

**WIND ENERGY FACILITY ON KANGNAS FARM
NEAR SPRINGBOK IN THE NORTHERN CAPE**

**FINAL LIFE-CYCLE ENVIRONMENTAL
MANAGEMENT PROGRAMME**

DEA 14/12/16/3/3/2/346

NOVEMBER 2015



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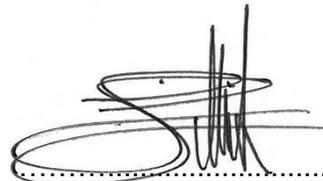
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PROJECT DETAILS

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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
EIR	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 Final Life-Cycle Environmental Management Programme (LEMP) for the proposed Wind Energy Facility (WEF) on Kangnas and Smorgenskadu Farm near Springbok in the Northern Cape.

1.1 Purpose of the LEMP

The draft LEMP was included in the Environmental Impact Assessment Report (EIR) 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.

This final LEMP aims to align and optimise of environmental management processes with conditions of authorisation, thereby ensuring that identified environmental considerations are efficiently and adequately taken into account during all stages of development and promoting compliance with the conditions of authorisation.

As part of the LEMP specific management plans were requested by the DEA. In addition to the management plans provisional Bird and Bat monitoring plans are also developed and appended herewith and should guide the appointed specialists in developing and implementing monitoring. These ancillary plans are tabulated below and are included as annexures to the LEMP.

Table 1: Management and Monitoring Plans for Kangnas WEF

Plan	Annexure
Erosion Management Plan	Annexure B1
Hazardous Substance Management Plan	Annexure B2
Plant Rescue, Protection, Rehabilitation and Re-Vegetation Plan	Annexure B3
Stormwater Management Plan	Annexure B4
Traffic Management Plan	Annexure B5
Bird and Bat Monitoring	Annexure B6

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 triggered 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 and 16 of Regulation R546 (18 June 2010). As the project triggers listed activities in terms of Regulation R544, R545 and R546 it was necessary to submit an Environmental Impact Assessment Report (EIR) for Environmental Authorisation (EA) to the Department of Environmental Affairs (DEA). Section 22 (l) of the EIA Regulations require that an EMPr is submitted as part of the EIR. The resulting EA must be kept on site during the construction and operational phases for inspection.

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 EMPr must address the identified / assessed potential environmental impacts of the proposed activity on the environment throughout the project life-cycle. The Department required that the draft EMPr be submitted together with the EIR and was considered simultaneously, and as a condition in the EA has requested that the EMPr be updated (finalised) and resubmitted to the Department prior to the commencement construction (as represented by the current revision). Table 2 lists the requirements of an EMPr as stipulated by Section 33 of the EIA Regulations R543. Table 3 lists the requirements of an EMPr as stipulated by Section 24N (2) and (3) of the NEMA (as amended).

Table 2: 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)'s *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPs. The guideline defines EMPs as:

“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:

“EMPs 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 EMPs 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 EMPs may be required for the specific activities that form part of the larger development”.

Table 3: 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 EMPr requirements as legislated by the NEMA Regulations (as amended) as well as falling in line with the guideline document for an Environmental Management Plan¹. 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

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 EMPr based on identified impacts and mitigation measures from the EIR (Chapter 3);
3. Operational Framework based on identified impacts and mitigation measures from the EIR (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 EMPr 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 **Annexure E**.

¹ 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 WEF. 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

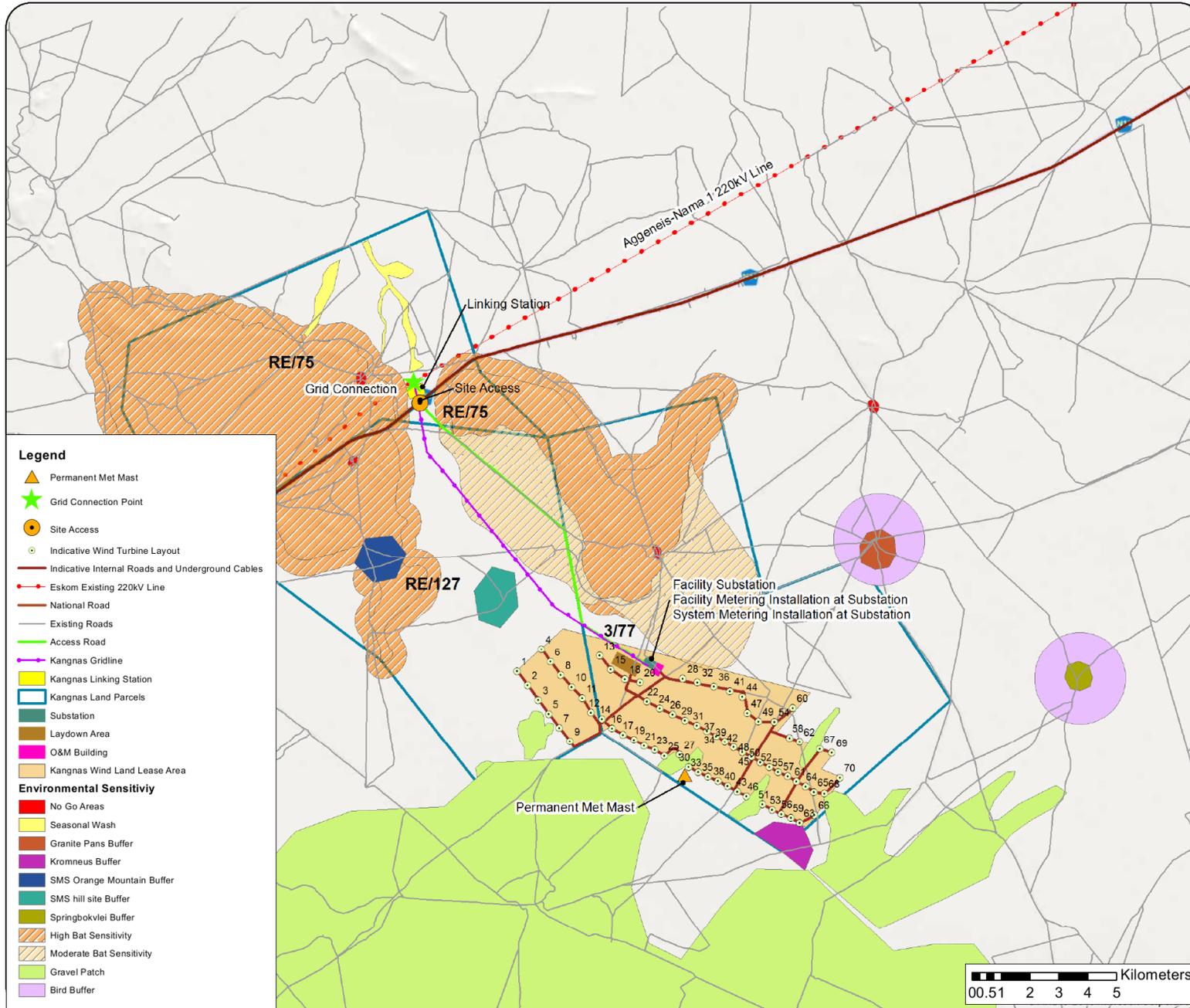
South Africa Mainstream Renewable Power Kangnas (Pty) Ltd (Mainstream) intends to develop a 140MW WEF on farms near Springbok in the Northern Cape (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1). Aurecon South Africa (Pty) Ltd (Aurecon) undertook the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream, as well as the finalisation of the EMPr as required by the EAs (Aurecon, 2013).

The proposed projects entail the generation of electricity from wind resources. The construction period will entail approximately 12 - 18 months for the proposed WEF. The proposed WEF would consist of 140MW of installed capacity, the turbine sizes would range between 1.5MW – 3.5MW and consist of between 94 (using 1.5MW machines) to 40 turbines (using 3.5MW machines). An onsite connection is proposed via an existing 220 kilovolt Eskom line (DEA, 2014).

The proposed project would take place on the farms Kangnas (Farm No. 77 Portion 3 and the Remainder) and Smorgenschaduwe (Farm No. 127 Portion 0) in the Northern Cape. These farms are located approximately 48km east of Springbok and are accessed via the N14. Figure 1 shows the entire project layout and the components are described under respective headings to follow.

DEA rejected the EMPr and specifically requested that the following drawings and maps be included in this report, please refer to Annexure F for the following maps and drawings:

- Environmental sensitivities map
- Final project layout
- Final Layout overlain on the environmental Sensitivities map



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Site Coordinates:

X-Coordinate: 18.359
Y-Coordinate: -29.6177

Map Orientation: N, S, E, W

Regional Map: SOUTH AFRICA, Cape Town, BOTSWANA, MOZAMBIQUE, SWAZILAND, Lesotho, Gaborone, Pretoria, Maseru. **SITE LOCALITY** is marked in the Northern Cape region.

Revision: None

Scale on A3: WGS84 UTM ZONE 34S

Created By: DAVID DEAN

Checked By: SHELDON VANDREY

Date: 19 NOVEMBER 2015

Project: Kangnas Wind Farm

Map Title: Project Facility

Logo: MAINSTREAM RENEWABLE POWER

Figure 1: Project overview

2.2 Project components (DEA DEA14/12/16/3/3/2/346, as amended)

The proposed WEF will comprise of the following infrastructure, which is covered by this LEMPr and EA (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1) (shown in Figure 1):

- Construction of 140MW capacity with wind turbines ranging between 94 (1.5MW) and 40 (3.5MW) capacity and associated infrastructure including:
 - O&M Building;
 - Construction laydown area;
 - Hard standings of approximately 40m by 40m alongside turbines;
 - Access following existing farm road and service roads of 4m to 10m wide between turbines;
 - Underground or above ground medium voltage collector circuit lines connecting the turbines to the main substation (Kangnas substation); and
 - One onsite collector station or main substation (Kangnas substation) to collect low voltage generated electricity.

Please refer to Annexure F for the following maps and drawings which relate specifically to this description and the affected area:

- Environmental sensitivities map
- Final project layout
- Final Layout overlain on the environmental Sensitivities map

2.2.1 Associated infrastructure

a) *Kangas substation and 132kV transmission line (DEA14/12/16/3/3/2/386, as amended)*

A proposed 132 kV transmission line associated with DEA14/12/16/3/3/2/386 (as amended) is dealt with under a separate LEMPr and will comprise of the following infrastructure (shown in Figure 1):

- One onsite collector station or main substation (Kangnas substation) to step low voltage up to 132kV and link with the overhead power lines.
- ~12.8km 132kV double overhead transmission line and pylons connecting the main onsite substation (Kangnas) and linking substation (Groeipunt).
- Access road (gravel tracks) up to 6m wide where required for construction and maintenance of the transmission lines. Only where access is not provided by the Kangnas WEF access road or other existing roads.

b) *Linking substation and 220kV transmission line (DEA14/12/16/3/3/2/447 as amended)*

The proposed linking substation and 220kV loop in loop out transmission line associated with DEA14/12/16/3/3/2/447 (as amended) is dealt with under a separate LEMPr will comprise the following infrastructure (shown in Figure 1):

- A 100m by 100m linking substation (Groeipunt) to step voltage up from 132kV to 220kV. Eskom required switchgear, telecommunication, storage, control room, access road, bus bars, overhead gantries, fencing and all other generic substation infrastructure.

- A ~ 200m double line, loop-in-loop-out 220kV connection between the Groeipunt substation and the existing Eskom (Nama- Aggeneis) 220kV line running past the northern boundary of the linking substation.
- Access road (gravel tracks) up to 6m wide where required for construction and maintenance of the transmission lines. Only where access is not provided by the Kangnas WEF access road or other existing roads.

2.3 Design of the project

The design for the proposed development should respond to the identified environmental constraints and opportunities at the time of mobilisation for construction. Given the amount of time since authorisation, a walkthrough needs to be conducted with a bat, bird, botanical specialist and the appointed ECO and minor adjustments or micro siting of infrastructure undertaken where necessary. This would take place only after the initial surveying and setting out by the Contractor, so that the location of the facilities. The following mitigation measures related to the design for the proposed developments have been recommended to reduce the environmental impacts:

- The holder of this authorisation must take note that no temporary site camps will be allowed outside the footprint of the development area as the establishment of such structures might trigger a listed activity as defined in the Environmental Impact Assessment Regulations, 2010 (DEA, 2014).
- No structures to be occupied or frequented by people shall be built within delineated servitude areas.
- **Avoid Platbakkies Succulent Shrubland** gravel patches.
- Restrict the construction footprint to the efficient minimum.
- **Micro-site turbines with the aid of a botanist, to avoid sensitive sites (EIA: Kangas WEF, 2013).**
- Place underground cables in shallow trenches alongside the internal access roads to avoid additional impacts to the disturbance caused by roads.
- Prior to commencement of construction, the Developer/contractor shall peg the layout of the facility and infrastructure routes and then shall appoint a bat, bird and botanical specialist to conduct a walkthrough with the ECO and the landowner. Where required, minor adjustments, to the layout will be made to improve the practicality of the layout with regard to existing layouts and avoid sensitive features (specific plants, burrows and nests, small rock outcrops, etc.) the project layout map will be amended to reflect these changes and forwarded to the Department for their records.
- At commencement of construction, the Developer/contractor shall peg the layout of the facility and infrastructure routes and arrange for a bat, bird and botanical specialist to conduct a walkthrough with the ECO. Where required, minor adjustments, to the layout will be made to avoid sensitive features (plants, nests, etc.) the project layout map will be amended to reflect these changes and forwarded to the Department for their records.
- The Project manager and ECO will make a record of the proposed changes and deviations arising from the micro-siting exercise and ensure that these do not impede into any identified sensitive areas, as identified during the EIA, without adequate justification.

These changes and relevant motivations shall be captured in the final layout and submitted to DEA.

- The results of the pre-construction bird monitoring programme dated October 2013 must inform the final layout and the construction schedule of the energy facility (DEA, 2014).
- Once approval of LEMP is received from DEA, a permit for the clearance (destruction of vegetation) should be applied for, where applicable, in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009). Protected species are listed as Schedule 1 (Specially protected), Schedule 2 (Protected) and Schedule 3 (Common indigenous).
- Appoint an avifauna specialist to monitor the local avifauna pre- and post-construction for a one year (12 month) period with monitoring scheduled in each of the four seasons as per as per Birdlife SA/Birds and Wind Energy Specialist Group requirements. Implement appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of the priority species listed in the Avifaunal Impact Assessment, or when collision or electrocution mortalities are recorded. Refer to the offset agreement regarding the Red Lark, entered into with BirdlifeSA, attached as Annexure D1.
- The facility must be designed to discourage the use of infrastructure components as perching or roosting substrates by birds and bats (DEA, 2014).
- Do not place turbines in the area indicated as having a High Bat Sensitivity (See Annexure F). Give special attention to areas of Moderate Bat Sensitivity and appoint a bat specialist to undertake post-construction monitoring prioritise these in post construction monitoring and implementation of mitigation measures;
- Take appropriate steps as agreed in consultation with bat specialist and the holder of the EA to mitigate impacts should any turbines be placed in moderate sensitivity areas;
- Avoid homesteads and interact with land owners with regards to the final turbine positioning, where turbines are in proximity to residences.
- Use LED lighting, where lighting is required.
- Keep lighting to an efficient minimum while still keeping within the safety norms (see Annexure 3 of the Visual Impact Assessment).
- No branding on the turbines.
- No lights on the blade tips (within safety limits).
- Locate any septic tanks at least 50m (measured from top of bank) from the ephemeral streams and at least 1,000m away from the springs or any boreholes/well points.
- Compile a storm water management plan and maintain storm water run-off infrastructure on site, refer to Annexure B4.
- Direct the storm water management plan to addressing runoff discharge into watercourses flowing across the site.
- Exclude development or disturbance from sensitive areas, including the Secretary bird nest site and the two wetland sites (the 'Granite Pan' and Steenbok Pan), currently outside

or on the edge of the footprint area for the WEF but could be impacted during the construction phase.

- Minimise the length of all new power lines installed, ensure that all lines have flight diverters, are adequately insulated and bird friendly when configured.
- Bury transmission lines connecting each turbine to the installation where possible to avoid avian collision with overhead lines.
- Adopt an exclusion zone of at least 1km from any identified Verreaux's eagle nests, to be confirmed upon site walk through by avifaunal specialist (likely not applicable as this was near the proposed solar energy facility).
- If relevant, avoid placing associated infrastructure (roads) in areas with a High Bat Sensitivity. No underground cabling should be laid in such areas, if so; plan for a more intensive vegetation rehabilitation to rectify the impact.
- Utilise existing road infrastructure, where possible, to minimize the overall disturbance and if access routes are to be constructed through ephemeral streams, maintain minimum disturbance.
- Maintain unrestricted stream flow at all crossings over drainage channels or stream beds, culverts should be designed cater for at least a 1:100 year flood flow.
- Coincide/ harmonise road infrastructure and power transmission lines to minimize the impact.
- Maintain a buffer of at least 30m (measured from top of bank) adjacent to the identified ephemeral streams and at least 500m from the springs (Refer to layout map).
- Consider 'Orange Hill' with its surrounds a no-go area and a buffer as shown in See Annexure F. The buffer is approximately 700m diameter.
- Consider 'SMS Hill' with its surrounds a no-go area and a buffer as shown in See Annexure F. The buffer is approximately east/west and 1.9km north/south (approximately 450m from all recorded heritage sources).
- Consider 'Gobees se Pan' with its immediate surroundings a no-go area and a buffer as shown in See Figure 1). The buffer is approximately 1.2km east/west and 1.3km north/south (approximately 350m from all recorded heritage sources).
- Consider 'Springbokvlei' with its immediate surroundings a no-go area and a buffer as shown in **Figure 1 and Annexure F** . The buffer is approximately 900m east/west and 1,000m north/south (approximately 200m from all recorded heritage sources).
- The potential graves and grave ARB2012/007 should be protected and conserved. SAHRA recommends that during the construction phase a temporary fence be built around them. The fence must be placed 2 meters away from the perimeter of the graves. No development is allowed within 20 meters from the fence line surrounding the burials. These graves must be indicated on all construction maps to ensure their continued protection.
- All perimeter fencing needs to be of a jackal proof standard, or as per agreement with neighbouring landowner. All internal fencing shall be "fit for purpose" unless otherwise specified and agreed to with the landowner.

