



Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

Environmental Management Programme (EMPr) Amendment: Addendum Report

Karreebosch Wind Farm (RF) (Pty) Ltd

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Acronyms and Abbreviations

BLSA	Birdlife South Africa (BLSA)
BBU	<u>Birds and Bats Unlimited</u>
CAA	Civil Aviation Authority
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IAIAsa	International Association for Impact Assessment South Africa
I&APs	Interested and Affected Parties
Karreebosch	Karreebosch Wind Farm (Pty) Ltd
NEMA	National Environmental Management Act (Act 107 of 1998),
OHPL	Overhead Powerline
REDZ	Renewable Energy Development Zone
SACNASP	South African Council for Natural and Scientific Professions
SAWEA	South African Wind Energy Association
SIA	Social Impact Assessment
SLR	SLR Consulting (South Africa) Pty Ltd
VE	Verreux's Eagles
VIA	Visual Impact Assessment
WEF	Wind Energy Facility
WSP	WSP Group Africa Proprietary Limited



1.0 Introduction

SLR Consulting (South Africa) Pty Ltd (SLR) has been appointed by Karreebosch Wind Farm RF (Pty) Ltd (Karreebosch), hereafter referred to as the Applicant, as the independent Environmental Assessment Practitioner (EAP), to facilitate an application for an amendment of the Karreebosch Wind Energy Facility's (WEFs) approved Environmental Management Programme (EMPr), in terms of the National Environmental Management Act (NEMA, Act 107 of 1998).

The existing approved EMPr (DFFE REF: 14/12/16/3/3/1/807/AM6) was prepared by WSP Group Africa Proprietary Limited (WSP) (refer to Appendix A) and the EMPr contains management outcomes (objectives) and management actions relevant to the Karreebosch WEF. Since the approved EMPr was prepared by another EAP, SLR in agreement with the Competent Authority, the Department of Forestry, Fisheries and the Environment (DFFE) have not edited the original document but instead proposed an EMPr Amendment Report as an addendum to the approved EMPr (i.e., this report). If approved, this addendum report will still be binding to Karreebosch as the applicant.

1.1 Project Location

Karreebosch WEF is located approximately 40km north of Matjiesfontein, and approximately 40 km south of Sutherland in the Northern and Western Cape Provinces, South Africa. The Karreebosch WEF is also located within the Karoo Hoogland and Laingsburg Local Municipalities (Figure 1). The project is also situated within the Komsberg Renewable Energy Development Zone (REDZ) promulgated in GNR 114 of 2018.

The Karreebosch WEF is located on the following properties:

- Farm Roode Wal No. 187
- Farm Appels Fontein No. 201
- Portion 1 of Farm Ek Kraal No. 199
- Portion 2 (Nuwe Kraal) of Farm Ek Kraal No. 199
- Portion 1 of Farm Klipbanks Fontein No. 198
- Remainder of Farm Klipbanks Fontein No. 198
- Remainder of Farm Wilgebosch Rivier No. 188
- Farm Rietfontein No. 197
- Remainder of Farm Karreebosch No. 200
- Portion 1 of Farm Karreebosch No. 200
- Farm Oude Huis No. 195
- Portion 1 of Farm Karree Kloof No. 196
- Remainder of Farm Brandvalley No. 75.





1.2 Project Background

Karreebosch received Environmental Authorisation (EA) for the WEF in 2016 (DFFE REF: 14/12/16/3/3/1/807) and subsequent amendments to its original EA, which included increased hub height, rotor diameter, and blade length. The EA has been extended to remain valid to 2026 (DFFE REFs: 14/12/16/3/3/2/807/AM1, 14/12/16/3/3/2/807/AM2, 14/12/16/3/3/2/807/AM3, 14/12/16/3/3/2/807/AM4, 14/12/16/3/3/2/807/AM5, 14/12/16/3/3/2/807/AM6).

The final layout and EMPr were approved by DFFE on the 7th of December 2022 (DFFE REF: 14/12/16/3/3/1/807/AM6) which included up to 40 turbines, with a hub height of up to 140m, a rotor diameter of up to 170m and a blade length of up to 85m. Additionally, approvals have been obtained for the associated 132V overhead powerline (OHPL) and onsite 33/132kV substation (DFFE REF: 14/12/16/3/3/2/2608/1/MP1).

