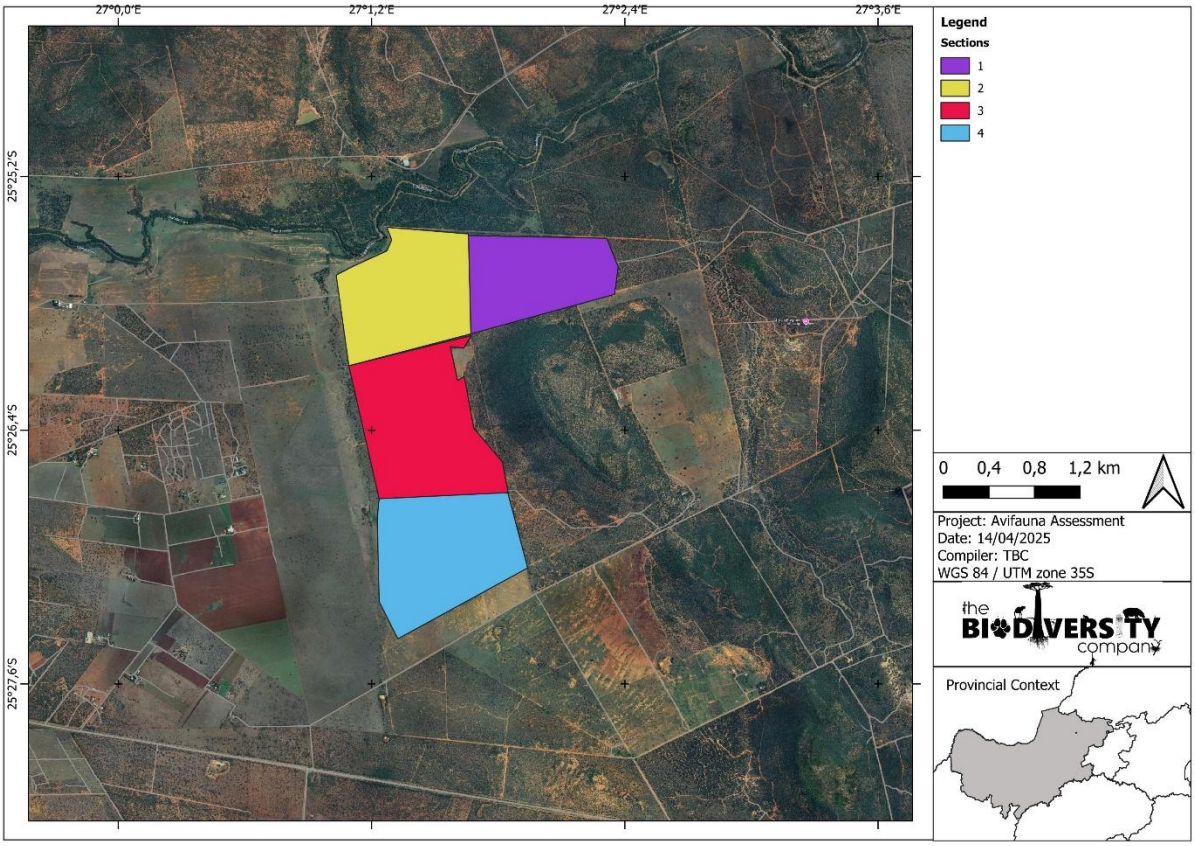


Figure 2-1 Sections that must be assessed

Table 2-1 Information to be recorded for the carcass search

Observer name	Project name	Date	Time	Species (or lowest possible taxonomic level)	Age class (where possible)	Sex (where possible)	GPS location	Condition of remains	Nearest solar array/hardware	Distance to nearest solar array/hardware by number	Habitat type/mix of habitats	Photographs of the site the evidence was located

GPS tracks of the observers' movements during the search are also required to assess the search effort.

After the data is collected, carcasses must be collected, bagged and carefully labelled on the inside and outside. The carcasses must be stored in a freezer. Depending on the outcome of the monitoring, the carcasses can be handed over to relevant authority for appropriate disposal such as SPCA or sent to a research institution for analyses. The avifauna specialist is to advise on the approach.

