
**PROPOSED WIND ENERGY FACILITY
(NORTH & SOUTH)
SITUATED ON THE EASTERN PLATEAU NEAR
DE AAR, NORTHERN CAPE**

**LIFE-CYCLE ENVIRONMENTAL
MANAGEMENT PROGRAMME**

**MARCH 2012
DRAFT**



CONSULTANT
Aurecon South Africa (Pty) Ltd
PO Box 494
Cape Town
8000

Tel: (021) 526 6034
Fax: 021 526 9500
Email: simon.clark@aurecongroup.com



PROPONENT
Mulilo Renewable Energy (Pty) Ltd
PO Box 50
Cape Town International Airport
Cape Town
7525

Tel: (021) 934 5278
Fax: (021) 935 0505
Email: constantin@mulilo.com

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AUTHORS & PREPARED BY	Simon Clark and Louise Corbett of Aurecon South Africa (Pty) Ltd
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Authors:

SIMON CLARK

Practitioner: Environmental & Advisory Services

LOUISE CORBETT (Pri. Sci. Nat.)

Associate: Environmental & Advisory Services

Approved by:

BRETT LAWSON (Pr.Sci.Nat., Cert. EAPSA)

Technical Director: Environmental & Advisory Services

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ABBREVIATIONS

CEMP	Construction Phase Environmental Management Programme
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Reports
EMP	Environmental Management Programme
LEMP	Life-Cycle Environmental Management Programme
NEMA	National Environmental Management Act (No. 107 of 1998)
OHS	Occupational Health and Safety Act (No. 85 of 1998)
OEMP	Operational Phase Environmental Management Programme
SDEMA	Specification Data Environmental Management
SPEC EMA	Specification Environmental Management

1 OVERVIEW

This document represents the Life-Cycle Environmental Management Programme (LEMP) for the proposed Wind Energy Facilities (North & South) situated on the Eastern Plateau near De Aar, Northern Cape.

1.1 Purpose of the LEMP

The LEMP has been included in the Environmental Impact Assessment Report (EIAR) in order to provide a link between the impacts identified in the EIA Process and the actual environmental management on the ground during project implementation and operation. The purpose of this document is to provide for environmental management throughout the various life-cycle stages of the proposed development. The following stages are included:

- Planning and design,
- Pre-construction and construction,
- Operation, and
- Decommissioning.

Furthermore, this LEMP aims for alignment and optimisation of environmental management processes with conditions of authorisation that may arise, thereby ensuring that identified environmental considerations are efficiently and adequately taken into account during all stages of development.

1.2 Legal requirements of Environmental Management Programmes

In terms of the EIA Regulations (Regulation 543 of 18 June 2010) enacted in terms of the National Environmental Management Act (no. 107 of 1998) (NEMA), the proposed project triggers Activity 10, 11 and 18 of Regulation R544 (18 June 2010), Activity 1 and 7 of Regulation R545 (18 June 2010) as well as Activity 14 of Regulation R546 (18 June 2010). As the proposed project triggers listed activities in terms of Regulation R544, R545 and R546 it is necessary to submit an Environmental Impact Assessment Report (EIAR) for Environmental Authorisation (EA) to the Department of Environmental Affairs (DEA). Section 22 (l) of the EIA Regulations require that a draft EMP is submitted as part of the EIAR.

The contents of the EMP must meet the requirements outlined in Section 24N (2) and (3) of NEMA (as amended) and Section 33 of the EIA Regulations. The EMP must address the potential environmental impacts of the proposed activity on the environment throughout the project life-cycle including an assessment of the effectiveness of monitoring and management arrangements after implementation. The Department requires that the EMP be submitted together with the EIAR so that it can be considered simultaneously. Table 1 lists the requirements of an EMP as stipulated by Section 33 of the EIA Regulations R543. Table 2 lists the requirements of an EMP as stipulated by Section 24N (2) and (3) of the NEMA (as amended).

Table 1: Section 33 of EIA Regulation R543 listing the requirements of an EMP

33.	<i>A draft environmental management programme must comply with section 24N of the Act and include –</i>
(a)	<i>details of –</i>
	<i>(i) the person who prepared the environmental management programme; and</i>
	<i>(ii) the expertise of that person to prepare an environmental management programme;</i>
(b)	<i>information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of—</i>
	<i>(i) planning and design;</i>
	<i>(ii) pre-construction and construction activities;</i>
	<i>(iii) operation or undertaking of the activity;</i>
	<i>(iv) rehabilitation of the environment; and</i>
	<i>(v) closure, where relevant.</i>
(c)	<i>a detailed description of the aspects of the activity that are covered by the draft environmental management programme;</i>
(d)	<i>an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);</i>
(e)	<i>proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;</i>
(f)	<i>as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;</i>
(g)	<i>a description of the manner in which it intends to—</i>
	<i>(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</i>
	<i>(ii) remedy the cause of pollution or degradation and migration of pollutants;</i>
	<i>(iii) comply with any prescribed environmental management standards or practices;</i>
	<i>(iv) comply with any applicable provisions of the Act regarding closure, where applicable;</i>
	<i>(v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;</i>
(h)	<i>time periods within which the measures contemplated in the environmental management programme must be implemented;</i>
(i)	<i>the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;</i>
(j)	<i>an environmental awareness plan describing the manner in which—</i>
	<i>(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</i>
	<i>(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;</i>
(k)	<i>where appropriate, closure plans, including closure objectives.</i>

The legislation hereby aims to ensure that effective environmental management is implemented throughout the life cycle of the project via the translation of EIA management actions into the LEMP.

The Department of Environmental Affairs & Development Planning (DEA&DP)'s¹ *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPs. The guideline defines EMPs as:

¹ Please note that DEA&DP's guideline is used even though the proposed project is based in the Northern Cape, as DEA has not compiled a guideline on EMPs.

“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”.

The guideline further provides *“situations [that] could trigger the need for an EMP requiring authority approval”*. One such trigger is:

“EMP’s covering specific activities assessed through an over-arching EIA and incorporated into a Strategic Environmental Management Plan. A tiered system of EIA leading to a [Strategic EMP] and multiple EMP’s may apply to large-scale complex developments with several sub-projects. In this case, an over-arching EIA may serve as the basis for environmental approval for the overall development. This may be supported by a [Strategic EMP] that is approved by the authorities. However, one or more EMP’s may be required for the specific activities that form part of the larger development”.