The Karreebosch WEF is surrounded by several operational WEFs, including Roggeveld, Soetwater, Karusa, and Perdekraal, each with a capacity of approximately 140MW. The Oya Hybrid Facility is under construction and set to be completed by the end of 2025.

Four more projects with capacities ranging from 140MW to 180MW have been awarded preferred bidder status and are expected to commence construction within the next 12 months. Two additional private off-takers, Kudusberg and Rondekop WEFs, plan to start construction in the next 24 months. Furthermore, there are nine additional projects in the vicinity with either bids in progress or approved EAs.

In summary, Karreebosch WEF is part of a growing network of wind energy projects in the region, contributing to South Africa's renewable energy capacity.

1.3 Proposed Blade Painting for Karreebosch WEF

Karreebosch is considering a new mitigation measure involving the patterned blade painting of turbines within a 5.2km buffer zone around Verreaux's Eagles (VE) nests on-site. This measure was recommended by the Avifaunal Specialist, Dr. Rob Simmons. Karreebosch seeks to collaborate with Dr. Rob Simmons to conduct research on the effectiveness of blade painting in reducing avian fatalities at wind farms. The research proposal suggests a randomised and stratified approach, where 50% of turbines within the VE buffer and 50% from the rest of the site would be painted, ensuring a precise and comparable study.

Since it's uncertain which of the authorised 40 turbine positions will be constructed, the specialists have assessed all 40 turbines (100%) as candidates for patterned blade painting, allowing flexibility for the research's statistical requirements. The proposed blade painting pattern involves two broad stripes on alternate blades, creating a maximum flicker effect using signal red or a colour approved by the Civil Aviation Authority (CAA).

Based on current research regarding the effectiveness of patterned blade painting (McIsaac 2001, May et al. 2020, Martin and Banks 2023), the Avifaunal specialist concludes that *"the revised patterning be included in the Karreebosch EMPr for use as a mitigation measure for reducing bird collisions. In addition, it will contribute greatly to on-going research on the effectiveness of patterned blade painting as a mitigation measure for reducing avian fatalities on wind farms in South Africa"*. Refer to the Avian Specialist Comment Letter in Appendix B.

A Visual Assessment was previously undertaken as part of the original EIA and associated amendments but since the visual assessment did not include the assessment of potential impacts of pattern painted blades, the applicant wishes to amend the approved EMPr to include the visual findings associated with the proposed patterned blade painting. Due to the nature of visual impacts, the amendments also required input from both social and cultural heritage specialists.



No other design or layout changes are proposed, and no additional environmental impacts are expected from the blade painting. A summary of the specialist input is included in Section 4 below.

2.0 Legal Framework

This EMPr Amendment has been prepared in compliance with Regulation 37 of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), the contents of which are outlined in Table 1 below.

Table 1: Requirements of an EMPr Amendment in terms of Regulation 37 of the EIA Regulations, 2014 (as amended)

ITEM	CONTENT OF EMPR	COMPLETED (Y) OR NOT APPLICABLE (n/a)	DESCRIPTION OF COMPLIANCE
Regulation 37: Amendment of environmental management programme or closure plan on application by holder of environmental authorisation			
(2)	<i>The holder of the environmental authorisation must invite comments on the proposed amendments to the impact management outcomes of the EMPr or amendments to the closure objectives of the closure plan in the case of a closure activity from potentially interested and affected parties, including the competent authority, by using any of the methods.</i>	Y	<u>The EMPr Amendment Addendum Report was made available for a 30-day public review period from 14th November 2023 to 14 December 2023.</u> Refer to Public Participation Process in Section 6.
(3)	<i>Reasonable alternative methods, as agreed to by the competent authority, to invite comments as contemplated in subregulation (2), may be used in those instances where a person desires but is unable to participate in the process due to-</i> (a) illiteracy; (b) disability; or (c) any other disadvantage.;	Y	Refer to Section 6 and Appendix G for details pertaining to the public participation process. Newspaper and Site Notices <u>were</u> placed in English and Afrikaans. Copies of the Media Advert <u>and proof of placement</u> are provided in Appendix G3. A copy of the Site Notices and proof of placement is included in Appendix G4.
(4)	<i>The invitation to comment as contemplated in subregulation (2) must include an indication that any comments to the proposed amendments must be submitted to the holder of the environmental authorisation within 30 days of such invitation to comment.</i>	Y	Refer to Section 6 and Appendix G.