Staff at the facility should be trained to detect and report bird fatalities through a formalised system such as an app or online form. These carcasses must be kept in place to prevent affecting the results of the formal carcasses searches. All fatality data must be sent to Birdlife South Africa, SANBI and the Department of Forestry, Fisheries and the Environment.

2.2 Avifauna Composition Monitoring

Post-construction monitoring of the effects of solar development on the avifauna assesses the changes in habitat availability, avifauna abundance and species composition, movements of priority species and breeding success of priority species. Priority species were defined in the original avifauna impact assessment (TBC, 2023) as species that are listed in Ralston-Paton et al. (2017) and those listed in the Eskom Poster of Birds and Powerlines (Eskom & EWT, no date). The table of priority species recorded in the avifauna impact assessment report is presented below (Table 2-2).

Table 2-2 Priority species identified in TBC 2023

Scientific Name	Common Name	Collisions	Electrocutions	Habitat Loss
Accipiter minullus	Little Sparrowhawk	X		
Afrotis afraoides	Northern Black Korhaan	X	X	
Alopochen aegyptiaca	Egyptian Goose	X	X	
Ardea melanocephala	Black-headed Heron	X	X	
Bubulcus ibis	Western Cattle Egret	X		
Circaetus pectoralis	Black-chested Snake Eagle	X	X	
Elanus caeruleus	Black-winged Kite	X		
Falco amurensis	Amur Falcon	X		
Falco naumanni	Lesser Kestrel	X		
Hieraaetus wahlbergi	Wahlberg's Eagle	X	X	
Lophotis ruficrista	Red-crested Korhaan	X	X	
Melierax canorus	Pale Chanting Goshawk	X		
Micronisus gabar	Gabar Goshawk	X		
Sagittarius serpentarius	Secretarybird			X
Tachybaptus ruficollis	Little Grebe	X		

The above list is not an exhaustive list of the priority species that are expected to occur on the site. The list of priority species may be revised by the avifauna specialist conducting the monitoring. TBC (2023) identified species of conservation concern (SCC) identified as globally red-listed by IUCN (2021) or locally red-listed by Taylor et al. (2015) that are expected to occur near the site. These SCCs should be considered priority species if recorded on the site. Any updates on red list species status regionally and globally should be upheld and will overrule these statuses. The expected SCC for the site is presented in Table 2-3.

Table 2-3 Threatened avifauna species that are expected to occur within the project area. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable (TBC, 2023).

Scientific Name	Common Name	Red List Regional	Red List Global	Likelihood of Occurrence
Alcedo semitorquata	Half-collared kingfisher	NT	LC	Low
Aquila rapax	Tawny Eagle	EN	VU	Moderate
Aquila verreauxii	Verreaux's Eagle	VU	LC	Moderate
Ardeotis kori	Kori Bustard	EN	NT	High
Calidris ferruginea	Curlew Sandpiper	LC	NT	Low
Ciconia abdimii	Abdim's Stork	NT	LC	Moderate
Ciconia nigra	Black Stork	VU	LC	Low
Circus macrourus	Pallid Harrier	NT	NT	Moderate
Circus ranivorus	African Marsh Harrier	EN	LC	Moderate
Coracias garrulus	European Roller	NT	LC	High
Falco biarmicus	Lanner Falcon	VU	LC	High
Glareola nordmanni	Black-winged Pratincole	NT	NT	Moderate
Anthropoides paradisea	Blue Crane	NT	VU	High
Gyps africanus	White-backed Vulture	CR	CR	Moderate
Gyps coprotheres	Cape Vulture	EN	VU	Moderate
Hydroprogne caspia	Caspian Tern	VU	LC	Moderate
Leptoptilos crumenifer	Marabou Stork	NT	LC	Low
Mycteria ibis	Yellow-billed Stork	EN	LC	Low
Pelecanus rufescens	Pink-backed Pelican	VU	LC	Low
Phoeniconaias minor	Lesser Flamingo	NT	NT	Moderate
Phoenicopterus roseus	Greater Flamingo	NT	LC	Moderate
Podica senegalensis	African Finfoot	VU	LC	Low
Polemaetus bellicosus	Martial Eagle	EN	EN	High
Pterocles gutturalis	Yellow-throated Sandgrouse	NT	LC	High
Rostratula benghalensis	Greater Painted Snipe	NT	LC	Low
Sagittarius serpentarius	Secretarybird	VU	EN	High
Terathopius ecaudatus	Bateleur	EN	EN	Moderate
Torgos tracheliotos	Lappet-faced Vulture	EN	EN	Low
Tyto capensis	African Grass Owl	VU	LC	High