Table 2: Section 24N (2) and (3) of the NEMA (as amended) listing the requirements of an EMP

24N.(2) *the environmental management programme must contain-*

- (a) *information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –*
 - (i) *planning and design;*
 - (ii) *pre-construction and construction activities;*
 - (iii) *the operation or undertaking of the activity in question;*
 - (vi) *the rehabilitation of the environment; and*
 - (vii) *closure, where relevant.*
- (b) *details of –*
 - (i) *the person who prepared the environmental management programme; and*
 - (ii) *the expertise of that person to prepare an environmental management programme*
- (c) *a detailed description of the aspects of the activity that are covered by the draft environmental management plan;*
- (d) *information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);*
- (e) *information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.*
- (f) *as far as is reasonable practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*
- (g) *a description of the manner in which it intends to-*
 - (i) *modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;*
 - (ii) *remedy the cause of pollution or degradation and mitigation of pollutants; and*
 - (iii) *comply with any prescribed environmental management standards or practices.*
- (3)** *the environmental management programme must , where appropriate-*
 - (a) *set out time periods within which the measures contemplated in the environmental management programme must be implemented;*
 - (b) *contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and*
 - (c) *develop an environmental awareness plan describing the manner in which-*

- (i) *the applicant intends to inform his or her employees of any environmental risk which may result from their work; and*
- (ii) *risks must be dealt with in order to avoid pollution or the degradation of the environment.*

The LEMP aims to meet the EMP requirements as legislated by the NEMA Regulations (as amended) as well as falling in line with the DEA&DP guideline document for an Environmental Management Plan². It should however be noted that no guideline or guidance exists in terms of best practice approach to LEMPs. This document should thus be seen in an iterative context allowing for amendments throughout the life-cycle of the project, allowing for adjustments as new information is made available.

1.3 Structure of the LEMP

As discussed above, the LEMP aims to address environmental management throughout the project life-cycle, from planning and design, through construction, to operation and potential decommissioning. The LEMP has been structured to include the following sections:

1. Discussion summarising environmental management influencing the planning and design of the proposed project (Chapter 2);
2. Construction EMP based on identified impacts and mitigation measures from the EIAR(Chapter 3);
3. Operational Framework based on identified impacts and mitigation measures from the EIAR (Chapter 4); and
4. Decommissioning Framework providing guidance on key considerations to be considered during decommissioning/closure (Chapter 5).

1.4 Expertise of Environmental Assessment Practitioners

Section 33 of EIA Regulations and Section 24N (2) and (3) of NEMA (as amended) requires that an EMP must include the details of the person(s) who prepared the EMP, and the expertise of that person to prepare an EMP. In this regard, the *Curriculum Vitae* of the Environmental Assessment Practitioners who compiled the LEMP are included in **Appendix A**.

² Lochner, P. 2005. *Guideline for Environmental Management Plans*. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

2 PLANNING AND DESIGN

This section has been divided into subsections which outline how environmental considerations have informed and been incorporated into the planning and design phases of the proposed wind energy facility. Detailed design is usually undertaken as part of the pre-construction phase as it is a costly undertaking which is generally only costed for once all required authorisations have been obtained. Thus, the planning and design phases discussed are limited to those associated with the pre-authorisation phases. Mitigation measures have been recommended for the detailed design phase.

2.1 Project Description

Initially, Mulilo proposed to construct two 150 - 200 MW wind energy facilities on the eastern plateau approximately 20 km east of De Aar, Northern Cape. The two proposed wind energy facilities would be located on the northern and southern portion of the plateau approximately 20 km east of the town of De Aar. The northern portion would have potentially consisted of 145 wind turbines and the southern portion, 105 wind turbines with a combined total capacity of 150 – 200 MW each. Subsequent to this initial proposal, the turbine layouts were revised in order to incorporate specialist recommendations that buffers be implemented around sensitive features and areas. The revised layouts for the northern portion would now potentially consist of 144 wind turbines with a potential capacity to produce between 216 - 360 MW and the southern portion with 103 wind turbines with a potential capacity of 155 – 258 MW. The power generated by the two proposed projects would be transmitted to the national grid via five proposed substations with three on the southern site and two on north site, connecting into the three existing transmission lines crossing the site and linking into the Hydra substation near De Aar. The proposed sites are situated in the Emthanjeni and Renosterberg LM in the Northern Cape. The northern site is approximately 14 500 ha in extent and consists of 14 portions of six farms, whilst the southern site is approximately 9 200 ha in extent and consists of nine portions of four farms.

2.2 Summary of Alternatives

To summarise, the feasible alternatives assessed in the EIAR included the following:

- Location alternatives:
 - One location per proposed wind energy facility;
- Activity alternatives:
 - Wind energy generation via wind turbines; and
 - “No-go” alternative to wind energy production.
- Site layout alternatives:
 - One layout alternative per site;
- Technology alternatives:
 - Turbine towers of 65 m and a blade length of 40m; and
 - Turbine towers of 100m with a blade length of 60 m;

2.3 Design of the project

The design for the proposed development should respond to the identified environmental constraints and opportunities. The following mitigation measures related to the design for the proposed development have been recommended to reduce the environmental impacts.

Botanical

- Locate roads, cabling and other infrastructure in order to avoid drainage lines, as far as possible; and
- Locate the proposed project in such a way that the development footprint is minimized, as far as possible.

Avifauna

- Implement long-term monitoring to inform design, construction, operation and decommissioning of the project. The long-term monitoring programme shall be compiled by a qualified avifaunal specialist to meet the requirements of the Avifaunal Impact Assessment conducted as part of the EIA.
- Implement planning and design mitigation measures for protection of avifauna based on the outcome of the comprehensive bird monitoring programme. Outcomes may recommend the following:
 - Minimising the length of any new powerlines installed, and ensuring that all new lines are marked with bird flight diverters along their entire length;
 - Marking turbine blades as way to reduce collisions. Other blade-marking options should also be considered, where applicable. Post-construction monitoring could allow for testing of efficacy, which would inform subsequent decisions about the need to mark blades more widely in this WEF.
 - Ensuring that lighting on the turbines is kept to a minimum, and is coloured (red or green) and intermittent, rather than permanent and white, to reduce confusion effects for birds flying at night.
 - Transmission lines connecting each turbine to the installation network should be buried underground to mitigate the considerable risk of avian collision that would arise by overhead lines installed on this high-lying ridge. Should transmission lines not able to be buried then they should be adequately marked using bird-flappers. Priority lines could be identified during pre-construction monitoring phase (see below). It is imperative that all new powerline infrastructure is adequately insulated and bird friendly when configured.
 - Additional mitigation arising from the results of pre-construction monitoring might include re-scheduling construction or maintenance activities on site, adjusting the siting of turbines positioned in areas subsequently identified as particularly important for disturbance and/or displacement sensitive, priority bird species, shutting down problem turbines either permanently or at certain times of year or in certain conditions, or installing radar tracking systems to monitor bird movements and institute temporary shutdowns as and when required.
- Restrict the construction footprint to a bare minimum.

Bats

- A buffer area of 100 m should apply to all high sensitivity areas (refer to Figure 2.1); and
- Implement planning and design mitigation measures for protection of bats and fine tune mitigation measures based on the programme;

Heritage and Palaeontology

- If mitigation by avoiding sensitive archaeological sites is not feasible, sampling and recording of the archaeological site before its destruction must be undertaken;
- At least one LSA site on the North site and one MSA “factory” site and two LSA sites on the South site will require targeted sampling and excavation to allow for more accurate characterization of the archaeological finding; and
- A 500 m buffer should be implemented around farmsteads, buildings, sheds, kraals etc.

Visual

- The alignment of access roads should be carefully considered to minimize visible scarring from cut and fill, and gravel should be used as surface material. Roads alignments should lie with the contour as far as possible;
- Consider temporary hard-standings for cranes in place of permanent hard-standings; and
- As much as possible, place any new structures where they are least visible to the greatest number of people.