ITEM	CONTENT OF EMPr	COMPLETED (Y) OR NOT APPLICABLE (n/a)	DESCRIPTION OF COMPLIANCE
(5)	<i>If no comments are received, the holder of the environmental authorisation may amend the EMPr or closure plan in the case of a closure activity, in accordance with its intention contemplated in subregulation (2) and submit the amended EMPr or closure plan to the competent authority for approval within 60 days of inviting comments.</i>	Y	<u>Comments have been received and are included in Appendix G6. The EMPr Amendment Addendum Report has been updated accordingly.</u>
(6)	<i>Prior to approving an amended EMPr or closure plan contemplated in subregulation (5), the competent authority may request such amendments to the EMPr or closure plan as it deems appropriate to ensure that the EMPr sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity or to ensure that the closure plan sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the closure of the facility.</i>	Y	DFFE have agreed that the process to follow is an amendment to the EMPr in terms of Regulation 37 (Refer attached minutes of pre-application meeting in Appendix G1). Additional comments and or amendments <u>have been</u> addressed in this report based on I&AP and authority comments <u>(Appendix G6)</u> .
(7)	<i>If comments are submitted to the holder of the environmental authorisation, such holder must submit such comments to the competent authority, including responses to such comments, together with the proposed amended EMPr or closure plan in the case of a closure activity.</i>	Y	A Comments and Response Report <u>has been</u> appended to this final EMPr Amendment submission <u>(Appendix G6)</u> .
(8)	<i>The competent authority must, within 30 days of receipt of the information contemplated in subregulation (7), consider such information and issue a decision to approve the amended EMPr or closure plan in the case of a closure activity or not.</i>	<i>To be undertaken post submission of the final report.</i>	To be determined.



ITEM	CONTENT OF EMPr	COMPLETED (Y) OR NOT APPLICABLE (n/a)	DESCRIPTION OF COMPLIANCE
(9)	After the competent authority has reached a decision in terms of subregulation (5) or (8), the competent authority must, within 5 days- (a) provide the holder of the environmental authorisation with its decision, including the amended EMPr or closure plan in the case of a closure activity, if the decision was to approve the amended EMPr or closure plan, as well as reasons for the decision; (b) draw the attention of the holder of the environmental authorisation to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations, if such appeal is available in the circumstances of the decision; and (c) instruct the holder of the environmental authorisation to, within 14 days of the date of the decision, inform the parties who submitted comments of the decision, to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations, if such appeal is available in the circumstances of the decision.	To be undertaken.	To be undertaken <u>once a decision is provided.</u>

3.0 Details of the Environmental Assessment Practitioner (EAP) and Project Team

The details and level of expertise of the persons who prepared the EMPr Amendment and associated Addendum Report are provided in Table 2 below.

SLR has no interest in the proposed project other than fair payment for consulting services rendered as part of the environmental assessment process.

Table 2: SLR Project Team

Name of representative	Educational Qualifications	Professional Affiliations	Experience (years)
Stuart Heather-Clark (Registered EAP)	B.Sc. (Hons) Civil Engineering M.Sc. Environmental Management	IAIAsa ¹ EAPASA ²	25
Liandra Scott-Shaw	B.Sc. Biological Sciences	IAIAsa ¹ EAPASA ²	10

¹ International Association for Impact Assessment South Africa

² Environmental Assessment Practitioners Association of South Africa



Name of representative	Educational Qualifications	Professional Affiliations	Experience (years)
	B.Sc. Honours degree in Ecological Sciences	SACNASP ³	
Katherine Wiles	B.Sc. Geography B.Sc. Honours degree in Geography and Environmental Management	IAIAsa ¹ SACNASP ³	14

CVs of personnel are attached in **Appendix F**.