- Maintain good sightlines on all road junctions.
- Engage with the roads authorities prior to construction to ensure the necessary road upgrades, permits, abnormal load traffic escorts, etc. are scheduled.
- Prevent the generation of disturbing or nuisance noises for example a transformer must be placed more than 200m away from any house.
- Where required, bridge design must be such that it minimise impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora (DEA, 2014).
- Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated (DEA, 2014).
- All wind turbines should be located at a setback distance of 500m from any homestead and a day/night noise criteria level at the nearest residents of 45dB(A) should be used to locate the turbines. The 500m setback distance can be relaxed if local factors; such as high ground between the noise source and the receiver, indicates that a noise disturbance will not occur (DEA, 2014).
- Positions of turbines jeopardizing compliance with accepted noise levels should be revised during the micro-siting of the units in question and predicted noise levels remodelled by the noise specialist, in order to ensure that the predicted noise levels are less than 45dB(A) (DEA, 2014).
- A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass (DEA, 2014).
- Lighting of main structures (turbines) and ancillary buildings should be designed to minimise light pollution without compromising safety, and turbines must be lit according to Civil Aviation Regulations (DEA, 2014).
- The holder of this authorisation must ensure that the operation of the wind facility shall comply with the relevant communication regulations or guidelines relating to electromagnetic interference, e.g. microwave, radio and television transmissions (DEA, 2014).
- The holder of this authorisation must obtain approval from the South Africa Civil Aviation Authority that the wind facility will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance (CNS) equipment, especially the radar, prior to commencement of the activity. A copy of the approval must be kept on site by the ECO (DEA, 2014).
- The holder of this authorisation must obtain approval from the South Africa Weather Services (WeatherSA) that the energy facility will not interfere with the performance of their equipment, especially radar, prior to commencement of the activity. A copy of the approval must be kept site by the ECO (DEA, 2014).
- Turbines must be positioned in such a way that shadow flicker does not affect any farm buildings (DEA, 2014).
- The final placement of turbines, roads and all other associated infrastructure must follow a micro-siting procedure involving a walk-through and identification of any sensitive areas by an ecologist, avifaunal specialists and bat specialists (DEA, 2014). This walkthrough

and micro siting exercise must be conducted in conjunction and with inputs from the ECO and the landowner. All changes to the layout must be motivated.

2.4 Biodiversity and offsets

- The holder of this environmental authorisation must sign an offset agreement with the provincial Department of Environmental Affairs and Nature Conservation (DENC) no later than when Financial Closure is reached for the proposed project. The holder of this environmental authorisation must offset by purchasing the Oranjefontein Farm (RE/129 RD Namaqualand), from Mr van Niekerk within six month of the initiation of construction activities of the wind farm, and this farm must be made available to DENC for nature conservation as agreed in the biodiversity agreement (DEA, 2014). Please refer to the signed offset agreement attached here as **Annexure D2**.
- The holder of this environmental authorisation must assist DENC or relevant authority in negotiation with Mr Agenbag, Mr Niekerk and Kennedy about Stewardships on the Inselbergs.
- The holder of this environmental authorisation must engage with Mr Agenbag (at their own expense) and assist with the negotiations for the purchase of Kaip between Mr Agenbag, DENC, Leslie Hill or any other 3rd party which DENC may want to involve.
- The holder of this environmental authorisation must appoint a lawyer to draft the legal terms or the offset agreement on receipt of this environmental authorisation (completed).
- Copies of the above agreements must be submitted to DEA for record keeping.
- Offset agreements are attached as annexures to this EMPr (Offset, Tripartite Biodiversity Agreement Kangnas Koeris DENC and Offset, Kangnas collaboration heads of terms (BirdlifeSA).

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 and rehabilitation measures and recommendations referred to in the EA are implemented and to monitor compliance with the provisions of the LEMP, thereby ensuring that identified environmental considerations are adequately addressed.

3.1 Roles and responsibilities

Client:

Mainstream (the holder of the EA) 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 a suitably qualified bird, bat, botanical specialist to undertake preconstruction walkthrough and infrastructure micro siting, where required, in conjunction with and with inputs from the ECO and landowner. All changes shall be marked and a motivation provided for their relocation. The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected and does not require a site visit unless the holder of the EA and / or ECO requires this.
- The Project manager and ECO will make a record of the proposed changes and deviations arising from the micro-siting exercise and ensure that these do not impede into any identified sensitive areas, as identified during the EIA, without adequate justification. These changes and relevant motivations shall be captured in the final layout and submitted to DEA.
- Appoint a bird and bat specialist to undertake post construction bird and bat monitoring in compliance with the relevant guidelines. Undertake long term (2 years) monitoring of bats and the potential impacts of turbines on them to effectively fine tune mitigation (EIA: Kangas WEF, 2013).
- 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.
 - An ECO must be appointed before commencement of any authorised activity and must be present at the pre-construction walk through and micro-siting exercise.
 - An ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.
 - Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring of the Department.
- Keep all records relating to monitoring and auditing on file and make it available for inspection to any relevant and competent authority in respect of the development.
- All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this authorisation, must be submitted to the Director: Compliance Monitoring at the Department.

- Submit an environmental audit report to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities.
- The environmental audit report must:
 - Be compiled by an independent environmental auditor;
 - Indicate the date of the audit, the name of the auditor and the outcome of the audit,
 - Evaluate compliance with the requirements of the approved EMPr and this environmental authorisation;
 - Include copies of any approvals granted by other authorities relevant to the development for the reporting period;
 - Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed;
 - Include a copy of this authorisation and the approved EMPr;
 - Include all documentation such as waste disposal records, hazardous waste landfill site licences etc. pertaining to this authorisation; and
 - Include evidence of adherence to the conditions of this authorisation and the EMPr where relevant such as training records and attendance records.
- Obtain a Water Use Licence, as determined by the DWS, from the Department of Water and Sanitation (DWS) prior to the commencement of the project. A copy of the license must be kept by the ECO.
- Fourteen (14) days written notice must be given to the Department that the activity commence. Commencement for the purposes of this condition includes site preparation, the notice must include a date on which it is anticipated that the activity will commence. This notification period may coincide with the Notice of Intent to Appeal period, within which construction may not commence.
- Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.
- Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.
- A copy of this authorisation and the approved LEMP must be kept at the property where the activity will be undertaken. The EAs and approved LEMP must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.
- Must notify both the Director: Integrated Environment Authorisations and the Director: Compliance Monitoring at the Department, in writing and within 48 (forty eight) hours, if any condition of this authorisation cannot be or is not adhered to any notification in terms of this condition must be accompanied by reasons for the non-compliance.
- Submit and annual environmental audit report to the DEA.

Project Manager

The Project Manager or Engineer shall:

- Shall have an oversight role with regards to the implementation of the EMPr and all technical specifications;

- Shall take note of the changes brought about by micro-siting exercise and ensure that Contractor keeps to the final, agreed project layout and, within reason, keeps his activities out and away from all identified sensitive areas.
- Have the authority to stop works and issue fines, as a result of non-compliances;
- Receive reports from the ECO and report to Mainstream; and
- Support the ECO in his/her roles and responsibilities and issue work instructions as may be required under the EMPr.

ECO

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

- i) Undertake a pre-construction walk through with the construction teams and specialists and be party to any decisions regarding micro-siting. The ECO shall provide written verification that the final layout is consistent with all discussions and agreements reached between the construction teams and specialists during the preconstruction walkthrough before being submitted to the DEA;
- ii) Liaison with the Client, Project Manager or Engineer and DEA;
- iii) Monitoring of all of the Contractor's activities for compliance with the various environmental requirements contained in the construction Specification;
- iv) Monitoring of compliance with the EA related to the construction phase as issued by DEA as well as other relevant environmental legislation;
- v) Reviewing of the Contractor's environmental Method Statements;
- vi) Discuss the conditions of the EA and the content of the LEMP with the contractors prior to any site clearing occurring and ensure that all protection measures are in place to protect sensitive and no go areas;
- vii) Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- viii) Ensuring the proactive and effective implementation and management of environmental protection measures;
- ix) 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;
- x) Routine recording and reporting of environmental activities on a monthly basis or more frequently if required;
 - a. Keep record of all activities on site, problems identified, transgressions noted and a schedule of tasks undertaken by the ECO
 - b. Keep and maintain a detailed incident (including spillage of bitumen, fuels, chemicals or any other material) and complaint register on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.
 - c. Keep copies of all reports submitted to the Department.
 - d. Keep and maintain a schedule of current site activities including the monitoring of site activities.
 - e. Inspect and report on any electrified jackal proof fencing and verify that routine inspections are being carried out and that fence design is fit for purpose.

- f. Obtain and keep record of all documentation, permits, licences and authorisations such as waste disposal records, hazardous waste landfill site licences etc. required by this facility.
- g. Compile a monthly monitoring report.
- xi) Recording and reporting of environmental incidents.
- xii) Attend site meetings if required or at the very least receive site meeting minutes.

The duties of the Environmental Auditor during operation phase will include:

- i) Liaison with the Client and DEA on matters pertaining to environmental management of the facility;
- ii) Undertake annual audits 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.
- v) Compile and annual audit report for the operator and proponent. The operator or proponent should in turn submit this to the DEA.

The contractor

The contractor shall be responsible for ensuring that his activities are compliant with the EMPr and shall make the required financial and physical resource provisions needed to ensure compliance. The Contractor shall appoint, in writing, a member of his staff to the role of Environmental Officer (EO) for the duration of his contract. The EO shall have the following duties:

- Undertake routine environmental awareness training with staff;
- Schedule, plan and oversee any environmental aspects of the project;
- Develop the project in accordance with the final layout as submitted to DEA and ensure that all construction activities are confined to the agreed site or footprint;
- Undertake daily inspection of the works to ensure the requirements of the EMPr are being fulfilled;
- Liaise with the Developer, Project Manager, and ECO on matters relating to environmental management;
- Oversee corrective actions associated with non-compliance observations noted by the ECO;
- Collect data required by the ECO and submit these as part of monthly returns;
- Report any incidents to the ECO and follow-up with a written report within 24hrs indicating causation, containment or remediation actions taken.

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 the Project Specification Data, addressing general construction issues and issues that are not addressed by the General Specifications. It should be noted that the Specification Data in this section was revised as required post authorisation to ensure that all relevant conditions of the EA and amended EA have been addressed.

The complete General Specifications have been included in **Annexure A** 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 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.

4.1 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 proposed WEF on Kangnas Farm near Springbok in the 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. No rubble, earth or other material shall be dumped within the Eskom servitude restriction area.

Topsoil (100mm--200mm) 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. Stockpile all topsoil (if any) in a suitable

location and re-utilise it for landscaping / rehabilitation. All cleared vegetation must be stored for use as seed supply and mulch during construction (EIA: Kangas WEF, 2013).

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. Hazardous wastes (if any) shall only be sent to landfill sites registered for hazardous wastes.

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.

Hazardous waste such as bitumen, oils, oily rags, paint tins etc. must be disposed of at an approved waste landfill site licensed to accept such waste (DEA, 2014). Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore, no chemicals must be stored nor may any vehicle maintenance occur within 350m of the temporal zone of wetlands, a drainage line with or without an extensive floodplain or hillside wetlands (DEA, 2014).

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 50m 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 50m from the top of the river banks/water courses/drainage lines. Any septic tanks constructed for the project should be located at least 50m (measured from top of bank) from the ephemeral streams and at least 1,000m away from the springs or any boreholes/wellpoints. 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. Provide regularly serviced ablution facilities at least 50m away from any drainage areas/ephemeral streams and within terms of the EMPr for the construction phase (EIA: Kangas WEF, 2013).

SDEMA4.2 Solid Waste Management (Subclause 4.2.2)

An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling and re-use options where appropriate. Where solid waste is disposed of such disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environment Management Waste Act, 2008 (Act 59 of 2008) (DEA, 2014).

Burying or burning of solid waste shall be prohibited on site. A waste management system shall be established to ensure regular waste removal and disposal at a licensed landfill. Properly store and contain all materials on the construction sites. Manage waste disposal properly. Strictly control all litter (EIA: Kangas WEF, 2013). No dumping or stockpiling of waste (EIA: Kangas WEF, 2013).

Areas around fuel tanks must be bunded or contained in an appropriate manner as per requirements of SABS 089:1999 Part 1 (DEA, 2014). Leakage of fuel must be avoided at all times and if spillage occurs, it must be removed immediately (DEA, 2014). Temporary bunds must be constructed around chemical storage to contain possible spills (DEA, 2014). Spill kits must be made available on-site for the clean-up of spills (DEA, 2014).

No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity (DEA, 2014).

The holder of this authorisation must provide sanitation facilities within the construction camps and along the road so that workers do not pollute the surrounding environment. These facilities must be removed from the site when the construction phase is completed as well as associated waste to be disposed of at a registered waste disposal site (DEA, 2014).

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 effluent or dewatering discharge be necessary, it will require the engineer's approval prior to commencing with such discharge. 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 300mm 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.

No discharge of effluents or polluted water must be allowed into any rivers or wetland areas (DEA, 2014). If construction areas are to be pumped of water (e.g. after rains), this water must be pumped into an appropriate settlement area, and not allowed to flow into any rivers or wetland areas (DEA, 2014).

SDEMA4.4 Site Structures (Subclause 4.2.4)

No site structures shall be located within 50m 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 500m 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. The use of the smallest/quietest equipment for the particular purpose should be considered. Ensure that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures.

Further measures pertaining noise management include:

- Ensure equivalent A-weighted daytime noise levels below 45dBA at potentially sensitive receptors;
- Ensure that maximum noise levels at potentially sensitive receptors be less than 65dBA;
- Prevent the generation of disturbing or nuisance noises for example a transformer must be placed more than 200m away from any house
- Ensure acceptable noise levels (SANS guidelines) at surrounding stakeholders and potentially sensitive receptors;
- Ensuring compliance with the Noise Control Regulations;
- Ensure that equipment is well-maintained and fitted with correct and appropriate noise abatement measures (EIA: Kangas WEF, 2013).
- If any noise complaints are received, noise monitoring should be conducted at the complainant, followed by feedback regarding noise levels measured.
- The holder of this authorisation must ensure that the National Noise Control Regulations and SANS10103:2008 are adhered to and measures to limit noise from the work implemented (DEA, 2014).
- The construction crew must abide by the local by-laws regarding noise; and where possible construction work should be undertaken during normal working hours (06H00 – 22H00; adopted from SANS 10103:2008.), from Monday to Saturday; If agreements can be reached (in writing) with all the surrounding (within a 1km) potentially sensitive receptors, these working hours can be extended. It is noted that there are no sensitive noise receptors within 1 km of the construction site.
- The holder of this authorisation must ensure that the construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment (DEA, 2014).
- The holder of this authorisation must ensure that all equipment and machinery are all maintained and equipped with silencers (DEA, 2014).
- The holder of this authorisation must provide a prior warning to the community when a noisy activity e.g. blasting is to take place (DEA, 2014).
- Construction staff must be trained in actions to minimise noise impacts (DEA, 2014).

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 350m from the top of any 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 and Erosion Control (Add Section 4.2.10)

A stormwater management plan has been compiled and shall be implemented. The plan shall ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. 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. Armour any steep or large embankments that are expected to be exposed during the 'rainy' months. Use a fascine structure consisting of a natural wood material to strengthen earthen structures or embankments (EIA: Kangas WEF, 2013).

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. Undertake storm water control and wind screening where earth works are required, prevent soil loss (EIA: Kangas WEF, 2013).

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 any rivers/streams. Withhold activities in the event of heavy rains to reduce the risk of erosion (EIA: Kangas WEF, 2013).

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 100-200 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. Wherever possible, restrict construction activities to designated turbine sites and lay-down areas (EIA: Kangas WEF, 2013). Rehabilitate previously modified areas and control invasive alien plant growth (EIA: Kangas WEF, 2013).

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 50m 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 and Annexure F** shall be demarcated as “no go” areas and construction activities shall remain outside these designated areas. These include the following no - go heritage areas:

- (i) “Orange Hill” with a buffer of 700 m,
- (ii) “SMS Hill” with approximately a 450m buffer from all recorded heritage sources,
- (iii) “Gobeesvlei and its immediate surroundings with a buffer of 350m and
- (iv) Springbokvlei with a buffer of 200 m.
- (v) 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.

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.

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. No vegetation or animal carcasses may be removed from the site without a DENC permit, if applicable. Should removal of materials from site be required for scientific study / assessment, the relevant specialist shall apply for the relevant DENC permits at the time.

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 has been compiled and is attached here as Annexure B3. 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. Where indigenous vegetation will be affected, a plant rescue and protection plan shall be implemented (refer to Annexure B3) which allows for the maximum transplant of conservation important species from areas to be transformed. It is recommended that a rehabilitation specialist be consulted during the rehabilitation phase to advise on the best manner to achieve restoration objectives (i.e. natural vegetative cover).

Any of the cleared areas onsite that are not hardened surfaces shall be rehabilitated after construction is completed by breaking up any compacted soils, undertaking a single heavy irrigation of the area, and the manual packing of cleared vegetation mulch and, where necessary revegetating the areas disturbed by the construction activities with suitable indigenous plants or as determined through consultation with the relevant specialist. Any disturbed areas shall be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. A slow and natural succession approach to rehabilitation should be promoted and should continue through the operations phase.

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.

The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction (DEA, 2014). 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. Disturbed areas must be rehabilitated as soon as possible after construction with locally indigenous plants, if required by the rehabilitation / botanical specialist, to enhance the conservation of existing natural vegetation on site (DEA, 2014).

Vegetation clearing must be limited to the authorised footprint (DEA, 2014). Before the clearing of the site, the appropriate permits must be obtained from the Department Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act, if required, and from the relevant provincial department for the destruction of species protected in terms of the specific provincial legislation. Copies of the permits must be kept by the ECO (DEA, 2014).

Construction activities must be restricted to demarcated areas to restrict the impact on sensitive environmental features (DEA, 2014).

The holder of this authorisation must ensure that all the "No-go" and buffer areas are clearly demarcated (using fencing for small sites closer to the works and / or appropriate signage for larger areas or those further from the works, at the discretion of the ECO) before construction commences (DEA, 2014), to the satisfaction of the ECO. Contractors and construction workers must be clearly informed of the no-go areas (DEA, 2014).

Where roads pass right next to major water bodies, provision shall be made for fauna such as toads to pass under the roads by using culverts or similar structures (DEA, 2014). No activities will be allowed to encroach into a water resource without a water use license being in place from the Department of Water Affairs (DEA, 2014). Bridge design must be such that it minimise impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora (DEA, 2014).

All areas of disturbed soil can, if required by the rehabilitation / botanical specialist, be reclaimed using only indigenous grass and shrubs. Reclamation activities shall be undertaken according to the rehabilitation plan to be included in the final EMPr (DEA, 2014). Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation (DEA, 2014).

No exotic plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised (DEA, 2014). Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing and must be temporarily stored in a demarcated area (DEA, 2014). Removal of alien invasive species or other vegetation and follow-up procedures must be in accordance with the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (DEA, 2014).

