

OPERATION PHASE: ENVIRONMENTAL MANAGEMENT PROGRAMME

1. OBJECTIVE

The overall goal for the Operational Environmental Management Programme (OEMP) is to ensure that the operation of the wind energy facility (WEF) does not have unforeseen negative impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action is taken timeously. In order to achieve this goal, it is necessary to operate the WEF in a way that:

- Ensures that operational activities are properly managed in respect of environmental aspects and impacts.
- Enables the WEF operational activities to be undertaken without significant disruption to other land uses in the area, in particular with regards to noise impacts, farming practices, traffic and road use, and effects on local residents.
- Minimises impacts on birds and other fauna found onsite.
- Monitors and evaluates the impacts of the WEF on birds and bats in order to mitigate appropriately.
- Established an environmental baseline for WEF sites in De Aar with regard to priority bird species using the site.

2. COMPLIANCE MONITORING

Prior to the commissioning of the WEF, a suitably qualified Environmental Manager (EM) should be appointed by Longyuan Mulilo De Aar Wind Power. The role of the EM during this phase would be to address the on-going operation of the WEF and to ensure that the issues that have been identified in the OEMP are properly addressed on a continued basis and in a manner that limits any environmental impact.

3. OEMP FRAMEWORK

The OEMP is presented in tabular format illustrating the activity, aspect, impact, mitigation measure, performance indicators, resources, schedule and verification. These criteria are listed and defined below:

- **Activity:** component/ activity of the project for which the impact has been identified;
- **Aspect:** the aspect of the above activity which will be impacted;
- **Impact:** the environmental impact identified and to be mitigated;
- **Mitigation measure:** measures identified for implementation in terms of environmental management to reduce, rectify or contain the identified environmental impact – mitigation is divided into the following:
 - **Objective:** desired outcome of mitigation measure,
 - **Mechanism:** method of achieving the objective;
- **Performance indicators:** outcomes that will indicate achievement of objective/s;
- **Responsibility:** party or parties identified for implementation of mitigation measure/s;
- **Resources:** available resources to aid implementation of mitigation;
- **Schedule:** timeframe in which identified impact and mitigation measure is anticipated to occur; and
- **Verification:** party or parties identified as responsible for review and assessment of final outcome.

Table 1: Operational Management Programme Framework

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
All Activities	Environmental management documentation and procedures.	No framework within which to locate the management of the operational phase. No procedures against which to assess environmental performance during the operational phase and thus no measure of compliance.	Objective: To ensure that the operation of the WEF does not result in avoidable impacts on the environment and that any impacts that do occur are anticipated and managed. Mechanism: 1) Appoint a suitably qualified Environmental Manager (EM) to monitor compliance (either independent or in-house). 2) Audit the compliance with the requirements of the environmental specification contained within the OEMP.	Environmental impacts effectively monitored and managed during the operational phase. Comprehensive record of compliance and remedial actions available to the authorities.	O&M (Operation and Maintenance) Contractor	EMP	Twice in the 1 st three years and then once every five years	EM DEA
All Activities	Protection of the surrounding environment (aquatic and terrestrial)	Impacts of the operation and maintenance of the WEF on the surrounding environment (including local flora, fauna, bats, avifauna and watercourses around the proposed development.	Objective: To maintain minimised footprints of disturbance of vegetation / habitats on-site. To ensure and encourage plant regrowth in areas of post-construction rehabilitation. Mechanisms: 1) Vehicle movements will be restricted to designated roadways. 2) Existing roads will be maintained to ensure limited erosion and impact on areas adjacent to roadways. 3) Implementation of the Revegetation and Rehabilitation Plan (Appendix 10). 4) Implementation of the Alien Vegetation Removal Programme (Appendix 11). 5) Ongoing implementation of the Storm Water Management Plan (Appendix 12) to ensure compliance with applicable regulations and	No further disturbance to vegetation. Continued improvement in rehabilitation efforts.	O&M Contractor	EMP Revegetation and Rehabilitation Plan Alien Vegetation Removal Programme Storm Water Management Plan Open Space Management Plan	Regular inspection of plant regrowth, performance of rehabilitation efforts and weed infestation	EM DEA

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
			prevent off-site migration of contaminated storm water or increased soil erosion. 6) Ensure ongoing implementation of the Open Space Management Plan (Appendix 13).					
All activities	Protection of avifauna	Disturbance to or loss of birds as a result of collision with the turbine blades. Disturbance to or loss of birds as a result of collision with the overhead power line. Electrocution as a result of the power line.	Objective: To reduce the impact of the operating WEF on priority bird species. Mechanisms: 1) Implementation of the Avifaunal Post-Construction Monitoring Programme (Appendix 7). Lesser Kestrel 2) Adaptive management must be implemented for the influx of Lesser Kestrel linked to locust invasions and species' presence during the summer season at the WEF area. 3) Counts must be conducted during the summer season at the De Aar roosting sites and any additional roosting sites in the vicinity of the WEF. Verreaux's Eagle 4) Continue with the Argos / GPS satellite tracking. 5) Implement adaptive management for the Verreaux's Eagle based on the satellite tracking monitoring results. 6) Monitor the breeding activity of eagles in the area by assessing the number of pairs and breeding success (productivity and fledgling rates), including (if feasible) the identification of individual adult birds.	No additional disturbance to avifauna populations on the WEF site. No additional disturbance to avifauna populations along the length of the power line route. Continued improvement of avifauna protection efforts.	Bird specialist O&M Contractor	EMP Avifaunal Post-Construction Monitoring Programme	In accordance with the Avifaunal Post-Construction Monitoring Programme (Appendix 7).	EM O&M Contractor DEA