4.0 Specialist input

The following specialist studies/statements were undertaken to assess the proposed impact associated with the patterned blade painting:

- Avifauna;
- Visual;
- Social; and
- Heritage.

4.1 Avifauna

During the Avifaunal Specialist assessment for the 2022 Part 2 EA Amendment, Final Layout and EMPr approval process, a new mitigation measure was introduced by the Avifaunal specialist involving the patterned painting of turbine blades within a 5.2-km radius of the confirmed Verreaux's Eagle (VE) nest. The proposed pattern aims to reduce avian collisions by enhancing visibility.

After approval of the EMPr, the Applicant collaborated with the Avifaunal Specialist to explore the opportunity to contribute to research evaluating by the effectiveness of patterned blade painting. A revised pattern was suggested (i.e. two alternate bands on two of the blades, see Figure 2 below, in "Signal Red") as a method to mitigate avian fatalities at wind farms (subject to Civil Aviation Authority (CAA) approval). This approach has subsequently been endorsed by the South African Wind Energy Association (SAWEA) and Birdlife South Africa (BLSA) as a promising mitigation at a fraction of the cost of other mitigation measures to reduce avian impacts (see www.sawea.org.za/research-studies).

The Avifaunal Specialist has proposed a randomized and stratified approach to select 50% of the turbines within the 5.2km VE buffer and an additional 50% from the remaining turbines across the site for blade patterning. At present, the exact locations of the approved 40 turbines are unknown, with the expectation that the actual number constructed will be less than 40. The specialists have assessed all 40 (100%) turbines as candidates for painting, allowing flexibility for the research's statistical requirements.

Furthermore, the initial visual assessment did not account for the possible consequences of painted blades. As a result, Karreebosch plans to enhance the assessment to consider the visual impacts associated with the proposed blade painting as well as obtaining input from Social and Cultural Heritage specialists.

The avifaunal specialist has prepared a specialist comment letter regarding the above and this is included in Appendix B as well as a SAWEA briefing note.

³ South African Council for Natural and Scientific Professions





Figure 2: Proposed patterned blade painting for combining increased visibility with research purposes.

4.2 Visual

A Visual Impact Assessment (VIA) was conducted to assess the visual impacts associated with the proposed patterned blade painting. The study area has sparse human habitation, mountainous terrain, and natural vegetation. However, the area has already experienced changes in visual character due to the operation of nearby wind farms.

The VIA found a low visual sensitivity of the area, primarily due to the absence of visual receptors valuing the landscape. Although some potentially sensitive visual receptors were identified within 5km of the wind turbines, only one of them was excluded from further assessment. Local sentiments toward the proposed development are still being ascertained, but some landowners have expressed positive feelings about patterned blade painting as it is associated with bird conservation.

The R354 Arterial Road, considered a "receptor road," is expected to experience varying levels of visual impact on road users due to the proposed wind farm, depending on the visibility of the patterned painted blades from different road sections.

The original VIA for the Karreebosch WEF found that visual impacts with standard white turbine blades were of HIGH significance. The new VIA revealed that the introduction of patterned painted blades maintained a HIGH significance rating during the operational phase, with limited mitigation measures available.

Given the proximity of operating wind farms and the concentration of renewable energy facilities in the area (Komsberg REDZ), the cumulative impacts were rated as HIGH during the operational phase.

A comparative assessment indicated that patterned painted blades would be more visible but did not necessarily increase the level of visual impact. Therefore, the patterned painting of blades will not change the previously determined significance rating. From a visual perspective, 50% of turbines with painted blades is not expected to be significantly less impactful than 100% of turbines with painted blades.

The VIA is included in Appendix C of this report.



4.3 Social

The 2015 Social Impact Assessment (SIA) findings remain valid. These findings stated that the development of the Karreebosch WEF would provide employment and business opportunities for the local community during both the construction and operational phases, with benefits accruing from the establishment of a Community Trust. The proposed development is considered a positive investment in clean, renewable energy infrastructure, with most potential negative impacts being effectively mitigated. It was recommended that the Karreebosch WEF be supported, subject to the implementation of recommended mitigation measures.