Freshwater

- A buffer of 30 m should be maintained adjacent to the identified freshwater features, and 75 m for the pans at Slingershoek;
- To reduce the risk of erosion, the locality of the turbines should preferably not be on any steep slopes.
- The existing road infrastructure should be utilized as far as possible to minimize the overall disturbance created by the proposed projects. For new access roads to the turbines, these should rather be along the ridges of the hills than in the drainage/stream beds;
- Wetland and pan areas should be avoided and any road adjacent to a wetland feature should also remain outside of the 30m buffer zone as far as possible.
- All crossings over drainage channels or stream beds should be such that the flow within the drainage channel is not impeded; and
- Road infrastructure and cable alignments should coincide as much as possible to minimize the impact.

Transportation

- Engage with the roads authorities prior to construction to ensure the necessary road upgrades, permits, traffic escorts etc are scheduled.

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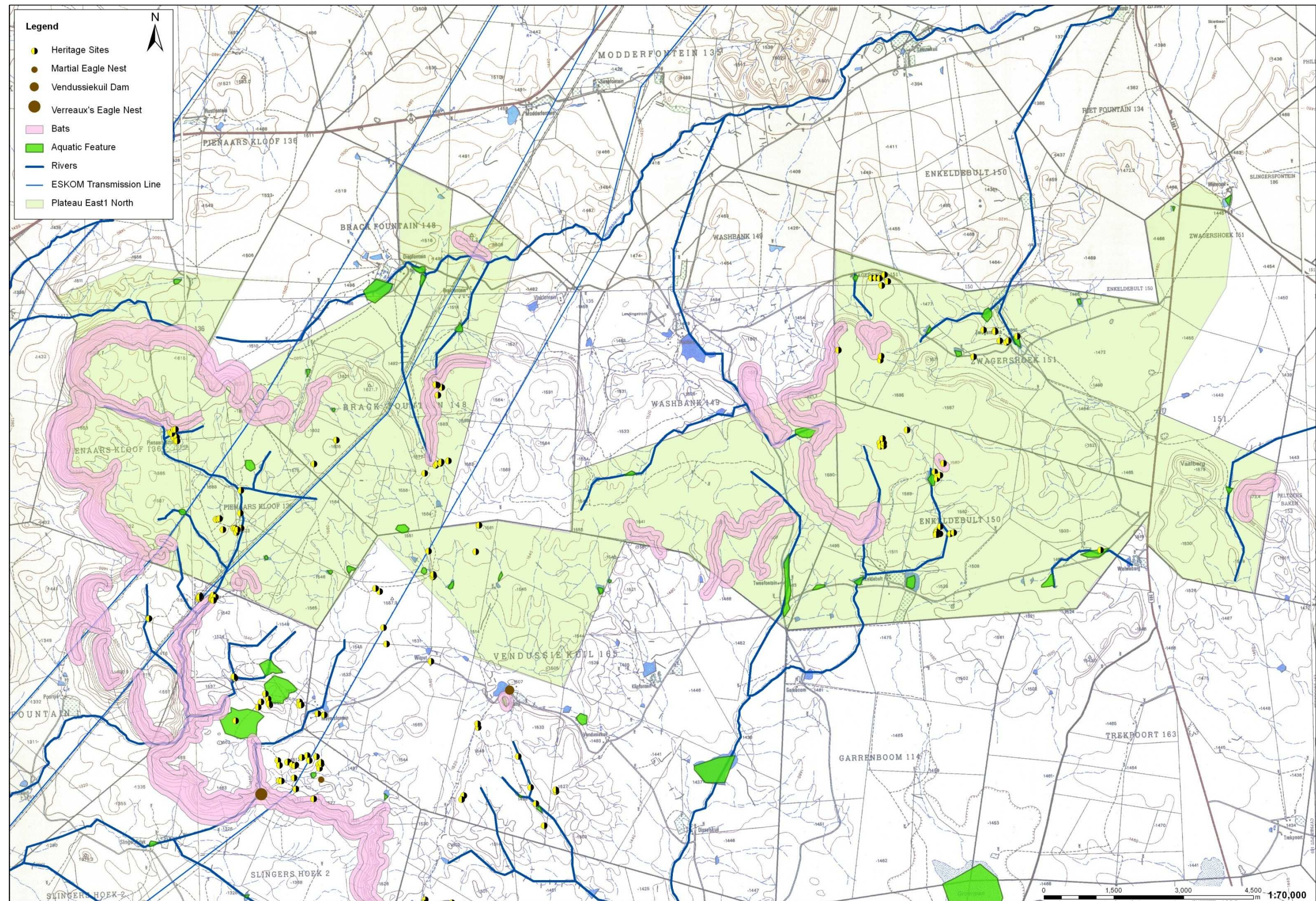
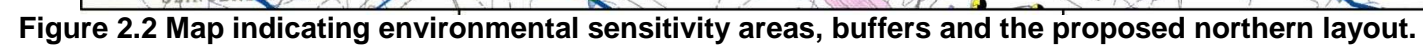


Figure 2.1 Map indicating environmental sensitivity areas, buffers for the proposed northern site.