2.2.1 Habitat Monitoring

Once a year between November and January (after sufficient rain has fallen), the habitats present on site and the immediate surroundings (undeveloped sections of the farm portions containing the project) should be described and delineated. Points across the assessment area that cover the range of habitats must be identified and photographs must be taken at each point. The form of habitat assessment must take a form that mirrors the habitat assessment in the avifauna impact assessment (TBC, 2023). This

can take place alongside the bird abundance and movement monitoring data collection described in Section 2.2.2.

2.2.2 Bird Abundance and Movement Monitoring

Protocols for data collection of bird abundance and movement must mirror those conducted in the avifauna impact assessment (TBC, 2023). Data collection must take place quarterly over a period of four days and start immediately after construction to obtain a baseline to which the subsequent monitoring data can be compared. This must be performed for two years after construction.

Point counts must be conducted for four hours after sunrise and before sunset and this must be supplemented by incidental searches for birds to ensure as many species as possible present are identified. Point counts should be far enough apart to ensure that the data collected from two separate point counts are independent (a minimum of 150 m apart), and close enough to adequately cover the site. Point counts should run over a 10-minute period in which the following data need to be collected (Table 2-4):

Table 2-4 Bird abundance and movement monitoring

Date	Start Time	End Time	Habitat	Number of each Species	Detection method (seen or heard)	Behaviour (Perching or Flying	General notes on habitat and nesting suitability for SCC

From these data, the relative abundance of species, frequency of detection and community composition can be compared over the monitoring period to assess changes in the abundance and composition of avifauna at the site.

2.3 Reporting

The reporting on the data collected as part of the monitoring must be done by an independent and suitably qualified avifauna specialist. Quarterly interim reports must be compiled. A detailed annual report must also be submitted at the end of each year to each of the relevant stakeholders, including Birdlife South Africa, Endangered Wildlife Trust (EWT), South African National Biodiversity Institute (SANBI), Department of Forestry, Fisheries and the Environment. The minimum requirement of the report is to answer the following questions:

- Has the habitat available to birds in and around the facility changed?
- Has the number of birds and species composition changed?
- Have the distributions and movements of priority species changed?

- If yes to any of the above, what is the nature of the observed changed?
- What are the annual raw and corrected mortality rates and total number of bird fatalities at the facility (reported per MW and per ha).
- What was the species composition, and if possible, the age and sex of fatalities?
- What proportion of fatalities is likely to have been due to interaction with the solar energy hardware and fences, and what other mortality factors are implicated?
- Are there any factors that may contribute to these fatalities?
- What is the likely demographic and ecological significance of any observed changes?
- What are the likely impacts on populations (locally and more widely)?
- Is additional monitoring and mitigation necessary?
- Were additional mitigation measures implemented based on monitoring results and were they effective?

The findings and recommendations of the reports should be included in an updated Environmental Management Programme that may be revised every 5 years.

2.4 Feedback Mechanisms and Thresholds

The findings of the monitoring are only useful if they provide feedback to the operations of the facility to better mitigate the impacts on birds. However, certain mechanisms need to be put in place to ensure that this happens. These mechanisms rely on predetermined thresholds for what may be considered a significant impact on the local avifauna that requires further mitigation. Table 2-5 are some recommended thresholds for the consideration of further mitigation from the findings of the avifauna composition and fatality data. The threshold for the species composition change must be determined by the avifauna specialist after the first quarterly assessment.

Table 2-5 Threshold for fatalities recorded before further mitigation considered

Species	Fatalities recorded per year before further mitigation considered
SCC	1
Other priority species	30
Other species	100

3 Avifauna Management

The monitoring information above should be used to inform the management of the avifauna. It is expected that the development will alter the species composition in the area. However, to assist in decreasing the impact the following management recommendations are provided.