The DEA have included a condition that "Electric fencing should not have any strands within 30cm of the ground, which should be sufficient to allow smaller mammals, reptiles and leopard tortoises to pass through, but still remain effective as a security barrier (DEA, 2014)". However, local experience suggests that this leaves too large a space and allows burrowing animals to dig under fences, providing access points for the predators. Thus we recommend that if new electric fences are used as part of the Jackal proofing that the landowner, DENC and the Predator Management Forum (PMF) be jointly consulted to determine the most suitable design for the fence, based on the local site characteristics and current best practice for the area. The PMF's best practice guidelines (Predator Management Forum, 2015) should be used as the basis for the design, which reads:

- Electrical fencing can be very useful but it poses a danger to animals such as tortoises, pangolins and Cape monitors (likkewaan). The electric conductors should be installed in such a way that it would not trap or eventually electrocute these animals.
- Install the earth conductor 10 cm above the ground to keep the mentioned animals away from the electrified fence. Install the first live conductor at a height of 20 cm above the ground.
- Install the upper electric wire 15 cm above the ordinary fence.
- Fences must be equipped with alarms that will trigger if any animal becomes entangled. These entrapped animals should be freed immediately. If they are injured, these injuries should be treated by a veterinarian and released afterwards.
- Charges on the fences should be on a setting that will not apply a lethal shock."

Where there is uncertainty with a fence design, DENC, the PMF and landowner should be consulted to provide guidance. The Client shall also arrange to undertake routine inspections of any electrified portions of the fencing and ensure that jackals cannot get through the fences and that no non-target

species are being harmed or ensnared. During the Construction phase the ECO shall also undertake inspections to verify this and report on it. Where fences are not meeting these objects further design modifications should be made in consultation with DENC, the PMF and the affected landowner.

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

The ECO shall be alerted to the two known fossil sites within the site as well as possibility of fossil remains being found either on the surface or exposed by fresh excavations during construction. Should substantial fossil remains be exposed during construction, these should be safeguarded by the EO, preferably *in situ*, and the South African Heritage Resources Association (SAHRA) should be notified by the EO so that appropriate mitigation can be undertaken. Work in the affected area may only recommence on instruction from the engineer / developer.

In the case of unexpected exposure of below-ground archaeological or fossil 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 or palaeontologist shall be involved to assist with the investigation and procedures to address the situation. A temporary fence to be built around potential graves and grave ARB2012/007. The fence must be placed 2 meters away from the perimeter of the graves. No development is allowed within 20 meters from the fence line surrounding the burials. These graves must be indicated on all construction maps to ensure their continued protection (EIA: Kangas WEF, 2013).

All buffer zones recommended in the specialist environmental reports be respected; the archaeology which is largely clustered around hills and pans, will be protected by these buffers (DEA, 2014). The location identified as sensitive should also be protected by buffers and activities within these zones shall be cleared with the ECO. These should be 1.5km in diameter for Orange Hill, 1.5km east/west and 1.9km north/west for SMS Hill, 1.2km east/west and 1.3 km north/south for Gobees se Pan, 0.9 km east/west and 1.0 km north/south for Springbokvlei and 1.0 km in radius from the Kromneus rock art sites. The pan at KNG2012/007 does not require a buffer (Environmental Authorisation for Kangnas Wind Energy Facility, 2014).

The potential graves and grave ARB2012/007 should be protected and conserved. A temporary fence must be built around them during construction. Fence must be placed 2 meters away from the perimeter of the graves. No development is allowed within 20m from the fence surrounding the burials. Alternatively, if the areas fall within the development footprint, list excavation must be undertaken, upon receipt of a permit from SAHRA (Environmental Authorisation for Kangnas Wind Energy Facility, 2014). Final layout for the turbines must take cognisance of the above and ensure that all identified heritage resources. If concentrations of archaeological heritage material, fossils and human remains are uncovered during construction, all work must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) (1.1 642 4502) so that a systematic and professional investigation/ excavation can be undertaken (Environmental Authorisation for Kangnas Wind Energy Facility, 2014). The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected (DEA, 2014).

Construction managers/foremen must be informed before construction starts on the possible types of heritage sites and cultural material they may be encountered and the procedures to follow when they find sites (Environmental Authorisation for Kangnas Wind Energy Facility, 2014). All buffers and no-go areas stipulated in this report must be adhered to for both the facilities and all roads and powerlines (DEA, 2014).

Should any human remains be uncovered during development they must be immediately protected in situ and reported to the heritage authorities or to an archaeologist. The remains will need to be exhumed at the cost of the developer (Environmental Authorisation for Kangnas Wind Energy Facility, 2014).

All construction and maintenance crew and vehicles (except small vehicles which may be existing farm tracks) should be kept out of the buffer zones (DEA, 2014).

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

Access roads shall be kept tidy, safe and maintained on an as needed basis. A designated access to the site must be created and clearly marked to ensure safe entry and exit (DEA, 2014).

Eskom's rights and services shall be acknowledged and respected at all times. Unobstructed access shall be granted to Eskom to access their servitudes.

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. Off road driving is strictly prohibited. Vehicles shall only be permitted to pass one another where the road is wide enough or where sidings have been provided for the purpose. Exceptions may be authorised by the ECO / Engineer (i.e. delivery of irrigation water to rehabilitation sites).

Turbine components shall be transported during low traffic periods (i.e. not scheduled during school holidays, and avoiding town centres during peak traffic times. Implement traffic control measures where necessary (EIA: Kangas WEF, 2013). Transport components overnight as far as possible (EIA: Kangas WEF, 2013).

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. Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuter, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time (DEA, 2014). Signage must be erected at appropriate points warning of turning traffic and the construction site (DEA, 2014). Ensure access roads are kept clean and storage of materials is screened where it may cause visual impacts.

A traffic management plan for the site access roads shall be implemented (refer to Annexure B5) 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 implemented (refer to Annexure B5) for the transport of turbine components, main assembly cranes and other large pieces of equipment. Construction vehicles carrying materials to the site should avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations (DEA, 2014).

Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas

or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats (DEA, 2014).

Internal access roads must be located to minimize stream crossings. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity (DEA, 2014). Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak (DEA, 2014). All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises (DEA, 2014).

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 50m from the top of any 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.

Blasting should not take place during the breeding seasons (mostly spring) of the resident avifaunal community (as determined by avifaunal monitoring) and in particular for priority bird species. Sequential blasting will be used for bulk blasts to minimise noise and shock vibrations. Spent munitions, packaging, caps and other materials shall be burnt on site in accordance with the law. Care will be taken to ensure adequate precautions are taken to prevent the spread of fire and firefighting equipment is in place during every burn.

The use of explosives of any type within 500m of Eskom’s services shall only occur with Eskom’s previous written permission. If such permission is granted the Contractor must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

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 fly-rock. Damage caused by blasting / drilling shall be repaired to the satisfaction of the Engineer.

Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses (DEA, 2014). Foundations and trenches

must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities (DEA, 2014). Borrow materials must be obtained only from authorized and permitted sites. Permits must be kept on site by the ECO (DEA, 2014). Anti-erosion measures such as silt fences must be installed in disturbed areas (DEA, 2014).

Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances with respect to existing power lines onsite. Clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated in terms of Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) at all times. Reduce and maintain minimum noise when blasting for wind turbines foundations. No blasting during breeding seasons (mostly spring: avifaunal monitoring programme to recommend) of resident avifaunal community and priority species. Synchronise with neighbouring blasts where possible (EIA: Kangas WEF, 2013).

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.

Compile relevant and clearly defined procurement standards to govern choices of suppliers, products and procedures for communication with suppliers. Maintain well defined standards as analysed by the developer, for quality and sustainability purposes, as well as for monitoring and evaluation of the suppliers and service providers (EIA: Kangas WEF, 2013).

Source supplies of services, labour and products from the local and regional economies, where possible (EIA: Kangas WEF, 2013).

Encourage the local government and stakeholders to undertake studies to ascertain the feasibility of establishing manufacturing activities in the area related to the proposed activities and if green energy industry is feasible (EIA: Kangas WEF, 2013).

Implement labour contracts whereby Contractors are required to employ a certain percentage of local labour (EIA: Kangas WEF, 2013). Encourage the local authority to implement a services management plan to monitor demand on infrastructure services so that upgrades or new services can be installed in a timely manner (EIA: Kangas WEF, 2013).

Provide basic construction skills programs pertaining to the projects in order to maximise the benefits of the project in the local municipality and to leave a lasting influence on the workforce (EIA: Kangas WEF, 2013).

Implement an educational initiative during the construction phases to avail an ideal practical learning environment for local and district schools and promote renewable energy and awareness around climate change and fossil fuel use (EIA: Kangas WEF, 2013).

SDEM4.18 Erosion and sedimentation control (Subclause 4.3.19)

An erosion management plan for monitoring and rehabilitating erosion events associated with the facility shall be implemented (refer to Annexure B1). Construction activities should as far as possible be limited to the identified sites for the proposed WEF and the identified access routes.

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, if required by the rehabilitation / botanical specialist. Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the energy facility site. Should any erosion features develop, they should be stabilised as soon as possible. Stabilise any erosion areas effectively as they develop (EIA: Kangas WEF, 2013). Limit disturbance of drainage channels when constructing transmission lines and rehabilitate accordingly upon completion of construction (EIA: Kangas WEF, 2013). Rehabilitate all crossings over drainage channels or stream beds after the construction phase to maintain flow (EIA: Kangas WEF, 2013).

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 implemented (refer to Annexure B3) with the aid of a rehabilitation specialist. The specialist shall recommend species and methodologies for successful establishment. The construction footprint associated with the activity can be re-vegetated naturally by distributing cleared vegetation (stored since inception) as a mulch layer and monitoring the site. Should natural rehabilitation not prove effective, in the opinion of the ECO, a rehabilitation specialist shall be consulted to assist with the development of adapted methods to re-establish vegetation in difficult or unresponsive areas. Disturbed areas shall be rehabilitated as soon as possible after construction.

Rehabilitation should take place in the wet season; or irrigated as agreed with the rehabilitation specialist. Irrigation should not be applied without expert opinion, as this could create an environment favouring alien invasive species.

SDEMA4.20 Labour, health and safety requirements

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.

A health and safety programme must be developed to protect both workers and public during construction of the energy facility. The program must establish a safety zone for wind turbines from residences and occupied buildings, roads, right-of-ways and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines (DEA, 2014).

Potentials interference with public safety communication systems (e.g. radio traffic related to emergency activities) must be avoided (DEA, 2014).

The holder of this authorisation must train safety representatives, managers and workers in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant act (DEA, 2014). Liaison with land owners/farm managers must be done prior to construction in order to provide sufficient time for them to plan agricultural activities (DEA, 2014). No unsupervised open fires for cooking or heating must be allowed on site (DEA, 2014).

SDEMA4.22 Visual resources

The holder of this authorisation must reduce visual impacts during construction by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques and restoring exposed soil as closely as possible to their original contour and vegetation (DEA, 2014).

Signage on or near wind turbines must be avoided unless they serve to inform the public about wind turbines and their function (DEA, 2014). Commercial messages and graffiti on turbines must be avoided (DEA, 2014).

SDEMA4.23 Dust

Dust abatement techniques must be used before and during surface clearing, excavation or blasting activities (Environmental Authorisation for Kangnas Wind Energy Facility, 2014). Appropriate dust suppression techniques must be implemented on all exposed surfaces during periods of high wind. Such measures may include wet suppression, chemical stabilisation, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas (Environmental Authorisation for Kangnas Wind Energy Facility, 2014).

Minimise areas disturbed at any one time and protect exposed soil against wind erosion, e.g. by dampening with water or covering with hessian. Dust suppression measures shall be used particularly during dry periods of weather during the summer months.

SDEMA4.23 Wetlands and water resources

Wetlands, rivers and river riparian areas must be treated as "no-go" areas and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, fuel, oil, bitumen or waste must be allowed into these areas without the express permission of and supervisory the ECO, except for rehabilitation work in these areas (DEA, 2014).

Workers must be made aware of the importance of not destroying or damaging the vegetation along rivers and in wetland areas and this awareness must be promoted throughout the construction phase (DEA, 2014).

Freshwater ecosystems located in close proximity to the construction areas must be inspected on a regular basis by the ECO for signs of disturbance from construction activities. If signs of disturbance are noted, immediate action must be taken to remedy the situation and, if necessary, a freshwater ecologist must be consulted for advice on the most suitable remediation measures (DEA, 2014).

Workers must be made aware of the importance of not polluting rivers or wetlands and of not undertaking activities that could result in such pollution and this awareness must be promoted throughout the construction phase (DEA, 2014).

Freshwater ecosystems located in close proximity to the site must be inspected on a regular basis (but especially after rainfall) by the ECO for signs of sedimentation and pollution. If signs of sedimentation or pollution are noted, immediate action must be taken to remedy the situation (DEA, 2014).

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 or driving off road.
- 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.

SDEMA6 FAUNA

SDEMA6.1 Avifauna and bats

An avifauna and bat monitoring programme shall be compiled and implemented to document the effect of the construction period on avifauna and bats (refer to Annexure B6) (DEA, 2014).

Active breeding nests in the immediate surroundings must be monitored during the construction phase and further mitigation measures must be discussed with the avifaunal specialist and Implemented if necessary (DEA, 2014). No turbines must be located within a 1000m buffer surrounding the Spotted - Eagle Owl nest (29°39'43.79"S, and 18°23'42.17"E, in 2012) and all active nest sites must be avoided (DEA, 2014)

A construction monitoring plan must be implemented to survey bird communities and nests on the WEF site and be implemented to monitor impacts resulting from the infrastructure installations. This plan must have a minimum duration of at least 1 (one) year (DEA, 2014).

Reports regarding bird monitoring must be submitted to the relevant provincial environmental department, BirdlifeSA, the Endangered Wildlife Trust (EWT) and DEA on a quarterly basis. The report will assist all stakeholders in identifying potential and additional mitigation measures and to establish protocols for a bird monitoring programme for wind energy development in the country (DEA, 2014). During construction the applicant must restrict the construction activities to the footprint area. No access to the remainder of the property is allowed (DEA, 2014). Refer to Annexure D1 for the offset agreement entered into with BirdlifeSA.

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 EMPr table which constitutes the Operational Framework EMPr. It is important to note that this Framework EMPr has been updated to include the conditions of the EA issued by the DEA.

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
1.	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 Kangnas 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 person to monitor compliance (either independent or in-house "Environmental Auditor"). 2) Audit the compliance with the requirements of the environmental specification contained within the OEMPr.	Environmental impacts effectively monitored and managed during the operational phase. Comprehensive record of compliance and remedial actions available to the Developer and authorities.	Developer	Twice in the 1 st three years and then once every five years.	Developer
2.	Protection of the surrounding environment (aquatic and terrestrial)	Effects that the operation and maintenance of the energy facility would have on the surrounding environment (including local flora, fauna, bats, avifauna and watercourses)	Objective: To ensure that impacts on the surrounding biophysical environment are minimised during the operational phase. Mechanism: 1) During maintenance activities limit movement to disturbed areas. 2) Limit operational activities as far as possible to the delineated site footprint and access routes. 3) Any areas disturbed during maintenance should be rehabilitated.	The surrounding environment including aquatic and terrestrial ecology is not impacted on.	Developer	As maintenance is required on site.	Developer

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
		around the proposed development.	4) 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. 5) Ensure ongoing implementation of the alien invasive and vegetation rehabilitation management plans.				
3.	Environmental management of the operational phase	Positive impacts on socio-economic environment during operation	Objective: To ensure that the operation of the Kangnas WEF maximises positive impacts on the socio-economic environment. Mechanism: <ol style="list-style-type: none"> 1) Train local people for operation and maintenance of facility (presumably only security personnel. 2) Employ local labour for the operational phase, where possible, and particularly for day to day operations and maintenance. 3) Adopt and audit (frequency to be determined by the policy) local employment policy with accompanying training programme. 	Consult annual skills and training records, employment records and proof of staff residency in the area prior to employment.	Developer	During Operational Phase (full lifetime) when the need arise to employ people.	Developer
4.	Protection of fauna and flora	During the construction phase impacts on vegetation would have been significant as the site would have been cleared of all vegetation.	Objective: To prevent unnecessary disturbance to natural vegetation associated with the operation of the facilities, schedule maintenance activities to avoid and/or reduce disturbance in sensitive areas. Mechanism: <ol style="list-style-type: none"> 1) All programmes and plans shall be audited. 2) Re-seeding of disturbed sites is <u>not recommended</u>. The veld should be allowed to regenerate unaided. 3) Operational activities should as far as possible be limited to the delineated site for the proposed development and the identified access routes. 	No animals are injured. No employees enter the no-go areas. No alien vegetation establishment. Invasive alien vegetation monitoring	Developer	As determined by relevant specialist	Environmental Auditor

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
			<p>4) Invasive alien plant growth should be monitored on an on-going basis to ensure that these disturbed areas do not become infested with invasive alien plants.</p> <p>5) All crossings over drainage channels or stream beds after the construction phase should be rehabilitated such that the flow within the drainage channel is not impeded.</p> <p>6) Maintenance of transmission lines should only take place via the designated access routes.</p> <p>7) Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the wind energy facilities site. Should any erosion features develop, they should be stabilised as soon as possible.</p> <p>8) Noise and disturbances associated with maintenance activities shall be kept to the minimum.</p> <p>9) The PMF best practice guidelines, described under SDEMA4.12 should be applied. Any redesign of the jackal fencing should be undertaken in consultation with the landowner, DENC and the PMF</p> <p>10) If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible (provided this complies with Civil Aviation Authority regulations).</p> <p>11) Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations).</p>	programme implemented.			