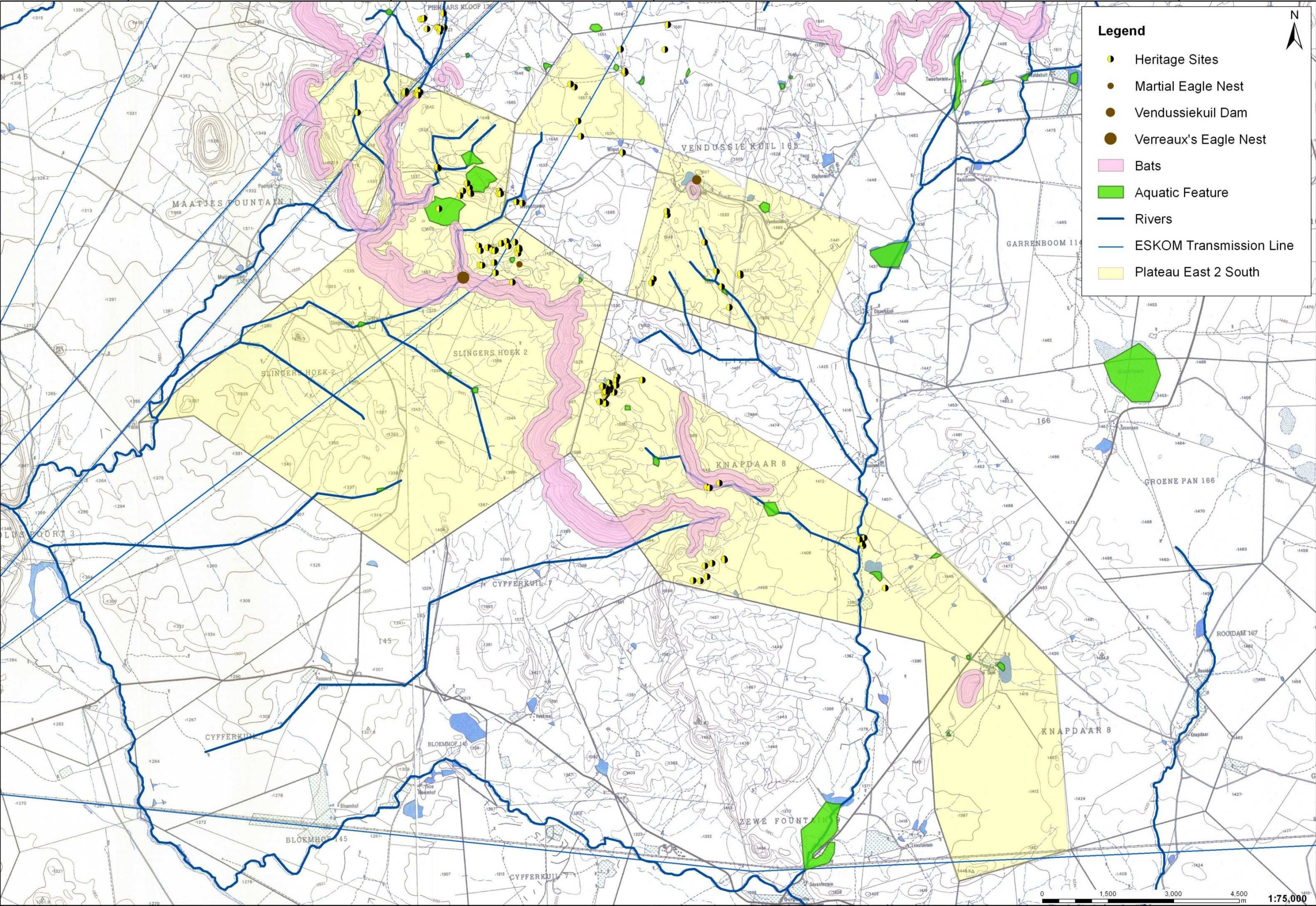


Figure 2.3 Map indicating environmental sensitivity areas, buffers for the proposed southern site.

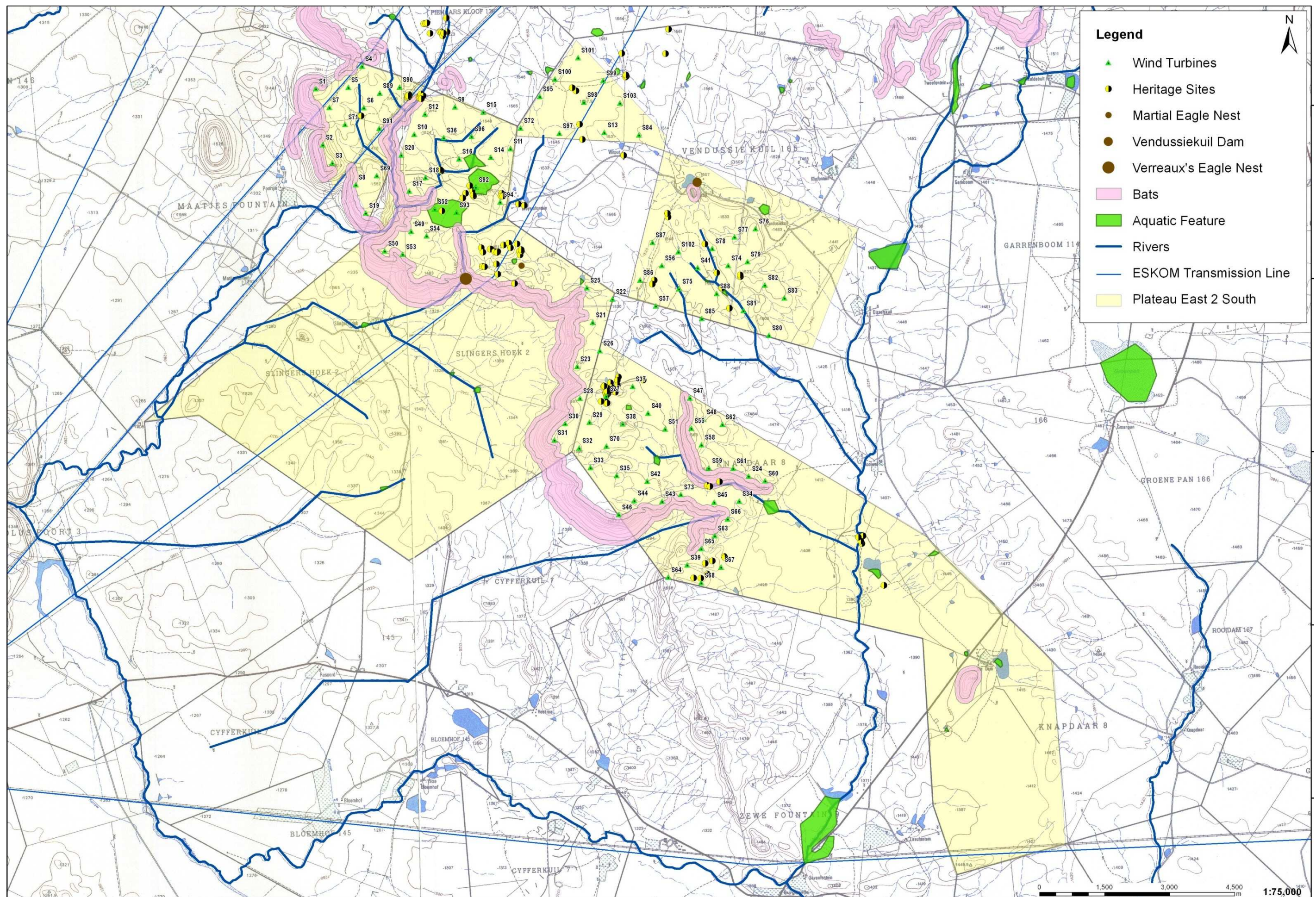


Figure 2.4 Map indicating environmental sensitivity areas, buffers and the proposed southern layout.

3 COMPLIANCE MONITORING

Prior to the commencement of construction and operation of the project a suitably qualified and experienced Environmental Control Officer (ECO) shall be appointed by the proponent to ensure that the mitigation rehabilitation measures and recommendations referred to in the EA are implemented and to ensure compliance with the provisions of the LEMP, thereby ensuring that identified environmental considerations are efficiently and adequately taken into account during all stages of development.

3.1 Roles and responsibilities

Client

Mulilo shall:

- Assume overall responsibility for the administration and implementation of the LEMP through an identified Project Manager or Engineer;
- Appoint or engage a suitably qualified Project Manager or Engineer; and
- Appoint or engage a suitably qualified independent ECO to monitor compliance with the LEMP and undertake monthly and close out audits of compliance with the requirements of the LEMP and provide a copy of the audit reports to DEA and the Contractor.

Project Manager

The Project Manager or Engineer shall:

- Have overall responsibility for the environment;
- Have the authority to stop works and issue fines, as necessary;
- Receive reports from the ECO and shall report to Mulilo; and
- Support the ECO in his/her roles and responsibilities.