A review of the 2023 VIA findings related to the proposed blade painting to reduce avian fatalities within a 5.2km buffer of Verreaux's Eagles nests indicates that this change does not affect the 2015 SIA findings, or the Social Statement prepared as part of the 2022 Part 2 amendment. The SIA findings and associated enhancement and mitigation measures from 2015 remain valid.

The SIA letter is included in Appendix D of this report.

4.4 Heritage/ Cultural Landscape

The potential impacts of blade painting as a mitigation are primarily related to the potential impact on cultural landscape and scenic routes. The cumulative impact assessment for heritage resources focuses on the potential impact on archaeological and palaeontological resources, which are assessed on a case-by-case basis. The main concern is the cultural landscape. The Karoo Cultural Landscape consists of various elements, including open spaces, shrubs, historical farm structures, and more, all of which contribute to the cultural landscape. Modern interventions like renewable energy developments are expected in REDZ, and their impact on the cultural landscape is a primary concern. The proposed blade painting is unlikely to increase the negative cumulative impact on the cultural landscape.

The specialist concludes that the proposed amendments, specifically the blade painting, do not impact known heritage resources and align with the recommendations in the previous Heritage Walkdown report. No deviations are required, and the impacts on heritage resources and the cultural landscape remain consistent with prior assessments.

The letter from the Cultural Landscape specialist is included in Appendix E of this report.

5.0 EMPr Amendment and proposed changes

A specific additional management outcome (objective) and management actions are required for the proposed project in addition to the approved EMPr and are presented in the tables that follow below. These additional management actions and outcome(objective) must be read in conjunction with the approved EMPr (Appendix A) for compliance and auditing purposes.

The applicant wishes to amend the EMPr to include revised blade patterning, as suggested by the Avifaunal specialist, for its contribution to ongoing research on the effectiveness of patterned blade painting, as well as for its use as a mitigation measure to reduce bird collisions, as previously included in the approved EMPr (DFFE REF:14/12/16/3/3/1/807/AM6).

The EMPr must also be amended to include the measures as recommended by the visual specialist regarding both painted and unpainted blades. The social and heritage/cultural landscape specialist had no additional requirements to the approved EMPr.



5.1 Amendment / addendum to the approved EMPr relating specifically to the Avifauna.

The table below is taken from Section 11.2.3 *OBJECTIVE 3: PROTECTION OF AVIFAUNA, PRIORITY BIRD SPECIES AND BAT SPECIES* of the approved EMPr (Appendix A). Note proposed amendments/additions to the approved EMPr are made in bold and underlined in the table below. Where text is not in bold or underlined it has been approved previously.

Mitigation: Action/control	Responsibility	Timeframe
A site monitoring programme must be implemented for surveying bird and bat movements in relation to the wind energy facility and fully documenting all collision and electrocution casualties with the turbines (refer to Appendix S).	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation
Periodically collate and analyse post-construction monitoring data for bird and bat monitoring and recommend additional mitigation measures for implementation as required.	Advising scientist/biologist	Every 3 months of monitoring period.
A 3.0-km buffer is installed around VE nest #1 based on existing Verreux's Eagle guidelines (Ralston Paton 2017) – all six turbines are thus removed from within this buffer	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation
<u>Consider research on the effectiveness of blade painting in reducing avian fatalities at wind farms. The research must consider a randomised and stratified approach, where 50% of turbines within the VE buffer and 50% from the rest of the site will be painted (two alternate bands on two of the blades), ensuring a precise and comparable study.</u> <u>Should the research opportunity not be viable at the time due to potential sensitivities of unpainted blades in high-risk flight areas, up to all 40 turbines (100%) may be included as potential candidates for patterned blade painting too</u>	Karreebosch Wind Farm (RF) (Pty) Ltd / Advising scientist/biologist	Operation
All turbines within the 5.2km Verreux's Eagle precautionary buffer are erected with <u>two alternate bands on two of the blades, in "Signal Red"</u> as a method to mitigate avian fatalities at wind farms. one blade painted with "signal red" paint in two broad stripes to increase blade visibility. This recommendation is subject to CAA approval of blades painting and colouring and the selected turbine supplier accepting the warranties of blades being painted. This must include the two turbines (T5 and T22) that lie within the 3.7 km buffer that will be recommended in the update Verreux's Eagle guidelines (Ralston Paton and Murgatroyd in press).	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation
Should one or more threatened species fatalities still occur per year (post-construction), <u>Birds and Bats Unlimited</u> (BBU) suggests an adaptive response in the form of a third tier of automated shut-down on demand (e.g., DT-bird or BioSeco) technology to reduce the risk to avifauna.	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation
A full 24-month post-construction monitoring must be undertaken and if that reveals that one or more Endangered or Vulnerable Red Data species are killed at any one turbine, then an adaptive management plan must be initiated within two months to reduce further fatalities.	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager Advising scientist/biologist	Operation