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
5.	Avifauna and bats	Operational impact from WEF on Birds and Bats	<p>Objective: Prevent severe fatalities of protected species or large numbers of species.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) Take appropriate steps as agreed in consultation between bat specialist and the holder of the EA to mitigate impacts depending on the severity of the impact and the level of confidence in operational bat mortality monitoring, 2) Formal monitoring should be resumed once the turbines have been constructed, as per best practice guidelines. The purpose of this would be to establish if displacement of priority species has occurred and to what extent. The exact time when post-construction monitoring should commence, will depend on the construction schedule, and will be agreed upon with the site operator once these timelines have been finalised. 3) On-going inputs of a suitable experienced ornithological consultant to oversee the post-construction monitoring and assist with the on-going management of bird impacts that may emerge as the post-construction monitoring programme progresses must be obtained. 4) Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels turn out to be significant, including selective curtailment of problem turbines during high risk periods. 5) Carry out post-construction monitoring of possible bat fatalities at least four seasons at the proposed WEF, focus on turbines in the Moderate bat 	Bird and Bat monitoring programme	Developer	As determined by relevant specialist	Environmental Auditor

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
			<p>sensitivity areas and at the two small caves on site. Pre-construction monitoring is optional for this site (EIA: Kangnas WEF, 2013).</p> <p>6) Share research from long term monitoring with academic institutions to aid in research of the potential impacts of WEF on bats (EIA: Kangnas WEF, 2013).</p> <p>7) Where recommended by long-term bat monitoring, curtail² selected turbines to lessen bat mortalities. Curtailment should be informed by long term bat monitoring (EIA: Kangas WEF, 2013). Refer to Annexure D1 for offset agreement with BirdlifeSA.</p>				
6.	Stormwater runoff, erosion, and pollution of surface water and groundwater resources.	Stormwater runoff can impact on the surface and groundwater resources. The mismanagement of stormwater can furthermore result in erosion.	<p>Objective: Prevent stormwater from eroding the land and becoming contaminated.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) Implement erosion control measures should there be evidence of erosion. 2) Channel runoff shall be diverted in such a way as to minimise erosion and if necessary, soil stabilising techniques shall be implemented in vulnerable areas. 3) Drainage system and pans shall be completely avoided and well buffered from any infrastructure and operational activities. 4) Monitoring in accordance with an environmental management plan as operation procedures. 	<p>Stormwater control measures are effective at regulating runoff from the site and erosion channels do not develop.</p> <p>Freshwater ecosystems are not unduly disturbed by construction activities within the drainage channels.</p>	Contractor	After site clearing has taken place up to the end of the construction phase.	Developer

² Curtailment is where the turbine cut-in speed is raised to a higher wind speed based on the principle that bats will be less active in strong winds due to the fact that their insect food cannot fly in strong wind speeds, and the small insectivorous bat species need to use more energy to fly in strong winds.

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
7.	Visual impact	The proposed site is visible to the public and would have a negative visual impact on the sense of place if not maintained appropriately.	<p>Objective: To protect the sense of place.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) Access roads are to be kept clean, and measures taken to minimise dust from traffic on gravel roads. 2) All lighting shall be kept to a minimum within the requirements of safety and efficiency. 3) Install and maintain any necessary aircraft warning lights as per the relevant authority requirements. 4) Security and perimeter lighting shall be shielded so that no light falls outside the area needing to be lit. Floodlighting shall be avoided. 5) Carrying out of repairs shall take place promptly. All site buildings, as well as the perimeter fence shall be kept tidy at all times. 	No complaints from the public.	Developer	Throughout the operational phase	Developer
8.	Impact on agricultural land	The activity may impact on the agricultural potential of the site	<p>Objective: To protect the agricultural land.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) Initiate land rehabilitation and re-vegetation as soon as possible and continue to monitor for early signs of degradation and erosion. Initiate further rehabilitation efforts where and if required throughout the operational phase; 2) Once construction is complete normal grazing (the primary agricultural activity) will be permitted around the turbines. 	Minimise the loss of grazing land and reduce the impact on agricultural production.	Site Manager & farmer	Construction and operational phases (from site establishment to contract completion).	Developer; Environmental Auditor

<p>9.</p>	<p>Noise pollution</p>	<p>The activity might impact on the noise levels of the area.</p>	<p>Objective: To reduce noise impacts.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) Design and implement a noise monitoring programme. 2) Due to the fact that wind energy facilities will only be in operation during periods that the wind is blowing it is critical that ambient sound level measurements reflect expected sound levels at various wind speeds. Because of the complexity of these measurements the following methodology must be followed: 3) Compliance with the latest version of SANS 10103; 4) The measurement equipment made use of a windshield specifically designed for outdoor use; 5) The areas where measurements were recorded was selected so as to limit the risks of direct impacts by the wind on the microphone; 6) Measurements took place in 10-minute bins for at least one full night-time period; and 7) Noise data was synchronised with the wind data measured at a 10 meter height with by the onsite meteorological mast. 8) Provide a contact number of the developer in the case of sudden and sharp increases in sound levels resulting from mechanical malfunctions or perforations or slits in the blades. 9) Ensure equivalent A-weighted daytime noise levels below 45dBA at potentially sensitive receptors (see NSD01 to NSD04 in Figure 1 (EIA: Kangnas WEF, 2013); 10) Ensure that maximum noise levels at potentially sensitive receptors be less than 65dBA (EIA: Kangnas WEF, 2013); 11) Ensure acceptable noise levels (within SANS guidelines) at surrounding stakeholders and potentially sensitive receptors (EIA: Kangnas WEF, 2013); 	<p>Minimise noise pollution.</p>	<p>Contractor Acoustical Consultant</p>	<p>Before operational phase commence</p>	<p>Developer; Environmental Auditor</p>
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Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
10.	Impacts on local economy (employment) and social conditions	The activity might impact on the economy (local shops, restaurants, and Guest Houses, etc.)	<p>Objective: To ensure on-going sustainability of the local tourism / hospitality industry.</p> <p>Mechanism:</p> <ol style="list-style-type: none"> 1) The operator of the proposed development should be encouraged to procure materials, goods and products required for the operation of the facility from local suppliers to increase the positive impact in the local economy as far as possible. 2) Give preference to local communities for employment opportunities. 3) Base recruitment on sound labour practices and with gender equality in mind. 4) Local Small and Medium Enterprises should be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible. 5) The developer should consider establishing vocational training programmes for the local labour force to promote the development of skills required by the wind energy industry and thus provide for the opportunities for these people to be employed in other similar facilities elsewhere around the study area or other parts of the country. 6) A three-year social development and economic development programme should be devised by the developer. 7) Engage with local authorities and inform them of the development as well as discuss with them their ability to meet the additional demands on social and basic services created by the in migration of workers. 	Contribute to local community upliftment	Contractor	As required	Developer

Operational Framework Environmental Management Programme Table							
No	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE	VERIFICATION
			8) Where feasible, assist the municipality in ensuring that the quality of the local social and economic infrastructure does not deteriorate through the use of social responsibility allocations. 9) The plan should be reviewed on an annual basis and where necessary updated. 10) When devising enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises. 11) Establish an educational notice board as an ideal practical learning environment for local and district schools (EIA: Kangnas WEF, 2013). 12) Educate surrounding receptors on the sound generated by the WEF; maintain essential public relations and community involvement throughout the lifespan of the proposed facility (EIA: Kangnas WEF, 2013).				

5.1 Project Specifications from EA

The project specifications as have specified in the EA and amended EA is presented here. These specifications are in addition to the specifications above Operational Framework EMP.

Avifauna and bats

- A bird and bat monitoring programme must be implemented to meet the prevailing guidelines and to document the effect of the operation of the energy facility on avifauna and bats. Known active breeding nests in the immediate surroundings must be monitored during the construction phase and further mitigation measures must be discussed with the avifaunal specialist and Implemented if necessary (DEA, 2014).
- Post-construction avifauna and bat monitoring by an independent monitor should take place or at least two years after operation has commenced. It is recommended that this is done in accordance with BirdlifeSA/ Endangered Wildlife Trust: Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in Southern Africa (DEA, 2014).
- Reports regarding bird monitoring must be submitted to the relevant provincial environmental department, BirdlifeSA, the Endangered Wildlife Trust (EWT) and this Department on a quarterly basis. The report will assist all stakeholders in identifying potential and additional mitigation measures and to establish protocols for a bird monitoring programme for wind energy development in the country (DEA, 2014). Refer to Annexure D1 for offset agreement entered into with BirdlifeSA.

Vegetation, wetlands and water resources

- Removal of alien invasive species or other vegetation and follow-up procedures must be in accordance with the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (DEA, 2014).
- The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction (DEA, 2014).

Roads and transportation

- Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats (DEA, 2014).
- Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak (DEA, 2014)

Noise

- The holder of this authorisation must ensure that the National Noise Control Regulations and SANS10103:2008 are adhered to and measures to limit noise from the work implemented (DEA, 2014).

- The holder of this authorisation must ensure that the construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment (DEA, 2014).

Visual resources

- Signage on or near wind turbines must be avoided unless they serve to inform the public about wind turbines and their function (DEA, 2014).
- Commercial messages and graffiti on turbines must be avoided (DEA, 2014).

Human health and safety

- A health and safety programme must be developed to protect both workers and public during operation of the energy facility. The program must establish a safety zone for wind turbines from residences and occupied buildings, roads, right-of-ways and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines (DEA, 2014).

Hazardous materials and waste management

- Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions (DEA, 2014).
- Spill kits must be made available on-site for the clean-up of spills (DEA, 2014).
- An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling and re-use options where appropriate. Where solid waste is disposed of such disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environment Management Waste Act, 2008 (Act 59 of 2008) (DEA, 2014).

6 DECOMMISSIONING

6.1 Decommissioning of the proposed WEF

The turbine infrastructure which would be utilised for the proposed project is expected to have a lifespan of approximately 20 - 30 years (with maintenance). Generally a power purchase agreement (PPA) of 20 years is signed with the energy buyer. After the PPA comes to an end the PPA may be renegotiated at terms that are financially viable at that point in time. The PPA may be based on a shorter term agreement using the existing turbines (if the existing turbines are still suitable) or a longer term PPA may be negotiated based on re powering (refurbishment) of the proposed WEF. It is most likely that refurbishment of the infrastructure of the facility discussed in this EIA would comprise the disassembly and replacement of the turbines with more appropriate technology/infrastructure available at that time. New turbine technology may also reduce potential environmental impacts and increase production.

Where no new PPA can be negotiated it is likely that the wind farm would be decommissioned according to requirements in the EMPr and as required by any other legislation/regulations at that time.

In general, decommissioning and deconstruction activities should be undertaken in a manner that is consistent with the provisions set out in the construction phase EMP, where relevant. Should authorisation not be required at the time of decommissioning it is still recommended that the developer notify the relevant authorities of their intention to decommission the facility. The following decommissioning and/or repowering activities have been considered to form part of the project scope of the proposed WEF.

A health and safety programme must be developed to protect both workers and public during operation and decommissioning of the energy facility. The program must establish a safety zone for wind turbines from residences and occupied buildings, roads, right-of-ways and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines (DEA, 2014).

6.1.1 Site preparation

Site preparation activities would include confirming the integrity of the access to the site to accommodate required equipment and lifting cranes, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of decommissioning equipment.

6.1.2 Disassemble and replace existing turbines

A large crane would be brought on site. It would be used to disassemble the turbine and tower sections. These components would be reused, recycled or disposed of in accordance with prevailing regulatory requirements. All parts of the turbine would be considered reusable or recyclable except for the blades. The land-use would revert back agriculture/ grazing.

6.2 Way Forward

If the facility is decommissioned or the activity cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time or any successor (DEA, 2014). All roads would be left on site, as it would assist the farmer in accessing his land, unless the farmer requires otherwise.

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 EIR 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.

8 REFERENCES

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ANNEXURE A
CONSTRUCTION EMP GENERAL
SPECIFICATIONS
(COMPREHENSIVE)

SPECIFICATION EM : ENVIRONMENTAL MANAGEMENT (COMPREHENSIVE)

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SPECIFICATION EM : ENVIRONMENTAL MANAGEMENT (COMPREHENSIVE)

1. SCOPE

This Specification covers the requirements for controlling the impact of construction activities on the environment. It contains clauses that are generally applicable to the undertaking of civil engineering works in areas where it is necessary to impose pro-active controls on the extent to which the construction activities impact on the environment.

Interpretations and variations of this Specification are set out in the Specification Data.

2. NORMATIVE REFERENCES

2.1 Supporting specifications

Where this Specification is required for a project the following specifications shall, inter alia, form part of the Contract Document.

- a) Specification Data;
- b) SANS 1200 Series of Standardized Specifications;
 - i) SANS 1200 A or SANS 1200 AA, as applicable;
- c) Specification AO,
- d) Construction Regulations, 2003, and
- e) Standards listed in Appendix A.¹

3. DEFINITIONS

For the purposes of this Specification the definitions and abbreviations given in the applicable specifications listed in 2.1 and the following definitions shall apply:

Environment : The surroundings within which humans exist and that are made up of:

- i) the land, water and atmosphere of the earth;
- ii) micro-organisms, plant and animal life;
- iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Potentially hazardous Substance : A substance that, in the reasonable opinion of the Engineer, can have a deleterious effect on the environment.

Method Statement : A written submission by the Contractor to the Engineer in response to the Specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

¹ See Appendix A

The Method Statement shall cover applicable details with regard to:

construction procedures,
materials and equipment to be used,
transportation of equipment/materials to and from site,
movement of equipment/material on site,
storage of materials on site,
containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
timing and location of activities,
areas of non-compliance with the Specifications, and
any other information deemed necessary by the Engineer.

- Reasonable** : Unless the context indicates otherwise, reasonable in the opinion of the Engineer after he has consulted with a person, not an employee of the Employer, suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in Act No 107,1998).
- Solid waste** : All solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
- Contaminated water** : Water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/ personnel wash areas.
- Topmaterial** : The top 150 mm of soil (topsoil) and root material of cleared vegetation.

4. REQUIREMENTS

4.1 Materials

4.1.1 Materials handling, use and storage

The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the Specifications. The Contractor shall ensure that these delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the Specifications.

Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, stone chips, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

4.1.2 Hazardous substances

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

Petroleum, chemicals, harmful and hazardous waste shall be stored in an enclosed and banded area. This area shall be subject to the approval of the Engineer. The waste shall be disposed of at a hazardous waste disposal site as approved by the Engineer.

4.1.2.1 Shutter oil and curing compound

Shutter oil and curing compound pose a risk of causing water and soil contamination and accordingly are regarded as potential hazardous substances. The Contractor shall ensure that shutter oil and curing compound containers in use are stored within the fuel bund. The remaining containers shall be inspected regularly to ensure that no leakage occurs. When shutter oil or curing compound is dispensed, the proper dispensing equipment shall be used, and the storage container shall not be tipped in order to dispense the oil/compound. The dispensing mechanism of the shutter oil/curing compound storage container shall be stored in a waterproof container when not in use.

Shutter oil and curing shall be used in moderation and shall be applied under controlled conditions using appropriate equipment. The Contractor shall take all reasonable precautions to prevent accidental and incidental spillage during the application of these compounds.

In the event of a shutter oil or curing compound spill, the source of the spillage shall be isolated, and the spillage contained. The Contractor shall clean up the spill, either by removing the contaminated soil or by the application of absorbent material in the event of a larger spill. Treatment and remediation of the spill area shall be undertaken to the reasonable satisfaction of the Engineer.

4.1.2.2 Bitumen

The Engineer shall be advised of the area that the Contractor intends using for the storage of bitumen drums/ products. The storage area shall have a smooth impermeable (concrete or 250 µm plastic covered in sand) floor. The floor shall be banded and sloped towards a sump to contain any spillages of substances. The bund shall be inspected and emptied daily, and serviced when necessary. The bund shall be closely monitored during rain events to ensure that it does not overflow.

4.2 Plant

4.2.1 Ablution facilities

The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are properly stored and removed from Site. Discharge of waste from toilets into the environment and burial of waste is strictly prohibited.

Washing, whether of the person or of personal effects and acts of excretion and urination are strictly prohibited other than at the facilities provided.

4.2.2 Solid waste management

The Contractor shall provide sufficient bins with lids on Site to store the solid waste produced on a daily basis. Solid, non-hazardous waste shall be disposed of in the bins provided and no on-site burying, dumping or burning of any waste materials, vegetation, litter or refuse shall occur. Bins shall not be allowed to become overfull and shall be emptied a minimum of once daily. The waste may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Engineer has approved.

All solid waste shall be disposed of off site at an approved landfill site. The Contractor shall supply the Engineer with a certificate of disposal.

4.2.3 Contaminated water

The Contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water. The Contractor shall prevent the discharge of water contaminated with any pollutants, such as soaps, detergent, cements, concrete, lime, chemicals, glues, solvents, paints and fuels, into the environment.

The Contractor shall notify the Engineer immediately of any pollution incidents on Site. The Engineer's approval is required prior to the discharge of contaminated water to the Municipal sewer system.

4.2.4 Site structures

All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of area disturbed. The type and colour of roofing and cladding materials to the Contractor's temporary structures shall be selected to reduce reflection.

4.2.5 Noise control

The applicable regulations framed under the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), and the provisions of SANS 1200 A Subclause 4.1 regarding "built-up areas" shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas.

Appropriate directional and intensity settings are to be maintained on all hooters and sirens, and the Contractor shall provide and use suitable and effective silencing devices for pneumatic tools and other plant such that the noise level in inhabited areas and dwellings adjacent to the work areas will not increase by more than 7 dB(A)Leq 60 above residual background sound levels. Similarly in habituated areas adjacent to access roads maximum noise levels shall not exceed 60 dB(A)Leq 60 and maximum sound pressure level of 70 dB(A).

Where excess noise generation is unavoidable, the Contractor shall, by means of barriers, effectively isolate the source of any such noise in order to comply with the said regulations. The Contractor shall restrict any of his operations that may result in undue noise disturbance to those communities and dwellings abutting the Site to the hours of 08:00 to 17:00 on weekdays and Saturdays. No work will be permitted on Sundays unless otherwise agreed to with the Engineer.

No amplified music shall be allowed on Site. The use of radios, tape recorders, compact disc players, television sets etc shall not be permitted unless the volume is kept sufficiently low as to avoid any intrusion on members of the public within range. The Contractor shall not use sound amplification equipment on Site unless in emergency situations.

4.2.6 Lights

The Contractor shall ensure that any lighting installed on the site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area.

4.2.7 Fuel (petrol and diesel) and oil

Unless otherwise specified in the Specification Data, fuel may be stored on site in an area approved by the Engineer. The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut or in bowsers. The tanks/bowsers shall be situated on a smooth impermeable surface (concrete or 250 µm plastic) with an earth bund (plastic must have a 5 cm layer of sand on top to prevent damage and perishing). The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 130% of the total capacity of all the storage tanks/ bowsers. The bunded area shall be covered to protect it from rain. Provision shall be made for refuelling at the fuel storage area, by protecting the soil with 250 µm plastic covered with a minimum of a 5 cm layer of sand.

If fuel is dispensed from 200 litre drums, only empty externally clean drums may be stored on the bare ground. All empty externally dirty drums shall be stored on an area where the ground has been protected. The proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage drum shall be stored in a waterproof container when not in use.

The Contractor shall prevent unauthorised access into the fuel storage area. No smoking shall be allowed within the vicinity of the fuel storage area. The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores.