ECO

The role of the ECO will be to oversee and monitor compliance with and implementation of the construction phase EMP and Operational Phase EMP, which includes compliance with the relevant conditions contained in the EA. This includes the following responsibilities:

- i) Liaison with the Client, Project Manager or Engineer and DEA;
- ii) Monitoring of all of the Contractor's activities for compliance with the various environmental requirements contained in the construction Specification;
- iii) Monitoring of compliance with the EA related to the construction phase as issued by DEA as well as other relevant environmental legislation;
- iv) Reviewing of the Contractor's environmental Method Statements;
- v) Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- vi) Ensuring the proactive and effective implementation and management of environmental protection measures;
- vii) Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- viii) Routine recording and reporting of environmental activities on a weekly and monthly basis;

- ix) Recording and reporting of environmental incidents.

The duties of the ECO during operation phase will include:

- i) Liaison with the Client and DEA;
- ii) Monitoring of the operation of the project for compliance with the various environmental requirements contained in the Framework Operational EMP;
- iii) Ensuring the proactive and effective implementation and management of environmental protection measures; and
- iv) Monitoring of compliance with the EA related to the operational phase as issued by DEA as well as other relevant environmental legislation.

4 CONSTRUCTION PHASE EMP

The Construction EMP aims to address mitigation measures pertaining to the construction phase as identified during the course of the EIA. This section includes both General Specifications as well as Draft Specification Data, addressing general construction issues and issues that are not addressed by the General Specifications, respectively. It should be noted that the Draft Specification Data should be revised as required post authorisation to ensure that all relevant conditions of the EA have been addressed.

4.1 Construction EMP General Specifications

The complete General Specifications have been included in **Appendix B** and include the following sections:

-
- Scope
 - Normative References
 - Supporting Specifications
 - Definitions
 - Requirements
 - Material
 - Material handling, use and storage
 - Hazardous substances
 - Shutter oil and curing compound
 - Bitumen
 - Plant
 - Ablution facilities
 - Solid waste management
 - Contaminated water
 - Site structures
 - Noise control
 - Lights
 - Fuel (petrol and diesel) and oil
 - Workshop, equipment maintenance and storage
 - Dust
 - Methods and procedures
 - Environmental awareness training
 - Construction personnel information posters
 - Site clearance
 - Site division
 - Site demarcation
 - "No go" areas
 - Protection of natural features
 - Protection of flora and fauna
 - Protection of archaeological and paleontological remains
 - Access routes/ haul roads
 - Cement and concrete batching
 - Earthworks
 - Pumping
 - Bitumen
 - Fire control
 - Emergency procedures
 - Community relations
 - Erosion and sedimentation control
 - Aesthetics
 - Recreation
 - Access to site
 - Crane operations
 - Trenching
 - Demolition
 - Drilling and jack hammering
 - Stockpiling
 - Site closure and rehabilitation
 - Temporary re-vegetation of the areas disturbed by construction
 - Temporary site closure
 - Compliance with requirements and penalties
 - Compliance
 - Penalties
 - Removal from site and suspension of Works
 - Measurement and Payment
 - Basic principles
 - General
 - All requirements of the environmental management specification
 - Work "required by the Specification Data"
 - Billed items
 - Method Statements: Additional work
 - All requirements of the environmental management specification

The following section provides the Draft Specification Data which, along with the General Specifications, will be included in all contract documentation associated with the proposed projects and will accordingly be binding on the Contractor.

4.2 Project Specifications

SDEMA ENVIRONMENTAL MANAGEMENT (SPEC EMA)

SCOPE: The general principles contained within this Specification Data: Environmental Management (SDEMA) shall apply to all construction related activities. All construction activities shall observe any relevant environmental legislation and in so doing shall be undertaken in such a manner as to minimise impacts on the natural and social environment.

SDEMA2 INTERPRETATIONS

SDEMA2.1 Application

This Specification contains clauses specifically applicable and related to the environmental requirements for the Wind Energy Facilities (North & South) situated on the Eastern Plateau near De Aar, Northern Cape.

Where any discrepancy or difference occurs between this SDEMA and the Specification: Environmental Management (Comprehensive), the provision of this Specification shall prevail.

Definitions (Subclause 3)

For the purposes of this Specification the following definitions shall be added:

Working area: The land and any other place on, under, over, in or through which the Works are to be executed or carried out, and any other land or place made available by the Employer in connection with the Works. The Working Area shall include the site office, construction camp, stockpiles, batching areas, the construction area, all access routes and any additional areas to which the Engineer permits access. The construction footprint must be kept to a minimum.

SDEMA3 MATERIALS

SDEM3.1 Materials handling, use and storage (Subclause 4.1.1)

The Engineer shall be advised of the areas that the Contractor intends to use for the stockpiling of both natural and manufactured materials. No stockpiling shall occur outside of the working area (as designated by the engineer) and without the Engineer's prior approval of the proposed stockpiling areas. Imported material shall be free of litter, contaminants or exotic plant seed. The Contractor shall ensure that material is not stockpiled along the border of any water body (permanent or seasonal).

Location and treatment of material stockpiles shall take consideration of prevailing wind directions and dwellings. Stockpiles shall be stored under cover so as to prevent erosion and run off during rainy periods.

Topsoil (100 -150 mm) from construction areas where vegetation clearing is required shall be removed and stockpiled for rehabilitation purposes. This shall be spread over the top of the turbine foundation after the turbine has been erected and any other disturbed areas which are to be rehabilitated and seeded with indigenous species. Ground shall be returned as far as possible to original levels/gradients and any excess material shall not be left in piles, but shall be removed off-site.

Dust suppression measures shall be used particularly during dry periods of weather during the summer months.

All materials on the construction sites should be properly stored and contained. Storage of materials and builders' rubble shall be screened from public view.

Cut material shall be used, where possible in construction or on site (e.g. in grading gravel roads), or removed from site.

SDEM3.2 Hazardous substances (Subclause 4.1.2)

Procedures detailed in the Materials Safety Data Sheets (MSDS) shall be followed in the event of an emergency situation.

Potentially hazardous substances shall be stored, handled and disposed of as prescribed by the Engineer.

An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage shall be compiled and implemented. This shall include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.

SDEM3.3 Shutter oil and curing compound (Subclause 4.1.2.1)

Shutter oil and curing compound shall be stored and dispensed within a bunded area, and not located closer than 32 m from the top of the river banks/water courses/drainage lines.

SDEMA4 REQUIREMENTS

SDEMA4.1 Ablution facilities (Subclause 4.2.1)

A sufficient number of chemical toilets shall be provided by the Contractor in the construction camp area and at appropriate locations approved by the Engineer. Temporary/ portable toilets shall not be located within 100 m from the top of the river banks/water courses/drainage lines. The ratio of ablution facilities for workers should not be less than that required by the Construction Regulations of 2003 of the Occupational Health and Safety Act. All temporary/ portable toilets shall be secured to the ground to prevent them from toppling due to wind or any other cause.

SDEMA4.2 Solid Waste Management (Subclause 4.2.2)

Hazardous wastes (if any) shall only be sent to landfill sites registered for hazardous wastes. Burying or burning of solid waste shall be prohibited on site. A waste management system shall be established to ensure regular waste removal.