5.2 Amendment / addendum to the approved EMPr relating specifically to the Visual

The table below is taken from Section 11.2.4 *OBJECTIVE 4: MINIMISATION OF VISUAL IMPACT of the approved EMPr (Appendix A)*. Note proposed amendments/additions to the approved EMPr are bold and underlined in the table below. Where text is not in bold or underlined it has been approved previously.

Mitigation: Action/control	Responsibility	Timeframe
Maintain the general appearance of the facility in an aesthetically pleasing way.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation and maintenance
Undertake regular maintenance of light fixtures.	Karreebosch Wind Farm (RF) (Pty) Ltd	Operation and maintenance
<u>Turbine colours must adhere to CAA requirements.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>



Mitigation: Action/control	Responsibility	Timeframe
<u>Inoperative turbines must be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work).</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>If turbines need to be replaced for any reason, they must be replaced with turbines of the same model, or similar one of equal height and scale to lessen the visual impact (unless a formal amendment process is followed).</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>With the exception of compulsory civil aviation lighting, limit the amount of security and operational lighting on site as far as possible.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>Light fittings for security at night must reflect the light toward the ground and prevent light spill.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>Lighting fixtures must make use of minimum lumen or wattage.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>Mounting heights of lighting fixtures must be limited, or alternatively, foot-light or bollard level lights must be used.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>If economically and technically feasible, make use of motion detectors on security lighting.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>Buildings on the site must be painted with natural tones that fit with the surrounding environment.</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>
<u>Non-reflective surfaces must be utilised where possible</u>	<u>Karreebosch Wind Farm (RF) (Pty) Ltd</u>	<u>Operation and maintenance</u>

5.3 Amendment/ addendum: Addition of Impact Management Outcome

The following Impact Management Outcome must also be added to Section 11.2.4 of the approved EMP (attached in Appendix A).

11.2.4 Objective 4: Reduction in Bird Collisions

Impact management outcome: Reduce bird collisions with turbines.

<u>Project component/s</u>	<u>Wind energy facility (turbines)</u> <u>Substations</u>
<u>Potential Impact</u>	<u>Disturbance to or loss of birds as a result of collision with the turbine blades</u>
<u>Activity/risk source</u>	<u>Spinning turbine blades</u> <u>Substation</u> <u>Power lines</u>
<u>Mitigation: Target/Objective</u>	<u>More accurately determine the impact of the operating wind energy facility on priority bird species</u> <u>Reduce potential for bird collisions.</u> <u>Contribution to ongoing research on the effectiveness of patterned blade painting.</u> <u>Minimise impacts associated with the substation</u>

Mitigation: Action/control	Responsibility	Timeframe
<u>Consider research on the effectiveness of blade painting in reducing avian fatalities at wind farms. The research must consider a randomised and stratified approach, where 50% of turbines within the VE buffer and 50% from the rest of the site will be painted (two alternate bands on two of the blades), ensuring a precise and comparable study.</u> <u>Should the research opportunity not be viable at the time due to potential sensitivities of unpainted blades in high-risk flight areas, up to all 40 turbines (100%) may be included as potential candidates for patterned blade painting too.</u>	Karreebosch Wind Farm (RF) (Pty) Ltd / Advising scientist/biologist	Operation