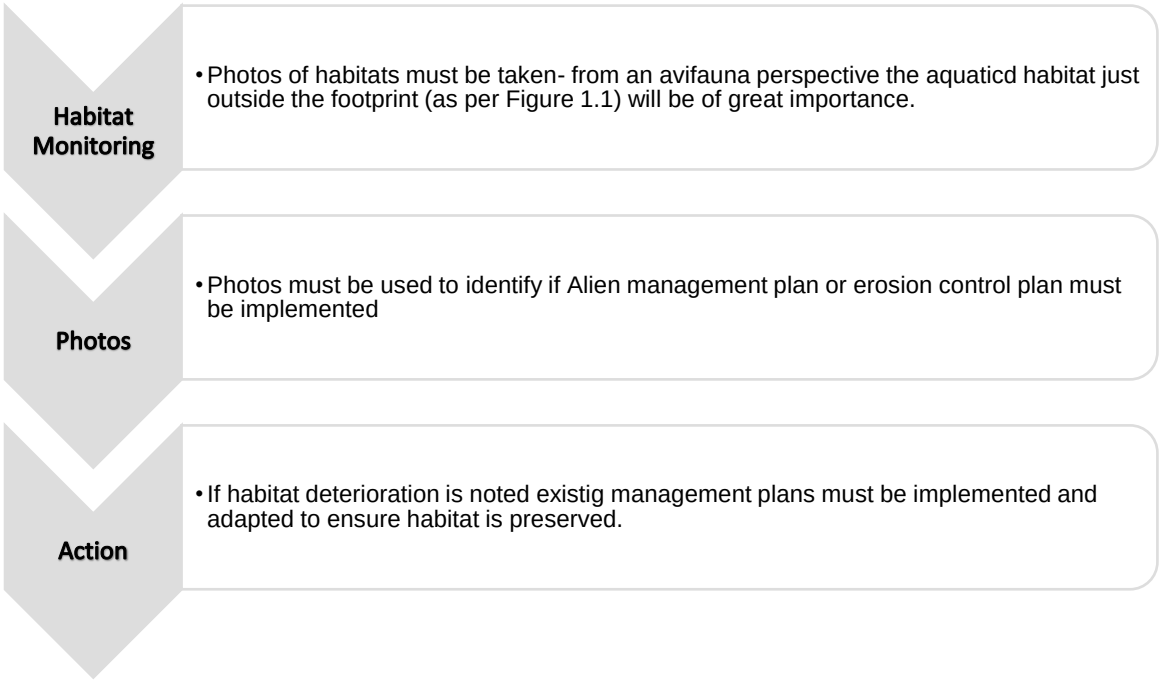
Fatalities: Carcass searches

Carcass Manangement	• Impact Trigger: Colissions of avifauna species • Fatalisty searches as described above must de done • If the thresholds mentioned in Table 2.5 and Table 2.6 is met and identified in the quaterly audits the following steps must be taken.
Threshold met	• An avifauna specialist must be consulted on how to proceed and what additional mitigations can be implemented to reduce the amount of fatalities.
Reporting	• A report must be provided to Birdlife and the DFFE, this report must include the recommendation from the avifauna specialist and the changes that has been made on site to improve the situation

Avifauna composition monitoring

Avifauna monitoring	• Compare the data to the existing baseline data
Recording	• If any additional SCC are recorded, determine if they are foraging/ nesting
Way forward	• If found nesting an avifauna specialist must be contacted on the way forward. • If just found on site and no collission or risk observed. Just note in the monitoring report to be shared with relevant stakeholders- no further action required.

Habitat Monitoring



4 Conclusions

Adherence to the recommendations presented in this management plan will allow the actual impacts of the facility on the local avifauna community to be assessed and provide a feedback mechanism to mitigate against excessive impacts. All management actions outlined in TBC (2023) remain relevant and must also be adhered to, alongside the monitoring protocols outlined in this management plan.

5 References

Birdlife South Africa (2017). Best Practice Guidelines for Birds and Solar Energy. Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.

Taylor MR, Peacock F, Wanless RW (eds) (2015). The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa. Johannesburg, South Africa.

TBC (2023). Avifauna Impact Assessment for the proposed Rustenburg Onderstepoort 1 Solar Facility.