SDEMA4.3 Contaminated Water (Subclause 4.2.3)

The Contractor shall prevent the discharge of any pollutants, such as soaps, detergents, cements, concrete, lime, chemicals, hydrocarbons, glues, solvents, paints and wastewater into the surrounding terrestrial and aquatic environment. Should any discharge be necessary it will require the engineer's approval prior to discharging any contaminated water into a lined sump, which will allow sediment particles to settle. Surface contaminants shall be separated by skimming off the surface. Dried particulates collected from the sump and skimmed pollutants such as oils and petrochemicals shall be collected and disposed of at a registered landfill site. The remaining water shall then be drained into an unlined drainage pond where the water can filter into the ground. The pond shall be located in an area approved by the ECO and Engineer. To excavate the pond the top 300 mm of soil shall be removed and stored separately. Once construction is complete the pond shall be backfilled and the top material replaced to cover the area for rehabilitation.

SDEMA4.4 Site Structures (Subclause 4.2.4)

No site structures shall be located within 32 m from the top of the river banks/water courses/drainage lines. Construction yards should be restricted in extent as far as possible and should be screened by visually impermeable material.

Ensure the camp is neat and tidy at all times. Site offices, if required, should be limited to single storey and should be sited carefully using temporary screen fencing to screen from the wider landscape.

Where site offices are required, these shall be limited to single storey and temporary screen fencing used to screen offices from the wider landscape.

SDEMA4.5 Noise control (Subclause 4.2.5)

Construction traffic shall be routed as far as practically possible from potentially sensitive receptors.

A good working relationship between the developer and all potentially sensitive receptors shall be ensured by establishing communication channels to ensure prior notice to the sensitive receptor if work is to take place close to them. Information that should be provided to the potential sensitive receptor(s) include:

- Proposed working times;
- how long the activity is anticipated to take place;
- what is being done, or why the activity is taking place;

- contact details of a responsible person where any complaints can be lodged should there be an issue of concern.

When working within 500 m of a potential sensitive receptor, the number of simultaneous activities (e.g. construction of access roads, trenches, etc) shall be limited to the minimum as far as possible. Furthermore, working time shall be co-ordinated with periods when the receptors are not at home, where possible. An example would be to work within the 08:00 to 14:00 time-slot to minimize the significance of the impact because potential receptors are most likely at school or at work, minimizing the probability of an impact happening.

Use of the smallest/quietest equipment for the particular purpose shall be considered.

Ensure that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures.

SDEMA4.6 Fuel (Petrol and Diesel) and oil (Subclause 4.2.7)

Fuels in the form of diesel and petrol shall not be stored within 32 m from the top of the river banks/water courses/drainage lines.

SDEMA4.7 Equipment Maintenance and Storage (Subclause 4.2.8)

Wastewater generated from construction or the washing of vehicles shall not be permitted to enter water courses, either directly or via a stormwater system.

SDEMA4.8 Stormwater Erosion Control (Add Section 4.2.10)

A stormwater management plan shall be compiled and implemented. The plan shall ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan shall include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures shall promote the dissipation of storm water run-off. Establish the stormwater system as a priority, so that all runoff is led to the designated drainage from the site.

The Contractor shall take reasonable measures to control the erosive effects of stormwater runoff. Any runnels or erosion channels developed during the construction period or during the maintenance period shall be backfilled and compacted to limit the impacts of sediment deposition into the surrounding aquatic environment.

Run-off over any exposed areas should be mitigated to reduce the rate and volume of run-off and prevent erosion occurring on the site and within the freshwater features and drainage lines.

Contaminated runoff from the construction site(s) should be prevented from entering the rivers/streams.

SDEMA4.9 Method Statements (Subclause 4.3.1)

The following additional method statements shall be provided by the Contractor within 14 days of the receipt of the Letter of Acceptance and prior to the activity covered by the Method Statement being undertaken:

- Logistics for the environmental awareness course for all the Contractors employees.
- Emergency procedures for fire, accidental leaks and spillages of hazardous materials including:
 - who shall be notified in the event of an emergency, including contact numbers for the relevant local authority,
 - where and how any hazardous spills will be disposed of,
 - the size of spillage which the emergency procedures could contain,
 - location of all emergency equipment and an indication of how regularly the emergency equipment will be checked to ensure that it is working properly.
- Location and layout of the construction camp in the form of a plan showing offices, stores for fuels, hazardous substances, vehicle parking, access point, equipment cleaning areas and staff toilet placement.
- Location, layout and preparation of cement/concrete batching facilities including the methods employed for the mixing of concrete and the management of runoff water for such areas. An indication shall be given of how concrete spoil will be minimised and cleared.
- Method of undertaking earthworks, including spoil management, erosion, dust and noise controls.
- Method of undertaking blasting.
- Management measures to be undertaken in instances where traffic flows may be interrupted.
- Extent of areas to be cleared, the method of clearing and the preparation for this clearing so as to ensure minimisation of exposed areas.
- Measures to be put in place during temporary closure periods, e.g. December holidays.
- Measures to be put in place to limit sediment deposition into the surrounding terrestrial and aquatic environment.

SDEMA4.10 Site Clearance (Subclause 4.3.4)

The Contractor shall strip the top material and root material of cleared vegetation (top 100-150 mm layer), for subsequent use during rehabilitation and re-vegetation. Top material shall be stripped from all areas of the Working Area where topsoil will be impacted by construction activities, including areas for temporary facilities, as directed by the Engineer. The Contractor shall not make use of herbicides or other chemical methods to clear the proposed site especially near the identified water courses. In order to limit erosion the Contractor shall retain original groundcover, as far as practically possible, adjacent to the aquatic environment and to the trenching line.

SDEMA4.11 No go areas (Subclause 4.3.7)

All works to be undertaken shall be within the boundary of the site. A “no go” area shall extend on either side of the working area i.e. all areas outside of the defined working area and designated access roads. The working area shall be demarcated in an appropriate manner determined by the Engineer. The “no-go” area shall be demarcated by a semi-permanent fence to prevent workers from entering the undisturbed areas.

Based on the ecological importance, all construction activities shall remain outside of all aquatic environments, with special efforts implemented to maintain a 32 m buffer between construction related activities and any rivers/water courses/drainage lines. These no go areas shall stay in place until construction of the infrastructure within the buffer area must commence.

The recommended ecological sensitivity and buffer areas indicated in **Figure 1.1 & 1.2** shall be demarcated as “no go” areas and construction activities shall remain outside these designated areas.

No equipment associated with earthworks shall be allowed outside of the site and defined access routes, or within “no go” areas, unless expressly permitted by the Engineer.

SDEMA4.12 Protection of flora and fauna (Subclause 4.3.9)

No flora shall be removed or damaged, outside of the designated working area, without specialist botanical input. The collection of firewood by construction workers should be prohibited.

Any snakes found on site shall be removed from site and released into an area away from the site, without harm.

The contractor shall ensure that the time a trench is left exposed is kept to a minimum, and that open trenches are inspected on a daily basis for animals which may have fallen or become trapped. Any animals found trapped in any trenches shall be freed without harm.

A vegetation rehabilitation plan shall be compiled and implemented with the aid of a rehabilitation specialist. The specialist is to recommend species to be used in rehabilitation as well as any special measures for rehabilitation such as shade-netting and alien vegetation removal. Restoration shall be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats. A plant rescue and protection plan shall be compiled and implemented which allows for the maximum transplant of conservation important species from areas to be transformed. This plan will be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.