Mitigation: Action/control	Responsibility	Timeframe
All turbines within the 5.2km Verreux's Eagle precautionary buffer are erected with two alternate bands on two of the blades, in "Signal Red" as a method to mitigate avian fatalities at wind farms. one blade painted with "signal red" paint in two broad stripes to increase blade visibility. This recommendation is subject to CAA approval of blades painting and colouring and the selected turbine supplier accepting the warranties of blades being painted. This must include the two turbines (T5 and T22) that lie within the 3.7 km buffer that will be recommended in the update Verreux's Eagle guidelines (Ralston Paton and Murgatroyd in press).	Karreebosch Wind Farm (RF) (Pty) Ltd / environmental manager	Operation

<u>Performance Indicator</u>	<u>Minimal additional disturbance to bird or bat populations on the wind energy facility site.</u> <u>Continued improvement of bird and bat protection devices, as informed by the operational monitoring.</u> <u>Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and bats and the proposed/ operating wind energy facility.</u> <u>Clear and logical recommendations on why, how and when to institute mitigation measures to reduce avian impacts of the development, from pre-construction to operational phase.</u>
<u>Monitoring and Reporting</u>	<u>Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades.</u> <u>The monitoring team to monitor turbine field for fatalities.</u> <u>Review of bird monitoring report on the full 2 years of post-construction monitoring</u>



6.0 Public Participation Process

6.1 Consultation with the Competent Authority

SLR attended a pre-application meeting with DFFE on 27 September 2023 (DFFE Ref: **2023-09-0011**) (Refer attached minutes in Appendix G1). The purpose of this meeting was to provide DFFE with an overview of the proposed Project and to obtain clarity on the legislative requirements and the approach to the Amendment process for the project, in order to ensure agreement on the way forward.

6.2 I&AP Identification

Since Karreebosch WEF has received EA and numerous amendments, all registered Interested and Affected Parties (I&APs) have been included in the database (Appendix G2). The I&AP database was also updated through a process of obtaining information from SLR's existing stakeholder database of projects in the area and liaison with potentially affected I&APs within the surrounding area. Key stakeholders, including organs of state, ward councillors, affected and adjacent landowners have been identified and registered on the database. Further I&APs have also had an opportunity to register through the media advert and site notice placement.

6.3 Advertisements and Site Notices

A newspaper advert (English and Afrikaans), providing notification of the proposed project and the EMPr Amendment process was placed on Tuesday **14 November 2023** in *Die Burger* newspaper (see Appendix G3 for a copy of the media advert as well as the proof of placement). Site Notices (in English and Afrikaans) (Appendix G4) were also placed at the entrances of the project site and in the nearest towns where there is a lot of foot traffic (libraries etc) in order to advertise the EMPr Amendment process of the proposed project. Proof of the media advert and site notice placement is included in this Final EMPR Amendment: Addendum Report Appendix G3 and G4).

6.4 Registration of I&APs

All stakeholders were invited to register as I&APs and submit any initial comments to SLR by **14 December 2023**. A notification letter has been included in Appendix G5 and proof of notifications is provided in this final report. All registered I&APs were given the opportunity to participate and comment on reports for the full duration of the amendment process. A copy of the EMPr Amendment Report and associated appendices were made available to all I&APs between **14 November 2023 to 14 December 2023** as follows:

- **Public Documents on SLR website:**
 - <https://www.slrconsulting.com/public-documents/karreebosch-wef-blade-painting-northern-and-western-cape-province-ref-14-12-16-3-3-2-807-am6/>
 - <https://slrpublicdocs.datafree.co/public-documents/karreebosch-wef-blade-painting-northern-and-western-cape-province-ref-14-12-16-3-3-2-807-am6/>
- Similarly copies of the Amended EMPr Addendum Report and associated appendices were made available at the following locations:

VENUE/WEBSITE	ADDRESS	OPENING HOURS	CONTACT NUMBER
SUTHERLAND PUBLIC LIBRARY	Sarel Cilliers Street, Sutherland	Monday – Friday: 9:00 – 17:00	023 571 1429