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			<p>7) Implement specific management measures as part of adaptive management, which will increase the resident eagles' productivity based on the results of ongoing research.</p> <p>Blue crane</p> <p>8) No specific mitigation is required at this stage, but ongoing monitoring should be performed to record any potential changes in this pattern of occurrence.</p> <p>Waterbirds</p> <p>9) No specific mitigation measures are required at this stage as far as the turbines are concerned.</p> <p>10) The fitting of Bird Flight Diverters on the 33 kV power line which crosses the narrow kloof between Smouspoort and Swartkoppies is recommended.</p>					
All activities	Protection of bats and fauna	Disturbance to or loss of fauna, including bats, and/or habitat. Direct mortalities.	<p>Objective: To minimise impacts on fauna, including bats.</p> <p>Mechanisms:</p> <p>1) Vehicle movements to be restricted to designated roadways.</p> <p>2) Adherence to reduced vehicle speeds by all vehicles moving on site.</p> <p>3) The minimal number of visits would be 24 over a period of 12 months.</p> <p>4) During the first two years post-construction monitoring would be required. Based on the results, changes could be considered in terms of: time within a year, number of visits and frequency, and number</p>	<p>No additional disturbance to fauna populations on the WEF site.</p> <p>Continued improvement of fauna protection efforts.</p>	<p>Bat specialist</p> <p>O&M Contractor</p>	<p>EMP</p> <p>Operational Phase Bat Management Plan</p>	<p>In accordance with the Bat Operational Phase Management Plan (Appendix 8).</p>	<p>EM</p> <p>O&M Contractor</p> <p>DEA</p>

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
			<p>of turbines sampled.</p> <p>5) Special attention should be devoted from October to April as the pre-construction monitoring results show that this is a peak period for bat activity.</p> <p>6) Implement an Operational Phase Monitoring programme (included in Appendix 8).</p> <p>7) Apply an Adaptive Management Plan based on the results of the Operational Phase Bat Monitoring Programme.</p>					
All activities	Appropriate handling and management of hazardous substances and waste	Litter or contamination of the site or water through poor waste management practices.	<p>Objective: To minimise the production of waste. To ensure appropriate waste disposal. To avoid environmental harm from waste disposal.</p> <p>Mechanisms:</p> <p>1) Hazardous substances must be stored in sealed containers within a clearly demarcated area.</p> <p>2) All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licenced waste disposal site or sold to a recycling merchant for recycling.</p> <p>3) Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it will be cleared up according to specified standards for bioremediation.</p> <p>4) Used oils and chemicals will be</p>	<p>No complaints received regarding waste on site or indiscriminate dumping.</p> <p>Internal site audits identifying that waste segregation, recycling and re-use is taking place.</p> <p>No contamination of soil or water.</p>	O&M Contractor	EMP	Waste collection must be monitored on a regular basis.	EM O&M Contractor

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			<p>appropriately disposed at a licensed facility.</p> <p>5) General waste will be recycled where possible or disposed of at an appropriately licensed landfill.</p> <p>6) Hazardous waste (including hydrocarbons) and general waste will be stored and disposed of separately.</p> <p>7) Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.</p>					
	Visual aesthetics	Impact of the proposed development on the surrounding visual aesthetics of the area	<p>Objective: To ensure that impacts on the visual aesthetics are minimised during the operational phase.</p> <p>Mechanism:</p> <p>1) During operation, the maintenance of the turbines, the internal roads, the power line servitude and other ancillary structures and infrastructure will ensure that the facility does not degrade, thus aggravating visual impact.</p> <p>2) Turbines should not display brand names.</p>	Condition of the project infrastructure and roads.	O&M Contractor	EMP	As required based on annual inspections of the project	EM DEA
All Activities	Environmental management of the operational phase	Positive impacts on socio-economic environment during operation	<p>Objective: To ensure that the operation of the wind energy facility maximises positive impacts on the socio-economic environment.</p> <p>Mechanism:</p> <p>1) Train local people for operation and maintenance of facility.</p> <p>2) Employ local labour for the operational phase, where possible,</p>	Consult annual skills and training records, employment records and proof of staff residency in the area prior to employment	O&M Contractor	EMP	During Operational Phase (full lifetime) when the need arises to employ people.	EM O&M Contractor

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			and particularly for day to day operations and maintenance.					
Activities within the buffer zones of the Eskom powerlines	Protection of Eskom infrastructure	Impact of the proposed development on the Eskom powerlines	<p>Objective: To ensure that the operation of the WEF does not result in avoidable impacts on the Eskom powerlines.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) Liaise with Eskom to come to an agreement regarding suitable risk mitigation measures to be put into place for operational management. 2) No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the Contractor must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager Note: Where and electrical outage is required, at least fourteen work days are required to arrange it. 3) Unobstructed access shall be granted to Eskom to access their servitudes. 4) Equipment shall be regarded electrically live and therefore dangerous at all times. Safety and best practice standards with regards to all safety hazards related to electrical plant shall be employed for the projects. 	Compliance with Eskom's guidelines	O&M Contractor	EMP	During Operational Phase (full lifetime)	EM O&M Contractor Eskom