Any of the cleared areas onsite that are not hardened surfaces shall be rehabilitated after construction is completed by revegetating the areas disturbed by the construction activities with suitable indigenous plants. Any disturbed areas shall be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.

An alien invasive management plan shall be compiled and implemented. The plan shall include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.

An open space management plan shall be compiled and implemented.

Noise shall be reduced and maintained to a minimum particularly with regards to blasting on the ridge-top associated with excavations for foundations. Blasting should not take place during the breeding seasons of the resident avifaunal community and in particular for priority species. Blasting shall be kept to a minimum and, where possible, synchronized with neighbouring blasts.

Disturbance associated with the operation of the facility shall be minimised, by scheduling maintenance activities to avoid and/or reduce disturbance in sensitive areas at sensitive times – such areas will be identified during the pre-construction and operational monitoring.

An avifauna and bat monitoring programme shall be compiled and implemented to document the effect of the construction period on avifauna and bats. This will be compiled by a qualified specialist.

SDEMA4.13 Protection of archaeological and paleontological remains (Subclause 4.3.10)

Should substantial fossil remains be exposed during construction, these should be safeguarded by the ECO, preferably *in situ*, and the South African Heritage Resources Association (SAHRA) should be notified by the ECO so that appropriate mitigation can be undertaken.

A general buffer of 500m is recommended for the distance between a heritage site and development including access roads (such as Zwagershoek and Pienaarskloof).

One LSA site on the North Plateau and one MSA and two LSA sites on the South Plateau shall require sampling (archaeological testing) and a permit from SAHRA should it be necessary to impact on the sites.

Areas known to have sensitive archaeological sites shall be avoided. An archaeologist shall be involved in the placement of the turbines and associated infrastructure in these sensitive areas.

In the case of unexpected exposure of below-ground archaeological material during excavations, SAHRA must be consulted immediately to ensure timeous implementation of appropriate mitigation measures. In the event of accidental uncovering of graves, work must stop immediately and the SAHRA Burials Unit must be notified. An archaeologist shall be involved to assist with the investigation and procedures to address the situation.

Old buildings shall be fenced off during construction to avoid vandalism of the buildings, kraal complexes must be avoided and access roads re-routed to avoid damage to the buildings.

SDEMA4.14 Access routes/ haul roads (Subclause 4.3.11)

Access roads shall be kept tidy.

The contractor shall ensure that all regulations relating to traffic management are observed and local traffic officials are informed of the proposed construction activities. As far as possible, attempts shall be made to ensure that high construction related road usage coincides with low traffic flow periods. If the roads through De Aar or Phillipstown are used as the access road, make use of this road only between 08h00 to 17h00 Monday to Friday for construction traffic.

Turbine components shall be transported overnight as far as possible.

Signage and safety measures during the construction of the access roads shall comply with the guidelines as set out in the latest issue of the SADC Road Traffic Signs Manual. Standard “construction ahead” warning signs should be placed on all relevant roads in the area. Ensure access roads are kept clean and storage of materials is screened.

A traffic management plan for the site access roads shall be compiled and implemented to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

A transportation plan shall be compiled and implemented for the transport of turbine components, main assembly cranes and other large pieces of equipment.

SDEMA4.15 Cement and concrete batching (Subclause 4.3.12)

No cement and / or concrete batching shall occur within the “no-go” areas or within 32 m from the top of river banks/water courses/drainage lines. Reasonable measures shall be implemented to limit contaminated surface run-off into the surrounding vegetation.

SDEMA4.16 Earthworks (Subclause 4.3.13)

Any blasting is to be executed by a suitably qualified person.

Controlled blasting techniques shall be employed to minimise dust and fly rock during blasting.

Prior to blasting the Contractor shall notify the relevant occupants/ owners of surrounding land and address any concerns. Buildings within the potential damaging zone of the blast shall be surveyed preferably with the owner present, and any cracks or latent defects pointed out and recorded either using photographs or video. All Local Authority regulations are to be adhered to and all service infrastructures are to be located prior to commencement of blasting activities.

Blasting or drilling shall take place during normal working hours. The Contractor shall notify emergency services, in writing, a minimum of 24 hours prior to any blasting activities commencing on site. Adequate warning must be issued to all personnel on site prior to blasting activities taking place. All legally required signals are to be clearly indicated. The Engineer shall be issued daily updates of the days intended blasting activities.

The Contractor shall prevent damage to special features and the general environment, which includes the removal of flyrock. Damage caused by blasting / drilling shall be repaired to the satisfaction of the Engineer.

Minimise areas disturbed at any one time and protect exposed soil against wind erosion, e.g. by dampening with water or covering with hessian.

SDEMA4.17 Community relations (Subclause 4.3.18)

Maintain a register that shall contain details of the measures taken to resolve complaints and the details of the communication of these measures to the person who raised the complaint.

SDEM4.18 Erosion and sedimentation control (Subclause 4.3.19)

Where necessary, sedimentation barriers shall be laid between the Work Area and the “no-go” areas to limit sediment deposition. The sedimentation barrier shall consist of a geotextile fabric stretched across and attached to supporting posts and stabilised with sandbags. The barrier shall be inspected daily and any damage shall be repaired immediately. Sediment deposits shall be removed once they reach half the height of the barrier.

An erosion management plan for monitoring and rehabilitating erosion events associated with the facility shall be compiled and implemented. Appropriate erosion mitigation shall form part of this plan to prevent and reduce the risk of any potential erosion.

Minimise duration and extent of construction activities in the river. Construction shall also preferably take place in the low flow season. Where access routes need to be constructed through ephemeral streams, disturbance of the channel should be limited.

Clearing of debris, sediment and hard rubble associated with the construction activities should be undertaken post construction to ensure that flow within the drainage channels are not impeded or diverted. Rehabilitate disturbed stream bed and banks and revegetation with suitable indigenous vegetation.

SDEMA4.19 Site closure and rehabilitation (Subclause 4.3.28)

All construction debris found within the disturbed areas shall be removed and disposed of at a registered landfill site.

A vegetation rehabilitation plan shall be compiled with the aid of a rehabilitation specialist, for inclusion in the Construction EMP. The plan shall recommend species to be used in rehabilitation as well as any special measures for rehabilitation such as shade-netting and alien

vegetation removal. The construction footprint associated with the activity shall be re-vegetated with indigenous vegetation, as directed by the rehabilitation plan. Disturbed areas shall be rehabilitated as soon as possible after construction.

Vegetated areas should preferably be watered if planted in the dry season to aid in establishment of plants; alternately rehabilitation should take place in the wet season; or as agreed with the rehabilitation specialist in the rehabilitation plan.

SDEMA4.20 Labour requirements (Add Subclause 4.3.32)

Recruitment shall be based on sound labour practices and with gender equality in mind. Obtain a list of locally available labour and skills. Preference shall be given to local communities.

Appropriate training shall be provided to enable individuals to apply their skills to other construction and development projects in the region once the construction phase is completed.

SDEMA5 COMPLIANCE WITH REQUIREMENTS AND PENALTIES**SDEMA5.1 Penalties (Subclause 5.2)**

Stop order works will be issued for the transgressions listed below. Stop order works may be issued per incident at the discretion of the Engineer.