Where reasonably practical, plant shall be refuelled at the fuel storage area or at the workshop as applicable. If it is not reasonably practical then the surface under the refuelling area shall be protected against pollution to the reasonable satisfaction of the Engineer prior to any refuelling activities. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill. The Contractor shall obtain the Engineer's prior approval for any refuelling or maintenance activities.

4.2.8 Workshop, equipment maintenance and storage

Leaking equipment shall be repaired immediately or removed from the Site. Where practical, all maintenance of equipment and vehicles on Site shall be performed off Site or in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the Engineer prior to commencing activities. The Contractor shall ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the Engineer's approval, the Contractor carries out emergency plant maintenance, there is no contamination of the soil or vegetation. The workshop shall have a smooth impermeable (concrete or 250 µm plastic covered with sand) floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil).

When servicing equipment on site, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles). Drip trays shall be inspected and emptied daily. Drip trays shall be closely monitored during rain events to ensure that they do not overflow. Where practical, the Contractor shall ensure that equipment is covered so that rainwater is excluded from the drip trays.

The washing of equipment shall be restricted to urgent or preventative maintenance requirements only. All washing shall be undertaken off Site or in the workshop. The use of detergents for washing shall be restricted to low phosphate and nitrate containing, low sudsing-type detergents.

4.2.9 Dust

The Contractor shall take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the Engineer. The Contractor's dust management planning shall, as a minimum, take cognisance of the following:

- Schedule of spraying water on unpaved roads paying due attention to control of runoff.
- Speed limits for vehicles on unpaved roads and minimisation of haul distances.
- Measures to ensure that material loads are properly covered during transportation.
- Schedule for wheel cleaning and measures to clean up public roads that may be soiled by construction vehicles.
- Minimisation of the areas disturbed at any one time and protection of exposed soil against wind erosion, e.g. by dampening with water or covering with straw
- Location and treatment of material stockpiles taking into consideration prevailing wind directions and location of sensitive receptors.
- Controlled blasting techniques to minimise dust and fly rock during blasting.
- Adherence to the dust loads and protective gear stipulated in the Occupational Health and Safety Act.
- Reporting mechanism and action plan in case of excessive wind and dust conditions.

During summer, a water tanker shall be permanently available for the control of dust generation, and the Contractor shall ensure that the sprays do not generate excess run off. During winter, provision shall be made for a tanker, as required by the Engineer.

During high wind conditions, the Contractor shall comply with the Engineer's instructions regarding dust-dampening measures. The Engineer may request the temporary cessation of all construction activities where wind speeds are unacceptably high, and until such time as wind speeds return to acceptable levels.

As required by the Specification Data, the Contractors shall develop and implement a programme for the monitoring of dust fallout in areas where dust generation may be expected.

4.3 Methods and procedures

4.3.1 Method Statements

Any Method Statement required by this Specification, the Specification Data or the Engineer shall be produced within such reasonable time as is required by this Specification, the Specification Data or the Engineer. The Contractor shall not commence the activity until the Method Statement has been approved. Except in the case of emergency activities, the Contractor shall allow a period of two weeks for approval of the Method Statement by the Engineer. Such approval shall not unreasonably be withheld.

Method Statements in respect of environment management that shall be provided by the Contractor within 14 days of receipt of the letter of acceptance and prior to the activity covered by the Method Statement being undertaken, include:

- 1) Location and structure of the fuel storage site, including the type and volume of storage container and the design and capacity of the bund.

- 2) Solid waste (refuse) control and removal of waste from the Site, including the number, type and location of rubbish bins, the manner and frequency with which the waste will be removed from site and the disposal site.
- 3) Contaminated water management system, including an indication of the source and volume of contaminated water and how this would be disposed of.
- 4) Dust control, including methods to prevent dust generation and methods to reduce dust where its generation is unavoidable.
- 5) Location and layout of the construction camp in the form of a plan showing offices, stores for fuels and explosives, vehicle parking, access point, equipment cleaning areas and staff toilet placement.
- 6) Location of proposed site access routes and proposed traffic safety measures.
- 7) Emergency procedures for fire, and accidental leaks and spillages of hazardous materials.
- 8) Location, layout and preparation of cement/ concrete batching facilities including the methods employed for the mixing of concrete and the management of runoff water from such areas. An indication shall be given of how concrete spoil will be minimised and cleared.
- 9) Method of undertaking earthworks, including spoil management, erosion, dust and noise controls.
- 10) Motivation and method for undertaking any construction related activities within a "no-go" area, including requisite emergency procedures. Unless need clearly motivated and proposed methodology exhibits clear focus on environmentally sensitive construction practice, no activity will be permitted within the defined "no-go" areas.

4.3.2 Environmental awareness training

Within seven days of the Commencement Date, the Contractor's site staff including foremen and site management staff shall attend an environmental awareness training course, of approximately one-hour duration. The Contractor shall liaise with the Engineer prior to the Commencement Date to fix a date and venue for the course. The Contractor shall provide a suitable venue with facilities as required by the Specification Data, and ensure that the specified employees attend the course.

No more than 20 people shall attend each course and the Contractor shall allow for sufficient sessions to train all personnel. Subsequent sessions shall be run for any new personnel coming onto site.

The environmental awareness training course shall be held in the morning during normal working hours. Any new employees coming on to site after the initial training course and the Contractor's suppliers and subcontractors shall also attend the course. Provision should also be made for quarterly refreshers courses to be undertaken during the course of the Contract. The Contractor shall ensure that all attendees sign an attendance register, and shall provide the Engineer with a copy of the attendance register the day after each course.

4.3.3 Construction personnel information posters

The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with aspects of the Specifications. Such posters will be supplied by the Engineer and shall be erected at a location specified by the Engineer.

4.3.4 Site clearance

The Contractor shall ensure that the clearance of vegetation is restricted to that required to facilitate the execution of the Works. Site clearance shall occur in a planned manner, and cleared areas shall be stabilised as soon as possible. The detail of vegetation clearing shall be to the Engineer's approval. All cleared vegetation shall either be mulched and mixed into the topsoil stockpiles or disposed of at an approved disposal site. The disposal of vegetation by burying or burning is prohibited without the requisite permit from the local authority.

The Contractor shall strip the Topmaterial within the working areas. The Topmaterial shall be stockpiled separately from subsoil and used for subsequent rehabilitation and revegetation. Topmaterial stockpiles shall not be compacted.

Should fauna be encountered during site clearance, earthworks shall cease until fauna have been safely relocated.

4.3.5 Site division

The Engineer shall be advised of the area that the Contractor intends using for his site establishment. The Contractor's camp shall occupy as small an area as possible, and no site establishment shall be allowed within 50 m of any watercourse unless otherwise approved by the Engineer.

The Contractor shall inform the Engineer of the intended actions and programme for site establishment. The site layout shall be planned to facilitate ready access for deliveries, facilitate future works and to curtail any disturbance or security implications for neighbours.

4.3.6 Site demarcation

As required by the Specification Data, the Contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations directed by the Engineer. Such fences shall, if so specified, be erected before undertaking designated activities.

4.3.7 "No go" areas

If so required by the Specification Data, certain areas shall be considered "no go" areas. The Contractor shall ensure that, insofar as he has the authority, no unauthorised entry, stockpiling, dumping or storage of equipment or materials shall be allowed within the demarcated "no go" areas.

"No go" areas shall be demarcated with fencing consisting of wooden or metal posts at 3 m centres with 1 plain wire strand tensioned horizontally at 900 mm from ground level. Commercially available danger tape shall be wrapped around the wire strand. The Contractor shall maintain the fence for the duration of construction and ensure that the danger tape does not become dislodged.

4.3.8 Protection of natural features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes unless agreed beforehand with the Engineer. Any features affected by the Contractor in contravention of this clause shall be restored/ rehabilitated to the satisfaction of the Engineer.

The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

4.3.9 Protection of flora and fauna

Except to the extent necessary for the carrying out of the Works, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted without authorisation.

Trapping, poisoning and/ or shooting of animals is strictly forbidden. No domestic pets or livestock are permitted on Site.

Where the use of herbicides, pesticides and other poisonous substances has been specified, they shall be stored, handled and applied with due regard to their potential harmful effects.

4.3.10 Protection of archaeological and palaeontological remains

The Contractor shall take reasonable precautions to prevent any person from removing or damaging any fossils, coins, articles of value or antiquity and structures and other remains of archaeological interest discovered on the Site, immediately upon discovery thereof and before removal. The Contractor shall inform the Engineer immediately of such a discovery and carry out the Engineers instructions for dealing therewith. All construction within the vicinity of the discovery shall cease immediately and the area shall be cordoned off until such time as the Engineer authorises resumption of construction in writing.

The Engineer will contact the relevant heritage authority.

4.3.11 Access routes/ haul roads

Access to the Construction camp and working areas shall utilise existing roads or tracks. Entry/exit points onto public roads shall take cognisance of traffic safety. Traffic safety measures shall included appropriate signage and signalmen where relevant.

On the Site, and, if so required by the Specification Data, within such distance of the Site as may be stated, the Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes not on the Site. On gravel or earth roads on Site and within 500 m of the Site, the vehicles of the Contractor and his suppliers shall not exceed a speed of 20 km/h.

Mud and sand deposited onto public roads by construction activities shall be cleared on a daily basis.

4.3.12 Cement and concrete batching

Where applicable, the location of the batching plant (including the location of cement stores, sand and aggregate stockpiles) shall be as approved by the Engineer. The concrete/cement batching plant shall be kept neat and clean at all times.

No batching activities shall occur directly on unprotected ground. The batching plant shall be located on a smooth impermeable surface (concrete or 250 µm plastic covered with 5 cm of sand). The area shall be bunded and sloped towards a sump to contain spillages of substances. All wastewater resulting from batching of concrete shall be disposed of via the contaminated water management system and shall not be discharged into the environment. Contaminated water storage areas shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented

Empty cement bags shall be stored in weatherproof containers to prevent wind blown cement dust and water contamination. Empty cement bags shall be disposed of on a regular basis via the solid waste management system, and shall not be used for any other purpose. Unused cement bags shall be stored so as not to be affected by rain or runoff events. In this regard, closed steel containers shall be used for the storage of cement powder and any additives. The Contractor shall ensure that sand, aggregate, cement or additives used during the mixing process are contained and covered to prevent contamination of the surrounding environment.

The Contractor shall take all reasonable measures to prevent the spillage of cement/ concrete during batching and construction operations. During pouring, the soil surface shall be protected using plastic and all visible remains of concrete shall be physically removed on completion of the cement/ concrete pour and appropriately disposed of. All spoiled and excess aggregate/ cement/ concrete shall be removed and disposed of via the solid waste management system.

Where “readymix” concrete is used, the Contractor shall ensure that the delivery vehicles do not wash their chutes directly onto the ground. Any spillage resulting from the “readymix” delivery shall be immediately cleared and disposed of via the solid waste management system.

4.3.13 Earthworks

All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities, particularly with regards to erosion and dust generation. No equipment associated with earthworks shall be allowed outside of the Site and defined access routes unless expressly permitted by the Engineer.

4.3.14 Pumping

Pumps shall be placed over a drip tray in order to contain fuel spills and leaks. The Contractor shall take all reasonable precautions to prevent spillage during the refuelling of these pumps.

The Contractor shall ensure that none of the water pumped during any dewatering activities, including well points, is released into the environment without the Engineer’s approval. The Engineer’s approval is required prior to the discharge of this water into the Municipal sewer system.

4.3.15 Bitumen

Over spray of bitumen products outside of the road surface and onto roadside vegetation or the surrounding environment shall be prevented using a method approved by the Engineer.

When heating bitumen products, the Contractor shall take cognisance of appropriate fire risk controls. Heating of bitumen products shall only be undertaken using LPG or similar zero emission fuels and appropriate fire fighting equipment shall be readily available.

Stone chip/gravel excess shall not be left on road / paved area verges. This shall be swept / raked into piles and removed to an area approved by the Engineer.

Water quality from runoff from new/ fresh bitumen surfaces will be monitored visually by the Engineer and remedial actions taken where necessary by the Contractor.

4.3.16 Fire control

No fires may be lit on site. Any fires that occur shall be reported to the Engineer immediately. Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965), burning is not permitted as a disposal method.

The Contractor shall ensure that there is basic fire-fighting equipment available on Site at all times. This shall include at least rubber beaters when working in urban open spaces and fynbos areas, and at least one fire extinguisher of the appropriate type when welding or other "hot" activities are undertaken.

4.3.17 Emergency procedures

The Contractor's procedures for the following emergencies shall include:

i) Fire

The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.

ii) Accidental leaks and spillages

The Contractor shall ensure that his employees are aware of the emergency procedure(s) to be followed for dealing with spills and leaks, which shall include notifying the Engineer and the relevant authorities. The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on Site at all times. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Engineer.

In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 l of hydrocarbon liquid spill.

4.3.18 Community relations

The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Engineer.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

4.3.19 Erosion and sedimentation control

The Contractor shall take all reasonable measures to limit erosion and sedimentation due to the construction activities. Where erosion and/or sedimentation, whether on or off the Site, occurs despite the Contractor complying with the foregoing, rectification shall be carried out in accordance with details specified by the Engineer. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the Engineer.

Any runnels or erosion channels developed during construction or during the defects liability period shall be backfilled and compacted. Stabilisation of cleared areas to prevent and control erosion shall be actively managed. Consideration and provision shall be made for various methods, namely, brushcut packing, mulch or chip cover, straw stabilising (at a rate of one bale/20 m² and rotovated into the top 100 mm of the completed earthworks), watering, soil binders and anti erosion compounds, mechanical cover or packing structures (e.g. Hessian cover).

Traffic and movement over stabilised areas shall be restricted and controlled, and damage to stabilised area shall be repaired and maintained to the satisfaction of the Engineer.

4.3.20 Aesthetics

The Contractor shall take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.

4.3.21 Recreation

If so required by the Specification Data, the Contractor shall take measures to reduce disruption to recreational users of the area abutting the Site.

4.3.22 Access to site

The Contractor shall ensure that access to the Site and associated infrastructure and equipment is off-limits to the public at all times during construction. If so required, as directed by the Engineer, the Contractor shall fence the site to ensure effective control of access to the site. This fence shall be a diamond mesh fence or similar with a minimum height of 1.8 m, and it shall be erected around the site and shall be maintained for the duration of construction.

4.3.23 Crane operations

Drive plants shall be well maintained and drip trays shall be positioned at potential leak areas. Over-greasing of crane cables shall be avoided.

Movement and lifting of hazardous materials shall be undertaken such that they do not cause a pollution, spillage or safety risk (in particular where concrete buckets are in use).

4.3.24 Trenching

Trenching for services shall be undertaken in accordance with the engineering specifications with the following environmental amplifications, where applicable:

- a) Soil shall be excavated and used for refilling trenches i.e. soil from the first trench shall be excavated and stockpiled, thereafter soil from the second excavated trench length shall be used to backfill the trench behind it once the services have been laid. The last trench shall be filled using the soil stockpiled from the first trench.
- b) Trench lengths shall be kept as short as practically possible before backfilling and compacting.
- c) Trenches shall be re-filled to the same level as (or slightly higher to allow for settlement) the surrounding land surface to minimise erosion.

4.3.25 Demolition

Hazardous and non-hazardous materials shall be separated at site and disposed of in a manner approved by the Engineer.

All buildings older than 60 years require a permit from South African Heritage Resources Agency in terms of the National Heritage Resources Act (no. 25 of 1999). A demolition permit is also required from the local authority in terms of the National Building Regulations.

4.3.26 Drilling and jack hammering

The Contractor shall take all reasonable measures to limit dust generation and noise as a result of drilling operations. The Contractor shall ensure that no pollution results from drilling operations, either as a result of oil and fuel drips, or from drilling fluid.

Any areas or structures damaged by the drilling and associated activities shall be rehabilitated by the Contractor to the satisfaction of the Engineer.

4.3.27 Stockpiling

The Engineer will identify suitable sites for stockpiling. Stockpiles shall be convex in shape, shall be no higher than 2 m and shall be located so as to cause minimal disturbance. Stockpiles shall be so placed to occupy minimum width compatible with the natural angle of repose of material, and measures shall be taken to prevent the material from being spread over too wide a surface. Where required, appropriate precautions shall be taken to prevent the erosion and limit the compaction of the stockpiles. The Contractor shall ensure that all stockpiles do not cause the damming of water or run off, or is itself washed away.

Topmaterial stockpiles shall not be covered with any material (e.g. plastic) that may kill seeds or cause it to compost. If the stockpiles start to erode significantly or cause dust problems, they shall be covered with hessian. Where practical, Topmaterial shall not be left for longer than six to eight months before being used for rehabilitation. If stored for longer than six months, the Topmaterial shall be analysed and, if necessary, upgraded before placement.

4.3.28 Site closure and rehabilitation

Any areas that the Engineer believes may have been impacted upon or disturbed, shall be rehabilitated to the satisfaction of the Engineer, which includes all areas where Topmaterial has been stripped. Once construction is complete the Contractor shall clear everything from the Site not forming part of the Permanent Works. The area to be rehabilitated shall first be landscaped to match the topography of the surrounding area as it was prior to construction. The composition of vegetation to be used for any rehabilitation shall be as specified in the Specification Data.

The Contractor may not use herbicides, pesticides, fertilisers or other poisonous substances for the rehabilitation process unless otherwise agreed with the Engineer.

All rehabilitated areas shall be considered “no go” areas and the Contractor shall ensure that none of his staff or equipment enters these areas.

The Contractor shall undertake to remove all alien vegetation re-establishing on the area and shall implement the necessary temporary or permanent measures to combat soil erosion.

4.3.29 Temporary revegetation of the areas disturbed by construction.

Where there is likely to be a delay of greater than two weeks in the landscaping and revegetation of a disturbed area or where that site is likely to be the subject of further construction activities at a later stage, the Contractor shall ensure that the area is temporarily revegetated to combat dust generation and prevent erosion. This revegetation shall occur incrementally immediately upon completion of the construction activities at the subject location.