VENUE/WEBSITE	ADDRESS	OPENING HOURS	CONTACT NUMBER
		Saturday – 9:00 – 15:00	
LAINGSBURG PUBLIC LIBRARY	Van Riebeeck Street, Laingsburg, Western Cape, South Africa	Monday, Wednesday, Friday: 9:30 – 12:30; 14:00 – 17:30 Tuesday, Thursday: 14:00 – 17:30	023 5511019

- Written Notifications (were emailed) to I&APs
 - SMS notifications where no email was provided;

7.0 Closure

The amendments being applied for in this application cater towards the impact management outcomes/ objective, this measure refers to reducing bird collisions with turbines.

The EMPr has been amended to include revised blade patterning, as suggested by the Avifaunal specialist, for its contribution to ongoing research on the effectiveness of patterned blade painting, as well as for its use as a mitigation measure to reduce bird collisions, as previously included in the approved EMPr (DFFE REF: 14/12/16/3/3/1/807/AM6). The EMPr has also been amended to include the measures as recommended by the visual specialist regarding both painted and unpainted blades (Section 5.2) as well as an addition of the following Impact Management Outcome:

- **Impact management outcome: Reduce bird collisions with turbines.**

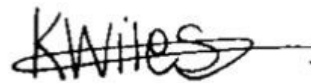
The required EMPr amendments have been included in this Addendum Report. This document forms the basis for the environmental specifications that the Contractor, in terms of the construction contract, will be obliged to adhere to during construction, as well as the Operator, in terms of the sale of land and associated binding agreements. This document will be included in the contract documentation for the construction and operation phase and is thus form a binding agreement between the Contractor and the Applicant. It will also be included in in the terms of sale and will form a binding agreement between the Operator and the Applicant. This EMPr Amendment: Addendum Report has also been prepared in compliance with Regulation 37 of the EIA Regulations, 2014 (as amended).

Kind Regards,

SLR Consulting (South Africa) Proprietary Limited



Stuart Heather-Clark
Registered EAP



Katherine Wiles
Associate Environmental Consultant



Record of Report Distribution

SLR Reference:	720.070097.00001
Title:	Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting Environmental Management Programme (EMPr) Amendment: Addendum Report
Report Number:	<u>2</u>
Client:	Karreebosch Wind Farm (RF) (Pty) Ltd

Name	Entity	Copy No.	Date Issued	Issuer
S Heather-Clark	SLR	1	13 November 2023	SLR
<u>S Heather-Clark</u>	<u>SLR</u>	<u>2</u>	<u>16 January 2024</u>	<u>SLR</u>
			Click to enter a date.	
			Click to enter a date.	
			Click to enter a date.	
			Click to enter a date.	
			Click to enter a date.	





Appendix A Approved WSP EMPr (14/12/16/3/3/2/807/AM6)

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

**Environmental Management Programme (EMPr) Amendment: Addendum
Report**

Karreebosch Wind Farm (RF) (Pty) Ltd

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Appendix B Avifauna Letter

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

Environmental Management Programme (EMPr) Amendment: Addendum Report

Karreebosch Wind Farm (RF) (Pty) Ltd

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Appendix C Visual Impact Assessment

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

**Environmental Management Programme (EMPr) Amendment: Addendum
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Appendix D Social Letter

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

Environmental Management Programme (EMPr) Amendment: Addendum Report

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Appendix E Cultural Landscape and Heritage Letter

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

**Environmental Management Programme (EMPr) Amendment: Addendum
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Appendix F EAP and Project Team CVs

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

**Environmental Management Programme (EMPr) Amendment: Addendum
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Appendix G Public Participation Documentation

Karreebosch Wind Energy Facility (WEF) Patterned Blade Painting

**Environmental Management Programme (EMPr) Amendment: Addendum
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G.1 DFFE Pre-application minutes

G.2 IAP Database

G.3 Media Advert and Proof

G.4 Site Notice and Proof

G.5 IAP Notification Letter and Proof

G.6 Comments and Response Report