- a) Any employees, vehicles, plant, or thing related to the Contractor's operations operating within the designated boundaries of a "no-go" area.
- b) Any vehicle driving in excess of designated speed limits.
- c) Persistent and unrepaired oil leaks from machinery.
- d) Persistent failure to monitor and empty drip trays timeously.
- e) The use of inappropriate methods for refuelling.
- f) Litter on site associated with construction activities.
- g) Deliberate lighting of illegal fires on site.
- h) Employees not making use of the site ablution facilities.
- i) Failure to implement specified noise controls
- j) Failure to empty waste bins on a regular basis.
- k) Inadequate dust control.
- l) A spillage, pollution, fire or any damage to any watercourse/ wetland resulting from negligence on the part of the Contractor.
- m) Any act, that in the reasonable opinion of the Engineer, constitutes a deliberate contravention of the requirements of these Specifications

The Engineer will determine what constitutes a transgression in terms of this clause, subject to the provisions of Clause 57(1) of the General Conditions of Contract. In the event that transgressions continue the Contractor's attention is drawn to the provisions of Sub-clause 55(1) of the General Conditions of Contract 2004 under which the Engineer may cancel the Contract.

5 OPERATIONAL FRAMEWORK EMP

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

The following components are identified/ described:

- **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.

This section contains the Operational Framework EMP table which constitutes the Operational Framework EMP. It is important to note that this Framework EMP has been compiled prior to authorisation of the proposed project and will be updated to include the conditions of the EA that will be issued by DEA as part of the EA.

Operational Framework Environmental Management Programme Table									
NO.	ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
1.	All Activities (wind energy facility)	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 wind energy facilities 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 ECO 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 Mulilo and the authorities.	ECO Mulilo	OEMP	Twice in the 1 st three years and then once every five years	Mulilo DEA
2.	Operational Activities (wind energy facility)	Protection of the surrounding environment (aquatic and terrestrial)	Effects that the operation and maintenance of the wind energy facility would have on the surrounding environment (including bats and avifauna)	Objective: To ensure that impacts on the surrounding biophysical environment are minimised during the operational phase. Mechanism: 1) Curtail turbine locations to a preliminary cut-in speed of 5 to 5.5 meters/second or as recommended by the	No dead birds or bats are found on site.	ECO Avifaunal Specialist Bat Specialist Mulilo	Environmental Management Procedures OEMP	As per the schedule of the avifaunal monitoring programme detailed in Section 5 below. As per the schedule of the	Mulilo DEA

Operational Framework Environmental Management Programme Table

NO.	ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
				findings of the bat monitoring program. 2) Undertake affordable long term monitoring of bats and the potential impacts of turbines on them and fine tune mitigation based on the outcome of the monitoring programme compiled with the aid of a bat specialist ³ . 3) Implement mitigation measures for protection of avifauna based on the outcome of the avifaunal monitoring programme. 4)				bat monitoring programme to be established.	
3.	All Activities (wind energy facility)	Protection of the surrounding environment (aquatic and terrestrial)	Effects that the operation and maintenance of the wind energy facility would have on the surrounding environment (including local flora, fauna, bats, avifauna and	Objective: To ensure that impacts on the surrounding biophysical environment are minimised during the operational phase. Mechanism: 1) During maintenance activities limit movement in disturbed areas.	The surrounding environment including aquatic and terrestrial ecology is not impacted on.	ECO Mulilo	Environmental Management Procedures OEMP	As maintenance is required on site.	Mulilo DEA

³ This should include 12 month long term monitoring (preferably prior to construction) where bat detectors are deployed on the site and passively recording bat activity every night. Additionally the site should be visited by a bat specialist quarterly to assess and compare the bat activity on a seasonal basis. The wind speed data gathered by meteorological masts can then be correlated with bat activity to determine the most feasible cut-in speed and fine tune other mitigation measures.

Operational Framework Environmental Management Programme Table

NO.	ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
			watercourses around the proposed development.	2) Any areas disturbed during maintenance should be rehabilitated. 3) Ensure ongoing implementation of the storm water management plan to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. 4) Ensure ongoing implementation of the open space management plan. 5) Ensure ongoing implementation of the alien invasive and vegetation rehabilitation management plans .					
4.	All Activities (wind energy facility)	Environmental management of the operational phase	Positive impacts on socio-economic environment during operation	Objective: To ensure that the operation of the wind energy facility maximises positive impacts on the socio-economic environment. Mechanism: 1) Train local people for operation and	Consult annual skills and training records, employment records and proof of staff residency in the area prior to employment	ECO Mulilo	Environmental Management Procedures OEMP	During Operational Phase (full lifetime) when the need arises to employ people.	Mulilo DEA

Operational Framework Environmental Management Programme Table

NO.	ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
				<p>maintenance of facility.</p> <p>2) Employ local labour for the operational phase, where possible, and particularly for day to day operations and maintenance.</p>					
5.	All Activities (wind energy facility)	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> <p>3) Turbines should be maintained in operational condition.</p>	Condition of the project infrastructure and roads.	Mulilo	Environmental Management Procedure OEMP	As required based on annual inspections of the project	Mulilo DEA

6 DECOMMISSIONING

The proposed projects have a project lifespan of 20-30 years, based on the mechanical characteristics of the turbines. However, as all the infrastructure, such as roads, transmission, substations and foundations would already be established, and the energy source (wind) is a renewable one, the proposed projects would most likely continue to be operated after 20-30 years. Turbines would be upgraded to make use of the latest technology available. All redundant equipment that was replaced would be removed from site and would be sold off.

The following activities would form part of any decommissioning:

1. Site preparation activities would include confirming the integrity of the access to the site to accommodate the required equipment and lifting cranes, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.
2. A large crane would be brought on site to disassemble the turbine and tower sections. These components would be reused, recycled and disposed of in accordance with regulatory requirements. All parts of the turbines would be considered reusable or recyclable, except for the blades.

If the facility is decommissioned then the site would be fully rehabilitated in accordance with requirements in terms of relevant legislation such as the National Environmental Management Act. The concrete bases of the turbines, transformers and transmission lines could be removed, but would most likely be left under the ground, to avoid disturbing rehabilitated areas once more. The turbines would be removed as described above. All roads would be left on site, as it would assist the farmer in accessing his land.

A rehabilitation cost of R52 million has been budgeted for decommission of the plant.

7 CONCLUSION

In conclusion it should be noted that the LEMP should be regarded as a living document and changes should be made to the LEMP as required by project evolution, while retaining the underlying principles and objectives on which the document is based.

The compilation of the LEMP has incorporated impacts and mitigation measures from the EIAR as well as incorporating principles of best practice in terms of environmental management. By identifying the potential impacts, mitigation measures, performance indicators, responsibilities, available resources, potential schedule and verification responsibility, the LEMP has provided a platform on which both the construction phase and the operational phase EMPs can be founded. The LEMP has ensured that the individual EMPs will be able to incorporate mitigation measures based on the project in its entirety as opposed to phase-specific measures.

APPENDIX A
CURRICULUM VITAE OF
ENVIRONMENTAL ASSESSMENT
PRACTITIONERS

APPENDIX B
CONSTRUCTION EMP GENERAL
SPECIFICATIONS
(COMPREHENSIVE)