Prior to revegetation structures and material not forming part of the Permanent Works, including remnants of building materials, concrete foundations, timber and other foreign debris, shall be removed and disposed of via the solid waste management system. The area shall be revegetated as follows:

- a) The surface shall be levelled by hand or machine as far as practically possible.
- b) Alien vegetation shall be cleared by cutting the plants off at ground level, and painting the stump with 0.5% Garlon in diesel.
- c) For areas with a slope of greater than 1:3, straw shall be utilised as a binding material to stabilise the soil during revegetation and rehabilitation of the site. Straw shall consist of natural, dried fibres of hay or chaff of various lengths between 50 mm and 400 mm, delivered to Site in bales and shall be applied evenly by hand or machine at a rate of 1 bale per 20 m² over the area to be revegetated. It shall then immediately be rotovated into the upper 100 mm layer of soil.
- d) The prepared area shall be hydro- or hand-seeded at a rate of 40 kg/ha using Rye grass (*Lolium multiflorum*). In the event of hand-seeding, the seed mixture as specified shall be mixed with two parts per volume of clean dry plaster sand, then divided in half and applied evenly in two successive applications, one after the other, by means of an approved hand seeding machine (known colloquially as a “tefsaaier”). On completion of the seeding the surface shall be lightly raked to cover the seed with no more than 5 mm of soil.
- e) Water used for the irrigation of vegetated areas shall be free of pollutants that will have a detrimental effect on the plants. The vegetated area shall only be watered once, immediately following seeding. Watering should be carried out from a tanker, using a fine nozzle spray to avoid erosion and disturbance of the vegetation. Water for irrigation purposes may not be drawn from any water body.

No construction equipment, vehicles or unauthorised personnel shall be allowed onto areas that have been vegetated. Only persons or equipment required for the preparation of areas, application of fertiliser and maintenance of revegetated area shall be allowed to operate on these areas.

4.3.30 Temporary site closure

If the site is closed for a period exceeding one week, the Contractor, in consultation with the Engineer shall carry out the following checklist procedure.

Hazardous materials stores

Outlet secure/ locked
Bund empty (where applicable)
Fire extinguishers serviced and accessible
Secure area from accidental damage e.g. vehicle collision
Emergency and contact details displayed
Adequate ventilation

Safety

All trenches and manholes secured
Fencing and barriers in place as per the Occupational Health and Safety Act (No 85 of 1193)
Emergency and management contact details displayed
Pipe stockpile wedged/ secured

Erosion

Wind and dust mitigation in place
Slopes and stockpiles at stable angle
Revegetated areas watering schedules and supply secured

Water contamination and pollution

Cement and materials stores secured
Toilets empty and secured
Refuse bins empty and secured
Drip trays empty and secure (where possible)
Structures vulnerable to high winds secure

5. COMPLIANCE WITH REQUIREMENTS AND PENALTIES

5.1 Compliance

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the Works but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the Works.

It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis and any failure on his part to do so will entitle the Engineer to certify the imposition of a penalty as detailed below.

5.2 Penalties

Penalties will be issued for certain transgressions. Penalties may be issued per incident at the discretion of the Engineer. Such penalties will be issued in addition to any remedial costs incurred as a result of non-compliance with this Specification. The Engineer will inform the Contractor of the contravention and the amount of the penalty, and shall be entitled to deduct the amount from monies due under the Contract.

Penalties will be as set out in the Specification Data.

5.3 Removal from site and suspension of Works

The Engineer may instruct the Contractor to remove from Site any person(s) who in their opinion is guilty of misconduct, or is incompetent, negligent or constitutes an undesirable presence on Site. Subclause 4.1.9 of this Specification requires that all Plant be in good working order, and accordingly the Engineer may order that any Plant not complying with the Specifications be removed from Site. Where the Engineer deems the Contractor to be in breach of any of the requirements of this Specification, he may order the Contractor to suspend the progress of the Works or any part thereof.

6. Void

7. Void

8. MEASUREMENT AND PAYMENT

8.1 Basic principles

8.1.1 General

Except as specified below, or in the Specification Data or as billed, no separate measurement and payment will be made to cover the costs of complying with the provisions of this Specification and such costs shall be deemed to be covered by the rates tendered for the items in the Bill of Quantities completed by the Contractor when submitting his tender.

8.1.2 All requirements of the environmental management specification

All work not measured elsewhere, associated with complying with any requirement of this Environmental Management specification will be measured and paid as a sum.

The tendered sum shall cover the cost of with complying with the environmental management specification and shall include for all materials, labour and plant required to execute and complete the Works as specified, described in the Bill of Quantities or shown on the Drawing(s).

8.1.3 Work "required by the Specification Data"

Where a clause in this Specification includes a requirement as "required by the Specification Data", measurement and payment for compliance with that requirement shall be in accordance with the relevant measurement and payment clause of the Specification Data.

8.2 Billed items

8.2.1 Method Statements: Additional work

No separate measurement and payment will be made for the provision of Method Statements but, where the Engineer requires a change on the basis of his opinion that the proposal may result in, or carries a greater than warranted risk of damage to the environment in excess of that warranted by the Specifications, then any additional work required, provided it could not reasonably have been foreseen by an experienced contractor, shall be valued in accordance with the Clause in the General Conditions of Contract dealing with Provisional Sums.

A stated sum is provided in the Bill of Quantities to cover payment for such additional work.

8.2.2 All requirements of the environmental management specification

Unit: Sum

All other work not measured elsewhere, associated with complying with any requirement of the environmental management specification shall be measured as a sum.

The tendered rate shall cover any cost associated with complying with the environmental management specification and shall include for all materials, labour and plant required to execute and complete the work as specified, described in the Bill of Quantities or shown on the drawing(s).

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APPENDIX A : APPLICABLE STANDARDS

Reference is made to the latest issues of the following standards:

SANS 1200 A General
SANS 1200 AA General (small works)

Specification AOOccupational Health and Safety

Construction Regulations, 2003.

ANNEXURE B
MANAGEMENT AND MONITORING
PLANS

EROSION MANAGEMENT PLAN

PROPOSED WIND ENERGY FACILITY ON KANGNAS FARM NEAR SPRINGBOK IN THE NORTHERN CAPE



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ACRONYMS AND ABBREVIATIONS

EIA	Environmental Impact Assessment
LEMP	Lifecycle Environmental Management Programme
k	Soil Erodibility Factor
MJ	Mega Joule

Date:01.09.2015	South Africa Mainstream Renewable Power Kangnas (Pty) Ltd	Erosion Management Plan
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SECTION 1: INTRODUCTION

PROJECT DESCRIPTION

South Africa Mainstream Renewable Power Kangnas (Pty) Ltd (Mainstream) intends to develop a 140MW WEF on the farms near Springbok in the Northern Cape (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1). Associated with the proposed WEF would be a substation and transmission line (DEA/ DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1). Aurecon South Africa (Pty) Ltd (Aurecon) were appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream.

The proposed projects entail the generation of electricity from wind resources. The construction period will entail approximately 12 - 18 months for the proposed WEF. The proposed WEF would consist of 140MW, the turbine sizes would range between 1.5MW – 3.5MW and consist of between 94 (using 1.5MW machines) to 40 turbines (using 3.5MW machines). An onsite connection is proposed via an existing 220 kilovolt Eskom line.

The subject of this plan is Erosion Management for the project known as Kangnas Wind Energy Facility (hereinafter referred to as the "Facility").

Proposed WEF will comprise of the following infrastructure:

- Construction of 140MW capacity with wind turbines ranging between 94 (1.5MW) and 40 (3.5MW) capacity;
- Associated infrastructure including:
 - Hard stands of 40m by 40m alongside turbines;
 - Access roads of 4m to 10m wide between turbines;
 - Overhead or underground transmission line connecting turbines (these are covered under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1);
 - One main substation connecting the proposed energy facility to the Eskom line; and
 - Main substation and four satellite substation that would link sectors of the facility to a main substation with overhead lines (under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1).
- Associated infrastructure including:
 - Access roads of 4m to 10m wide; and
 - One main substation with overhead lines.

SECTION 2: SITE SPECIFIC INFORMATION

Climate

The study area has a semi-arid to arid continental climate with a winter rainfall regime i.e. most of the rainfall is confined to winter and early autumn. Mean Annual Precipitation (MAP) is approximately 195

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mm per year. An MAP of 195mm is deemed extremely low as 500mm is considered to be the minimum amount of rain required for sustainable dry land farming. Without some form of supplementary irrigation natural rainfall for the study area is insufficient to produce sustainable harvests. This is reflected in the lack of dry land crop production within the site.

The region typically experiences hot days with an average midday temperature of 28°C in summer, with average night time temperatures dropping to around 4°C during winter (<http://www.saexplorer.co.za>). Evaporation for the region is estimated at between 2,000 and 2,200 mm per annum. In summary the climate for the study area is severely restrictive to arable agriculture which is primarily due to the lack of rainfall and severe moisture availability restrictions.

Geology

The study area is underlain by a variety of geologic materials including, Sedimentary, Gneiss, Quartzite and Tillite. Non-descript sedimentary geologic materials dominate much of the Kangnas site, and this material is found on all five farm portions. Tillite, consisting of consolidated masses of unweathered blocks and unsorted glacial till, is found in non-contiguous zones throughout the site and particularly on the remainder of Farm Kangnas (No.77).

Gneiss, a coarse grained metamorphic rock which is characterised by alternating light and dark bands, differing in mineral composition, is found along the western boundary of Farm Smorgen Schaduwe and Farm Areb. A ring of Quartzite, a medium grained metamorphic rock, underlies the north eastern portion of the study area and is formed from re-crystallised sandstone with the fusion of sedimentary quartz grains.

Slope

Slope or terrain is used to describe the lie of the land. Terrain influences climate and soil characteristics and thus plays a dominant role in determining whether land is suitable for agriculture. In most cases sloping land is more difficult to cultivate and is usually less productive than flatland, and is subject to higher rates of water runoff and soil erosion.

The majority of the site is characterised by flat plains and gently sloping topography with an average gradient of less than 5%. These plains are ideal areas for intensive agriculture, with a high potential for large scale mechanisation. From a developmental perspective, the flat topography would also allow for minimal earthworks and site preparation. The site does, however, contain sporadic steep rocky outcroppings and ridges particularly on Farm Arab, Farm Smorgen Schaduwe and the northern areas of Portion 3 of the Farm Kangnas (No.77). These outcrops and ridges are limiting to arable agriculture.

Soils

The ENPAT for the Northern Cape Province shows the majority of the study area is dominated by shallow Red Apedal (structureless) soils with a high base status. The southern and eastern portions of the site are classified as having an effective soil depth (depth to which roots can penetrate the soil) of less than 0.45m deep, which is a limiting factor in terms of sustainable crop production. Marginally deeper soils are found on the northern portions of the site and particularly on Farm Areb.

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According to the Soil Erodibility Factor (k) Map of South Africa, the Kangnas area has a 'k' (erodibility) of 0.025-0.035 MJ.mm/ha.hr.yr¹, which is a low erosive value. Soils with high permeability prevent runoff and erosion, and, therefore, have generally low k-factor values².

OBJECTIVES OF THIS EROSION CONTROL PLAN

- To maintain surface water by appropriately managing construction works associated with excavation activities and general civil works.
- Prevent erosion, the loss of soil and sedimentation of drainage lines by appropriately managing planned works.
- To prevent the contamination of surrounding waters and disposal sites through the disturbance or inappropriate disposal of sediment.
- To maintain the quality of surface water by appropriately managing the ongoing operation of the Facility.

This plan has been prepared in terms of the requirements of the Environmental Authorisation issued by the Department of Environmental Affairs for the proposed project and seeks to enable Kangnas WEF to identify and implement all legal and best practice requirements in respect of the prevention and control of erosion associated with the project.

This plan must be read together with the remainder of the LEMP and shall apply during both the construction and operational phases of the project.

A copy of this plan must be maintained on site by the ECO, and all employees working at the site, as well as sub-contractors must be trained to ensure compliance with this plan.

It is important to minimise concentration of flows. Various simple design features can minimise the chances of erosion occurring including the design and implementation considerations presented in Table 1.

Table 1: Design and implementation considerations to minimise erosion potential of the development

Structure type	Design considerations
Road culverts	<ul style="list-style-type: none"> • Maximise number of culvert barrels. • Design a 'spreader' structure or stilling basin on downstream side of culvert to reduce energy prior to water flowing back into the channel. • Lay culverts with their bases flush with the natural ground level of the channel and on the same slope as the natural channel. Do not lower the culvert barrels to below natural ground level as this generally causes dongas to form and migrate upstream.
Road drifts	<ul style="list-style-type: none"> • Design the drift so that the road surface follows the natural ground level, minimising the reduction in the cross-sectional area of the channel at the drift. • Any drop off the drift on the downstream side should include a stilling basin of sufficient length to prevent erosion of the downstream channel.
Control of sheet flow	<ul style="list-style-type: none"> • This could be done by excavating a drainage channel around the uphill side of the turbine site or erecting a low berm, say 0.5 m high, uphill of each site.

¹ The revised universal soil loss equation is based on the formula ($A = RKLSCP$). Where "A" is the estimate of average annual soil loss ($t\ ha^{-1}\ yr^{-1}$) caused by sheet and rill erosion. "R" is the rainfall erosivity factor ($MJ\ mm\ ha^{-1}\ h^{-1}\ yr^{-1}$). "K" is the soil erodibility factor ($t\ h\ ha^{-1}\ MJ^{-1}\ mm^{-1}$) which is a measure of the susceptibility of soil to be eroded under standard conditions. "LS" is the topographic factor, derived from a combination of the slope steepness and slope length measurements (non-dimensional), "C" is the cover and management factor (non-dimensional). P is the support practice factor (non-dimensional).

² Maps of factors influencing sheet-rill erosion at a national scale (University of Pretoria).

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around turbine sites	<ul style="list-style-type: none"> The design should include a 'spreader' type structure at the outflow point to reduce the energy of the concentrated flows and to return the flow to sheet flow downstream of the sites. This can be achieved in a simple channel contouring the hill with a long 'spillway' to allow flows to exit downhill.
Control of sheet flow along roads	<ul style="list-style-type: none"> Concentration of sheet flow due to drainage channel design should be minimised. If possible roads can be designed so their surface is at ground level, like most of the local gravel roads are designed at present so that water can flow across them. Where stormwater control is needed, flow crossings should be frequent and considerations for culvert and road drift designs mentioned above should be included in the design. Where sheet flow becomes concentrated due to drainage channels alongside the road collecting sheet flow, a spreader structure or channel should be considered downstream of the road crossing to minimise the chance of erosion due to concentrated flows. This can be achieved in a simple channel contouring the hill with a long 'spillway' to allow flows to exit downhill.

A plan for erosion control for the **decommissioning** of the project shall be formulated prior to the commencement of decommissioning, which will be in compliance with relevant legislative and best practice requirements at the time of decommissioning.

SECTION 3: ACTIVITIES

Construction of the WEF infrastructure (i.e. hard standing, access roads, overhead or underground transmission lines, etc.), together with ancillary works, may result in erosion along the alignment and subsequent sediment releases to the surrounding environment. In turn, the water has the potential to be affected by general civil construction activities, which contains oils and hydrocarbons and on-site waste management.

Sources and activities that may contribute to the processes of erosion include:

- Site preparation and earthworks.
- Construction-related transport on unsealed roads and hard stands.
- Construction activities.
- Vegetation clearing.
- Topsoil and subsoil stockpiling.
- Inadequate compaction during backfilling and weakened soil structure may make excavations more susceptible to water erosion, forming gullies.
- Inappropriate disposal of sewerage or waste waters from site amenities.
- Migration of dust from access roads, stockpiles and exposed areas.
- Potential leakage of waste, oils and hydrocarbons from equipment.

SECTION 4: PERFORMANCE CRITERIA

The performance criteria developed for this project are as follows:

- No discharge of sediment laden water from site.
- No significant erosion on site.
- Correct design and function of erosion and sedimentation control measures.

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SECTION 5: KEY CONSTRUCTION MANAGEMENT ACTIONS CONTROL MEASURES

Audit Ref	Control Measure
General	
ER 1	Site access roads and lay-down areas will incorporate existing tracks where ever possible to minimise disturbance of the site.
ER 2	All land disturbances will be confined to the minimum practicable working area to ensure that the minimum land area is exposed to erosion for the shortest possible time.
ER 3	All vehicles will use only designated access roads and movement of vehicles on and off site will be through approved access points only.
ER 4	Existing drainage lines will be protected and diversion of drainage lines avoided wherever practicable.
ER 5	Surface water will be diverted around the construction footprint using structures such as catch drains, silt fences or bunds. Surface water will not be diverted across erosion prone slopes.
ER 6	Sediment controls shall be installed in accordance with the relevant guidelines and standards for such controls.
ER 7	Erosion control works and measures will be installed to control surface water runoff and prevent the export of sediments from the site by ensuring: <ul style="list-style-type: none"> • Discharge of stormwater is to stable preferably vegetated land. • Erosion control measures closely follow land contours to reduce runoff velocity from exposed soils.
ER 8	Silt fences will be constructed across all drainage lines and erosion controls at the site that are likely to receive runoff from exposed or disturbed soils. Sediment basins will be installed where required.
ER 9	Infrastructure foundations will be designed to ensure that there is no adverse impact on groundwater.
Trenches	
ER 10	Trenches will remain open for the shortest duration possible and prevailing weather conditions will be taken into consideration.
ER 11	Excavated spoil will be stockpiled on the uphill side of the exposed trench and silt fences installed where necessary.
ER 12	Where trenches will be open for a significant length of time, trench plugs may be used if appropriate.

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Spoil Stockpiles	
ER 13	All soil stockpiles will be located at least 50 m from drainage lines.
ER 14	Soil will be stockpiled to maintain separate soil horizons.
ER 15	Stockpiles will be designed with slopes no greater than 2:1.
ER 16	Steep Batters (cut faces which result in steep embankments created by the deep excavation of material) will be treated in accordance with best industry practices.
ER 17	Stockpiles will be stabilised and control measures implemented including watering to suppress dust. This may require netting of geo-textile laid over the stockpiles to inhibit water erosion as well as to curb dust.
ER 18	If required, sediment controls will be installed around unstable stockpiles.
Access Roads	
ER 19	Access roads and hard stand areas will be designed to minimise erosion both during and after construction by: <ul style="list-style-type: none"> • Constructing roads using compacted crushed rock. • Providing regular drains along the main access road that runs up the face of the hill. • Implementing a regular maintenance program for access roads and hard stand areas.
ER 20	Access roads will be designed to avoid the generation of mud. This should be monitored and if pools of water form in the wet season, such pools should be filled in with suitable material (crushed rock)
Dust	
ER 21	Dust suppression measures will be implemented as required and may include: <ul style="list-style-type: none"> • Monitoring of dust and ensuring its suppression during construction of infrastructure. • Wetting access roads and or hard stand areas. • Revegetating exposed areas as soon as practicable.
Rehabilitation	
ER 22	Rehabilitation of disturbed areas will be completed progressively to ensure disturbed land is exposed for the shortest possible time.
ER 23	Rehabilitation will include, at a minimum, reinstatement of soil and surface levelling followed by restoration of vegetation. The vegetation restoration should be carried out by a suitably qualified practitioner using plants from the local area. No foreign plant species (e.g. from commercially available seed mixes) should be used for restoration purposes.
Site Hygiene	
ER 24	All earth moving and track construction equipment shall be thoroughly cleaned prior to entering or leaving the site.
ER 25	All materials (sand, aggregate etc.) imported on to site must be sourced from weed and pathogen free sites.
Maintenance	
ER 26	All drains will be regularly cleaned to remove silt and other debris, and replaced immediately if damaged.
ER 27	Access roads and hard stand areas will be maintained for the duration of the project to prevent erosion.
Sewerage and Waste Water Management	
ER 28	Appropriate sanitary facilities will be provided for construction personnel in accordance with relevant standards.
ER 29	Sanitary facilities will be self-contained and serviced in accordance with the supplier's information and instructions.
Monitoring	
ER 30	Sediment and erosion control measures will be inspected daily and after a significant rainfall event by the Site Manager.
ER 31	All personnel will report damaged or ineffective sediment control measures or potential water contamination to the Site Manager immediately.
ER 32	Monitoring for erosion and sedimentation will be undertaken at 3 months intervals after the

	completion of construction as well as more frequently during the rainy season.
ER 33	This plan shall be audited at the commencement of works and at regular intervals throughout construction works.

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HAZARDOUS SUBSTANCES CONTROL PLAN, INCLUDING MONITORING REQUIREMENTS

**PROPOSED WIND ENERGY FACILITY ON KANGNAS
FARM NEAR SPRINGBOK IN THE NORTHERN CAPE**



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ACRONYMS AND ABBREVIATIONS

EIA	Environmental Impact Assessment
LEMPR	Environmental Management Programme
NRTA	South African National Road Traffic Act
MSDS	Material Safety Data Sheets
NRTR	National Road Traffic Regulations
SANS	South African National Standards

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SECTION 1: INTRODUCTION

PROJECT DESCRIPTION

South Africa Mainstream Renewable Power Kangnas (Pty) Ltd (Mainstream) intends to develop a 140MW WEF on the farms near Springbok in the Northern Cape (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1). Associated with the proposed WEF would be a substation and transmission line (DEA/ DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1). Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream.

The proposed projects entail the generation of electricity from wind resources. The construction period will entail approximately 12 - 18 months for the proposed WEF. The proposed WEF would consist of 140MW, the turbine sizes would range between 1.5MW – 3.5MW and consist of between 94 (using 1.5MW machines) to 40 turbines (using 3.5MW machines). An onsite connection is proposed via an existing 220 kilovolt Eskom line.

The subject of this plan is Erosion Management for the project known as Kangnas Wind Energy Facility (hereinafter referred to as the "Facility").

Proposed WEF will comprise of the following infrastructure:

- Construction of 140MW capacity with wind turbines ranging between 94 (1.5MW) and 40 (3.5MW) capacity;
- Associated infrastructure including:
 - Hard stands of 40m by 40m alongside turbines;
 - Access roads of 4m to 10m wide between turbines;
 - Overhead or underground transmission line connecting turbines (these are covered under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1);
 - One main substation connecting the proposed energy facility to the Eskom line; and
 - Main substation and four satellite substation that would link sectors of the facility to a main substation with overhead lines (under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1).
- Associated infrastructure including:
 - Access roads of 4m to 10m wide; and
 - One main substation with overhead lines.

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OBJECTIVES OF THIS HAZARDOUS SUBSTANCES CONTROL PLAN

- To present measures for preventing hazardous substances from entering the surrounding environment and causing irreversible damage.
- To present measures for effective clean-up in emergency situations.
- To present measures for the management of hazardous substances before, during and after use.
- To present measures to monitor the transport, storage and usage of hazardous substances.

This plan has been prepared in terms of the requirements of the Environmental Authorisation issued by the Department of Environmental Affairs for the proposed project and seeks to enable Kangnas WEF to identify and implement all legal and best practice requirements in respect of hazardous substance management, including monitoring requirements, associated with the project.

This plan must be read together with the remainder of the LEMPR and shall apply during both the construction and operational phases of the project.

An Environmental Control Officer (ECO) will visit the site regularly (as per the requirements of the EMPr) and will ensure implementation of this plan. A copy of this plan must be maintained on site, and all employees working at the site, as well as sub-contractors must be trained to ensure compliance with this plan. Changes to the plan must be approved by the ECO, and updates and reasons for the changes incorporated into the plan.

Where hazardous substances spills occur, whether on or off the site, despite the Contractor complying with the measures in this plan, rectification shall be carried out in accordance with details specified by the Engineer and approved by the ECO.

A plan for hazardous substances control for the **decommissioning** of the project shall be formulated prior to the commencement of decommissioning, which will be in compliance with relevant legislative and best practice requirements at the time of decommissioning.

SECTION 2: ACTIVITIES

Construction of the WEF infrastructure (i.e. hard standing, access roads, overhead or underground transmission lines, etc.), together with ancillary works, may result in hazardous substance spills to the surrounding environment that could affect the well-being of fauna, flora and humans. In turn, the water quality has the potential to be affected by these general civil construction activities, including installation of the WEF, which contains oils and hydrocarbons and on-site waste management.

Sources and activities that may contribute to hazardous substance spills include:

- Leaking construction equipment (e.g. generators) during site preparation and/or earthworks.
- Plant used during construction:
 - Leaking Plant; and
 - Hydraulic pipes and/or fuel pipes bursting during operation.
- Spillage from chemical toilets onsite due to bad management (i.e. not being serviced regularly, not secured to the ground, bad placement, etc.).
- Untrained staff not using hazardous substances correctly.

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SECTION 3: PERFORMANCE CRITERIA

The performance criteria developed for this project are as follows:

- No spillage¹ of hazardous substances.
- Immediate reporting to the ECO and/or Engineer of any spillage of hazardous substances.
- Corrective measures implemented and documented for cleaning up spills.
- Correct disposal of hazardous substances.

¹ Although no spillage is set as the benchmark, spills, especially in emergency situations, cannot always be foreseen or planned. Therefore, the management and corrective measures of spills are very important.

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SECTION 4: KEY CONSTRUCTION MANAGEMENT ACTIONS, CONTROL MEASURES AND MONITORING REQUIREMENTS

Audit Ref	Control Measure
Transportation of Hazardous Substances	
HzS 1	Hazardous materials will be transported in accordance with the South African National Road Traffic Act, (NRTA) and National Road Traffic Regulations (NRTR), The Hazardous Substances Act, The Occupational Health and Safety Act and associated South African National Standards (SANS).
Storage of Hazardous Substances	
HzS 2	At the tender stage, method statements are required from the Contractor that must provide the layout of the construction camp showing the location of key infrastructure and services, including but not limited to: offices, guard camps and sleeping quarters, overnight vehicle parking areas, stores, workshop, stockpile and laydown areas, and hazardous storage areas, including fuels, oils and lubricants.
HzS 3	The choice of location of storage areas must take into account prevailing winds, distances to water bodies, on-site topography and erosion potential of the soil. Impervious and bunded surfaces must be provided.
HzS 4	Facilities for the storage of oils, lubricants, paints, greases, fuels, chemicals and any other hazardous substances and materials to be used during construction and operation must be provided to prevent the migration of spillage into the ground and groundwater regimes around the storage areas. These pollution prevention measures must include a bund wall high enough to contain at least 110% of any stored volume.
HzS 5	Hazardous storage facilities (including diesel and petrol tanks and bowsers) must be located on an impervious surface that is protected from the ingress of storm water from surrounding areas in order to avoid accidental spillages entering and polluting local soil and water resources.
HzS 6	Material Safety Data Sheets (MSDS) will be readily available on site for all chemicals and hazardous substances to be used on site. Where, possible, the available MSDS should include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.
HzS 7	When not in use, hazardous substance storage areas will be secured against unauthorised entry.
HzS 8	Hazardous stores will be located away from high fire risk areas. The bulk storing of flammable materials (i.e. cleared vegetation, wood offcuts, fuel stores, etc.) near to hazardous stores is prohibited.
HzS 9	Hazardous stores will be equipped with adequate and appropriate firefighting equipment.
HzS 10	No effluents may be discharged directly into the environment from a hazardous storage or associated work area. Where water may become contaminated (e.g. dilution of chemicals, washing of contaminated equipment and containers, washing of contaminated persons or clothing, etc) by hazardous substances, a conservancy/evaporation tank (protected to prevent access by human and animals) will be provided and any effluent/residues will be transported for disposal at a registered waste disposal facility. Proof of disposal will be by disposal certificate issued by the operator of the waste disposal facility. These certificates will form part of project documentation and are auditable.
HzS 11	Hazardous substance storage areas will be clearly identified with the appropriate warning signage and labels.
HzS 12	Empty containers in which hazardous substances were kept are to be treated as hazardous waste.
HzS 13	Used oil, lubricants and cleaning materials from the maintenance of vehicles and machinery will be collected in a holding tank and returned to the supplier.
HzS 14	All used filter materials will be stored in a secure bin for disposal off site.
HzS 15	Regular documented inspections of hazardous substance (including chemical, oil and fuel) stores

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	will be undertaken.
Prevention, Management and Documentation of Spillages	
HzS 16	Spill kits appropriate to the volume and type of hazardous materials will be maintained on site. The correct personal protective equipment, as determined by the nature of the substances in storage, will be kept at the stores (e.g. breathing apparatus, goggles, gloves, overalls, etc.), including the correct equipment needed during a clean-up (i.e. a plastic spade for flammable materials). The location of spill containment materials and equipment will be included in the site induction.
HzS 17	Training for spill clean-up will be provided to nominated persons that will be present on site for the duration of the works.
HzS 18	All plant and equipment will undergo maintenance in accordance with their individual service requirements. Equipment leaks will be addressed immediately.
HzS 19	Where practicable, all plant and mobile equipment will be parked in designated Hard Stand areas when not being used in construction activities.
HzS 20	Spills of hazardous materials (including hydrocarbons) will be cleaned immediately in accordance with the requirements of the Northern Cape Department of Environment and Nature Conservation and local municipal requirements. Disposal of contaminated soil and clean up materials will be to an approved waste disposal facility capable of handling such hazardous waste. Proof of disposal will be by disposal certificate issued by the operator of the waste disposal facility. These certificates will form part of project documentation and are auditable.
HzS 21	Any storage of oil or other hydrocarbon on a water vessel, for example, a dredger, will be banded.
HzS 22	Entry of oil, grease or fuel into any watercourse is prohibited. Drainage from any area likely to be so contaminated shall be effectively diverted to a suitable collection point.
HzS 23	No plant or equipment is to enter a watercourse if it is found to be leaking oil or fuel, or be allowed to continue operation within the watercourse if the plant or equipment is found to be leaking oil or fuel.
HzS 24	Significant quantities of fuel will not be stored on site. Equipment and machinery that require refuelling on site (e.g. cranes) will be refuelled by a dedicated refuelling vehicle, with drip trays underneath the dispensing mechanisms. The refuelling vehicle will have adequate spill kits and containment devices readily available.
HzS 25	Documented inspections of all plant and equipment for fuel, oil or hydraulic leakage will be carried out at least weekly. Any leakages must be repaired before plant and equipment are permitted to be used.
HzS 26	Any and all spillages shall be documented and shall include, <i>inter alia</i> , the following information: <ul style="list-style-type: none"> • When the incident occurred; • Where it occurred; • How it occurred; • Proof that the Engineer and/or ECO was notified of the spill; • How the situation was rectified; and • Photo proof of the spill before and after clean-up.
Disposal of Hazardous Substances	
HzS 27	All hazardous waste not earmarked for reuse, recycling or resale (such as oil contaminated with chlorinated hydrocarbons, bitumen, tar, electrical cleaning solvent, certain chemicals and fluorescent tubes) must be regularly disposed by an approved waste disposal contractor at an approved waste disposal facility capable of handling such hazardous waste. Proof of disposal will be by disposal certificate issued by the operator of the waste disposal facility. These certificates will form part of project documentation and are auditable.
HzS 28	The contractor will be in possession of at least two (2) recognised hazardous chemical spill kits that, at a minimum, will have a supply of absorbent material readily available to absorb any emergency spills. The spill kits will be easily accessible and clearly marked. The kits must be known to all senior staff on site, including the ECO.

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Monitoring	
HzS 29	<p>An environmental register must be maintained on site which keeps a record of all incidents which occur on the site during construction and operation. These incidents include:</p> <ul style="list-style-type: none"> ▪ Public involvement/complaints. ▪ Health and safety incidents. ▪ Hazardous materials stored on site. ▪ Non-compliance incidents.
HzS 30	<p>The ECO is to compile a check list of all aspects that require regular monitoring. This checklist must, at a minimum, cover the following for the Hazardous Substances Store:</p> <ul style="list-style-type: none"> ▪ The store is on an impervious layer that has not deteriorated over time. ▪ The bund wall is constructed to specifications. ▪ The bund wall remains in acceptable condition with no obvious signs of deterioration through which hazardous substances may leak. ▪ The door to the store is locked at all times when not in use. ▪ The hazardous substances register is up to date and includes all materials stored on site. ▪ All containers within the store are: <ul style="list-style-type: none"> ○ Located in their correct area of the store. ○ Are securely sealed. ○ Not obviously damaged. ○ Not obviously leaking. ▪ MSDS are all available and easily accessible. ▪ Spill Kits are available and 100% complete in terms of their contents. <p>Inspections must be carried out fortnightly or more frequently (after each event) in the event of the use of hazardous substances, the use of spill kits or the receipt of new/additional hazardous substances.</p>
HzS 31	<p>With regards to fuels, the ECO is to compile a check list of all aspects that require regular monitoring. This checklist must, at a minimum, cover the following:</p> <ul style="list-style-type: none"> ▪ The fuel storage and dispensing areas are on an impervious layer that has not deteriorated over time. ▪ Bund walls are constructed to specifications. ▪ The bund walls remain in acceptable condition with no obvious signs of deterioration through which fuels may leak. ▪ The storage and dispensing areas are secure when not in use, e.g. over-night. ▪ Clean up kits for accidental spills are available and 100% complete in terms of their contents. <p>Inspections must be carried out fortnightly or more frequently (after each event) in the event of use of clean up kits or the receipt of new/additional hazardous substances.</p>
HzS 32	<p>The workshop area must be inspected fortnightly to determine:</p> <ul style="list-style-type: none"> ▪ The correct storage of fuels, oils and lubricants within the workshop. ▪ Whether or not there have been accidental spills. In the event of an accidental spill, the ECO is to ensure that all records pertaining to clean up and the avoidance of a repeat event, are completed and filed for future reference. <p>In the event that there is unavoidable servicing and/or repair of machinery in the field, the ECO must ensure that the above two items are addressed immediately for each such event.</p>
HzS 33	<p>Any spillage, which may occur, shall be investigated and immediate action must be taken. This must also be reported to the ECO and DWA, and local authorities, where necessary</p>

HzS 34	All matters pertaining to the monitoring of hazardous substances, fuels, oils and lubricants must be reported in the ECO's regular monitoring and audit reports.
HzS 35	Any issues identified by the ECO with regard to the conditions of this Hazardous Substances Control Plan and LEMPR are to be addressed immediately by the contractor or operator.
HzS 36	The ECO is to ensure that copies of all waste disposal certificates are kept on file.

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VEGETATION MANAGEMENT PLAN

**(Alien Invasive Control, Plant Rescue and
Protection, and Rehabilitation)**

**PROPOSED WIND ENERGY FACILITY ON KANGNAS
FARM NEAR SPRINGBOK IN THE NORTHERN CAPE**



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ACRONYMS AND ABBREVIATIONS

ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
LEMPR	Lifecycle Environmental Management Programme

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SECTION 1: INTRODUCTION

PROJECT DESCRIPTION

South Africa Mainstream Renewable Power Kangnas (Pty) Ltd (Mainstream) intends to develop a 140MW WEF on the farms near Springbok in the Northern Cape (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1). Associated with the proposed WEF would be a substation and transmission line (DEA/ DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1). Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream.

The proposed projects entail the generation of electricity from wind resources. The construction period will entail approximately 12 - 18 months for the proposed WEF. The proposed WEF would consist of 140MW, the turbine sizes would range between 1.5MW – 3.5MW and consist of between 94 (using 1.5MW machines) to 40 turbines (using 3.5MW machines). An onsite connection is proposed via an existing 220 kilovolt Eskom line.

The subject of this plan is Erosion Management for the project known as Kangnas Wind Energy Facility (hereinafter referred to as the “Facility”).

Proposed WEF will comprise of the following infrastructure:

- Construction of 140MW capacity with wind turbines ranging between 94 (1.5MW) and 40 (3.5MW) capacity;
- Associated infrastructure including:
 - Hard stands of 40m by 40m alongside turbines;
 - Access roads of 4m to 10m wide between turbines;
 - Overhead or underground transmission line connecting turbines (these are covered under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1);
 - One main substation connecting the proposed energy facility to the Eskom line; and
 - Main substation and four satellite substation that would link sectors of the facility to a main substation with overhead lines (under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1).
- Associated infrastructure including:
 - Access roads of 4m to 10m wide; and
 - One main substation with overhead lines.

OBJECTIVES OF THIS VEGETATION MANAGEMENT PLAN

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- To restrict disturbance of the natural vegetation surrounding the development to the greatest possible extent.
- To ensure that vegetation on site is rehabilitated as close to its original state as possible.
- To present measures for preventing alien plant species from being introduced to the site.
- To present measures for the removal of alien plant species.
- To present measures for protecting plants from unnecessary destruction and to introduce measures for rescuing protected plant species that cannot be avoided.

This plan has been prepared in terms of the requirements of the Environmental Authorisation issued by the Department of Environmental Affairs for the proposed project and seeks to enable Kangnas WEF to identify and implement all legal and best practice requirements in respect of vegetation management associated with the project.

This plan must be read together with the remainder of the LEMPR and shall apply during both the construction and operational phases of the project.

An Environmental Control Officer (ECO), who is well appraised of the nature of the vegetation assemblages found within the project area, will visit the site regularly (as per the requirements of the LEMPR) and must ensure implementation of this plan. A copy of this plan must be maintained on site, and all employees working at the site, as well as sub-contractors must be trained to ensure compliance with this plan. Changes to the plan must be approved by the ECO, and updates and reasons for the changes incorporated into the plan.

Where vegetation has been harmed, whether on or off the site, despite the Contractor complying with the measures in this plan, rehabilitation shall be carried out in accordance with details specified by the Engineer and approved by the ECO.

A plan for vegetation management for the **decommissioning** of the project shall be formulated prior to the commencement of decommissioning, which will be in compliance with relevant legislative and best practice requirements at the time of decommissioning.

SECTION 2: ACTIVITIES

Construction of the WEF infrastructure (i.e. hard stands, access roads, overhead or underground transmission lines, etc.), together with ancillary works, may result in vegetation being harmed and/or destroyed within the project footprint. The introduction of building materials, such as building sand, could result in alien seeds entering the site. Alien vegetation is also likely to establish where disturbance has taken place. Both sources of alien vegetation need to be managed and controlled on site.

Sources and activities that may contribute to vegetation being harmed include:

- Vegetation clearing during construction (i.e. for the hard stands, access roads, construction camp, etc.).
- Disturbance of topsoil during construction making it susceptible for alien vegetation incursion.
- Compaction of soil making it unlikely for seeds to establish and grow in such areas.
- Construction materials brought onto the site from outside areas that contain organic material, with alien vegetation propagules that could result in the establishment of alien vegetation on site.

Limited mitigation can be implemented to offset the damage to vegetation on site and, therefore, it is essential that disturbed areas are re-vegetated as quickly (progressive rehabilitation, i.e. on-going during construction phase once construction has been completed in a particular area of the construction footprint) and as extensively as possible given the arid environment. The aridity of the environment and the slow rate of growth of woody plant species will impact on the success of rehabilitation and, therefore, it will be necessary to actively water areas to enhance plant growth once the source of disturbance has ceased.

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SECTION 3: PERFORMANCE CRITERIA

The performance criteria developed for this project are as follows:

- The construction footprint must be demarcated at the outset of construction and all areas excluded are to be considered no-go areas for whatever purpose (persons and vehicles) excepting emergencies. Transgressions will be dealt with severely.
- Within the construction footprint, the clearing of plants must be limited to the smallest possible area.
- Materials introduced to the site must be clean and not contain organic materials.
- The limited topsoil available must be managed according to the specifications of the LEMPR so as not to inadvertently introduce alien vegetation and propagules.
- Disturbed areas are to be rehabilitated as soon as possible after being disturbed. Progressive rehabilitation must be implemented.
- Rehabilitation must be actively managed and plants will be watered as required.

SECTION 4: KEY CONSTRUCTION MANAGEMENT ACTIONS/CONTROL MEASURES (PRE-, DURING-, AND POST-CONSTRUCTION)

Audit Ref	Control Measure
Plant Protection and Rescue	
PRP 1	A qualified Environmental Control Officer will be appointed to implement and manage the Environmental Management Programme (EMPr). The ECO will be well apprised of the nature of the vegetation found within the project area. If required, a botanist will be appointed to assist the ECO on a needs basis.
PRP 2	The proponent, contractor and ECO must establish and clearly demarcate the footprint of the construction site prior to the commencement of any construction activities on site. All areas outside the demarcated areas will be no-go areas (except in the case of emergencies).
PRP 3	Prior to commencement of construction, the ECO, together with a botanist with knowledge of the area, must survey the areas to be disturbed and identify and mark any individual plants that need to be protected.
PRP 4	The Northern Cape Department of Environmental Affairs and Nature Conservation must be consulted before any vegetation is cleared.
PRP 5	Department Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act for removal of <i>Boscia albitrunca</i> (Shepherds' Tree) must be made and approved before any activities that would affect this species are undertaken. If any aloe species are to be removed or relocated, a permit from DENC must be obtained.
PRP 6	The botanist must recommend measures for the relocation of any species requiring such action (this has not been identified as a requirement in the specialist botanist report as part of the EIA) should this become apparent at the time of survey. Measures must be implemented as directed by the botanist and the ECO.
PRP 7	The Contractor must ensure that clearance of vegetation is restricted to that required to facilitate the execution of the Works.
PRP 8	Site clearance must occur in a planned manner, and cleared areas shall be stabilised and rehabilitated as soon as possible.
PRP 9	Cleared vegetation must be chipped, bagged and stored for application as mulch in rehabilitation or used for brush packing as part of the rehabilitation process. The disposal of vegetation by burying is prohibited.
PRP 10	Topsoil must be removed from the construction area and stockpiled, as per the specifications of the LEMPR, for future rehabilitation use.

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PRP 12	The ECO must monitor the use of roads to ensure that there is no driving off roads into surrounding veld. Any such activity must result in fines (as provided for in the LEMPR) and appropriate remedial action to repair any damage.
PRP 13	The ECO is to monitor roads for run-off and erosion into the adjacent veld. Any negative impacts, such as erosion, must be managed in accordance with the provisions of the Erosion Management Plan.
PRP 14	The ECO is to ensure implementation of the Storm Water and Erosion Management Plans.

Rehabilitation

RHB 1	Remove topsoil and stockpile separately from subsoil, ensuring there is no mixing of the two. The areas used for topsoil and subsoil stockpiling should not be cleared of shorter herbaceous vegetation and must not be grubbed.
RHB 2	Flatten or mould disturbed areas to be rehabilitated to form uniform surfaces, with no heaps of soil or piles of rock.
RHB 3	Scarify the disturbed areas to break up any compaction due to vehicles and ensure no deep ruts or channels are left.
RHB 4	Any temporary access roads and the construction zone alongside the canal must be scarified to alleviate compaction by heavy vehicles and to aerate the soil to permit re-colonization by local flora.
RHB 5	Replace topsoil from the stockpile to mimic the natural situation of the disturbed areas.
RHB 6	Spread chipped organic material over the topsoil as a mulch to enhance the water-holding capacity of the soil.
RHB 7	The areas being rehabilitated must be watered at least twice a week, until there are positive signs of vegetation establishment, in order to supplement rainfall and to encourage vegetative cover before the following winter.
RHB 8	Restoration work must take place in late summer to ensure that all rehabilitation areas are prepared before the end of February. The intention of this action is to benefit from the autumn rains (highest rainfall is in March).
RHB 9	Trees such as <i>Searsia pendulina</i> and <i>Ziziphus mucronata</i> must be planted in strategic places e.g. at the construction camp site and in the vicinity of the intake structure and tail-race to re-create groves of trees. These trees must be actively watered until there are positive signs of establishment particularly over winter periods.
RHB 10	No hydro-seeding using exotic or grasses non-native to the area is permitted. The natural grass and shrub species have the capacity to quickly and successfully recolonize disturbed sites and this must be encouraged by watering, as noted above.

Alien Invasive Control

AIC 1	Construction materials (e.g. sand, gravel, crushed stone, rock, etc.) should be bought from a supplier that provides certification that the materials are free of invasive species. Materials brought on site must be documented (e.g. photo proof) and the documentation must be provided to the ECO before the material is used.
AIC 2	Stockpiles shall be kept clear of weeds and alien invasive vegetation. Manual clearing is preferred, but in extreme cases herbicides can be considered, if permitted (this will be done at the discretion of the ECO).
AIC 3	Topsoil is to be maintained in a weed free condition, and alien invasive plants colonising the stockpiles are to be manually removed immediately. As per the above control measure, herbicides and poisons may not be used on stockpiled materials unless otherwise stated by the ECO.
AIC 4	Any alien invasive vegetation, such as <i>Prosopis glandulosa</i> (mesquite) that appears in disturbed areas or near the WEF site, must be removed and destroyed.
AIC 5	Alien vegetation that has the potential to seed must be burnt with the relevant authorisation at an approved site. Woody components, without leaves, flower heads, etc can be used for chipping, mulching and brush packing.

Alien Vegetation Clearing

AVC 1	Alien vegetation clearing techniques: Before clearing occurs, the preferred technique for the
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	specific area and the applicable alien species must be reviewed and determined by the Engineer, ECO and the Contractor, bearing in mind that more than one of these techniques might be required at different stages of clearing.
AVC 2	<p>If and when required (as directed by the ECO), the following alien eradication process should be followed:</p> <ul style="list-style-type: none"> • Initial clearing - clearing can be by way of mechanical or motor-manual (brush-cutters or chainsaws) methods depending on the size of the target vegetation. • Processing the cleared vegetation – to limit problems associated with access, vermin and fire risk, the undesirable vegetation that has not been used in rehabilitation must be burnt at an approved site. • First follow-up clearing – can be undertaken by manual (slashers, machetes and axes) or motor-manual (weed-eaters or brush-cutters) means or through foliar herbicide applications. The timing of the first follow up operation must be directed by the ECO and can, in some cases, include the burning of the initial clearing residue (at an approved burning site) to destroy the secondary growth. • Second and ongoing follow-up operations – conducted manually (slashers, machetes or even hand-pulling) whenever alien vegetation re-growth is of sufficient size to warrant such action. These follow-up operations will become less intensive and less frequent while progressing towards the management objective of zero alien vegetation on site.
AVC 3	No chemical techniques for alien vegetation clearing are to be used, except if instructed by the ECO.
AVC 4	<p>All chemicals and fuels must be removed from the site at the end of each working day, and returned again in the morning. While on site, all such materials are to be kept in a clearly demarcated area (i.e. the hazardous substances store), away from the river, as agreed upon with the ECO. Disposal of chemicals that have expired should be undertaken in accordance with the Hazardous Substances Control Plan attached as to the LEMPR.</p> <p>All chemicals with a one day shelf life, and not used within the day must be disposed of as per the manufacturer's directions.</p>
AVC 5	<p>In the case that the Engineer, ECO and Contractor agree on the use of chemical means for alien vegetation clearing, the sub-contractors appointed for alien vegetation clearing must at all times comply with the Occupational Health and Safety Act (Act 85 of 1993) and any regulations regarding the use of machinery and chemicals. The following must also be implemented in planning and managing operations:</p> <ul style="list-style-type: none"> • Chemicals must only be applied by trained operators (with a certificate of competence) wearing the necessary protective clothing. • Chemicals must only be used and applied according to the manufacturers' recommendations and in terms of their registered use. • The application of chemicals must avoid the risk of contaminating ground or surface water. • Chemicals must be applied at their correct rates. • Chemicals must only be applied when the weather is cool and calm to prevent drift from the application point, particularly near sensitive areas such as drainage lines. • Chemicals should be pre-mixed off site. • Equipment used to apply chemicals should not be cleaned in-field. • Chemical containers should be treated as hazardous waste and must be disposed at a registered hazardous waste site, or they should be returned to the suppliers from which they were purchased. Documentation must be presented to the ECO as proof of how the containers were disposed.
AVC 6	Removal of alien invasive species or other vegetation and follow-up procedures must be in accordance with the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

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SECTION 5: MONITORING

The progress of vegetation rehabilitation must be monitored and reported on a quarterly basis for 36 months (3 years) post-construction. Measurable targets for rehabilitation must be determined by a restoration practitioner with the ECO at the commencement of the rehabilitation activities taking cognisance of the characteristics of the local environment.

The project footprint (all areas affected by the development; i.e. disturbed areas and a buffer area of 20m around the site and any other area disturbed by project activities) must be monitored for alien plants and reported on quarterly for 36 months post construction. Inspections must be undertaken thereafter annually for the next 2 years. Appropriate remedial action (as outlined above) must be implemented should alien plant species be recorded. The target is removal of all alien plants.

STORM WATER MANAGEMENT PLAN

PROPOSED WIND ENERGY FACILITY ON KANGNAS FARM NEAR SPRINGBOK IN THE NORTHERN CAPE



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ACRONYMS AND ABBREVIATIONS

CARA	Conservation of Agricultural Resources Act
DWA	Department of Water Affairs
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
LEMPR	Lifecycle Environmental Management Programme
HV	High Voltage
NEMA	National Environmental Management Act
NWA	National Water Act

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SECTION 1: INTRODUCTION

PROJECT DESCRIPTION

South Africa Mainstream Renewable Power Kangnas (Pty) Ltd (Mainstream) intends to develop a 140MW WEF on the farms near Springbok in the Northern Cape (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1). Associated with the proposed WEF would be a substation and transmission line (DEA/ DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1). Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream.

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The subject of this plan is Erosion Management for the project known as Kangnas Wind Energy Facility (hereinafter referred to as the “Facility”).

Proposed WEF will comprise of the following infrastructure:

- Construction of 140MW capacity with wind turbines ranging between 94 (1.5MW) and 40 (3.5MW) capacity;
- Associated infrastructure including:
 - Hard stands of 40m by 40m alongside turbines;
 - Access roads of 4m to 10m wide between turbines;
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PURPOSE OF THIS PLAN

This plan serves to outline the related surface, storm water issues on the proposed site for the purposes of inclusion in the Environmental Management Programme. During the design phase, specific drainage drawings will be produced which will incorporate and address the issues raised in this Storm Water Management Plan.

This plan has been prepared in terms of the requirements of the Environmental Authorisation issued by the Department of Environmental Affairs for the proposed project and seeks to enable Kangnas WEF to identify and implement best practice requirements in respect of the management of storm water associated with the project.

This plan must be read together with the remainder of the LEMPR and shall apply during both the construction and operational phases of the project.

An Environmental Control Officer (ECO) will visit the site regularly (as per the requirements of the LEMPR) and will ensure implementation of this plan. A copy of this plan must be maintained on site and all employees working at the site, as well as sub-contractors must be trained to ensure compliance with this plan. Changes to the plan must be approved by the ECO, and updates and reasons for the changes incorporated into the plan.

A plan for storm water management for the **decommissioning** of the project shall be formulated prior to the commencement of decommissioning, which will be in compliance with relevant legislative and best practice requirements at the time of decommissioning.

SECTION 2: LEGISLATION

There are a number of legal requirements to which the project proponent must adhere for the proposed development. Fundamentally, the proponent is required to include and integrate environmental principals and values into all planning and implementation procedures taken for development purposes.

Underlying the reasoning above is the Constitutional right that people have to environmental protection as set out in the Bill of Rights in the Constitution (Section 24). These rights have now been interpreted and included into the National Environmental Management Act, 1998 (Act 107 of 1998), which, together with other national and provincial legislation, governs the way environmental principles are incorporated into any form of development.

Relevant legislation pertaining to the control of storm water on site is described hereunder.

National Environmental Management Act, 1998 (Act 107 of 1998)

The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) provides for the right to an environment that is not harmful to the health and well being of South African citizens. In addition, there is recognition that development must be socially, environmentally and economically sustainable, and that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and

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remedied. Section 2 of the Act sets out the National Environmental Management principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that “every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”. If such pollution or degradation cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution or degradation.

Conservation of Agricultural Resources, 1983 (Act 43 of 1983)

The aim of the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) is to provide for control over the utilisation of the natural agricultural resources within South Africa and to promote the conservation of soil and water resources, indigenous vegetation and the control of invasive plants.

Thus, in terms of CARA, the landowner or land user is responsible for the maintenance of all soil conservation works located on his/her property. Added to this, the maintenance and improvement of the structure and function of wetlands furthers the aims of CARA.

National Water Act, 1998 (Act 36 of 1998)

The National Water Act, 1998 (Act 36 of 1998) (NWA) has various sections of relevance to the proposed hydro power facility. The Department of Water Affairs (DWA) is the responsible authority with regard to matters affecting water resource management, including water quality. Added to this, certain provincial and local authority powers also influence the regulation of water resources, including agriculture, the environment, health services, nature conservation, pollution control, regional planning and development, soil conservation and water and sanitation services.

Part 4 of the NWA deals with pollution prevention, and, in particular, the situation where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking appropriate measures to prevent the pollution of water resources. If these measures are not taken, the catchment management agency concerned may, itself, do whatever is necessary to prevent the pollution or to remedy its effects, and to recover all reasonable costs from the persons responsible for the pollution. This section of the Act has bearing on the proposed WEF as it deals with pollution, which, in this case can include the spillage of chemicals and hydrocarbons during construction and operation, or soil erosion run-off, all of which may enter surface and ground water resources.

The National NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources. The authorisation may need to be applied for the following water use activities should they be triggered: Sections 21 (a) - abstraction, 21 (c) - change to the bed, banks and characteristics of a water course and 21 (i)- impeding and diverting the flow.

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SECTION 3: SITE SPECIFIC INFORMATION

Climate

The study area has a semi-arid to arid continental climate with a winter rainfall regime i.e. most of the rainfall is confined to winter and early autumn. Mean Annual Precipitation (MAP) is approximately 195 mm per year. An MAP of 195 mm is deemed extremely low as 500 mm is considered to be the minimum amount of rain required for sustainable dry land farming. Without some form of supplementary irrigation natural rainfall for the study area is insufficient to produce sustainable harvests. This is reflected in the lack of dry land crop production within the site.

The region typically experiences hot days with an average midday temperature of 28°C in summer, with average night time temperatures dropping to around 4°C during winter (<http://www.saexplorer.co.za>). Evaporation for the region is estimated at between 2 000 and 2 200 mm per annum. In summary the climate for the study area is severely restrictive to arable agriculture which is primarily due to the lack of rainfall and severe moisture availability restrictions.

Geology

The study area is underlain by a variety of geologic materials including, Sedimentary, Gneiss, Quartzite and Tillite. Non-descript sedimentary geologic materials dominate much of the Kangnas site, and this material is found on all five farm portions. Tillite, consisting of consolidated masses of unweathered blocks and unsorted glacial till, is found in non-contiguous zones throughout the site and particularly on the remainder of Farm Kangnas (No.77).

Gneiss, a coarse grained metamorphic rock which is characterised by alternating light and dark bands, differing in mineral composition, is found along the western boundary of Farm Smorgen Schaduwe and Farm Areb. A ring of Quartzite, a medium grained metamorphic rock, underlies the north eastern portion of the study area and is formed from recrystallised sandstone with the fusion of sedimentary quartz grains.

Slope

Slope or terrain is used to describe the lie of the land. Terrain influences climate and soil characteristics and thus plays a dominant role in determining whether land is suitable for agriculture. In most cases sloping land is more difficult to cultivate and is usually less productive than flatland, and is subject to higher rates of water runoff and soil erosion.

The majority of the site is characterised by flat plains and gently sloping topography with an average gradient of less than 5 %. These plains are ideal areas for intensive agriculture, with a high potential for large scale mechanisation. From a developmental perspective, the flat topography would also allow for minimal earthworks and site preparation. The site does, however, contain sporadic steep rocky outcroppings and ridges particularly on Farm Arab,

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Farm Smorgen Schaduwe and the northern areas of Portion 3 of the Farm Kangnas (No.77). These outcrops and ridges are limiting to arable agriculture.

Land use

According to the Environmental Potential Atlas for South Africa (ENPAT) Database and 2010 land cover data the site consists of a mix of natural veld and unimproved shrubland which is used as grazing land for sheep, goats and cattle. According to the spatial databases there are no cultivated fields or irrigated lands on site.

Soils

The ENPAT for the Northern Cape Province shows the majority of the study area is dominated by shallow Red Apedal (structureless) soils with a high base status. The southern and eastern portions of the site are classified as having an effective soil depth (depth to which roots can penetrate the soil) of less than 0.45 m deep, which is a limiting factor in terms of sustainable crop production. Marginally deeper soils are found on the northern portions of the site and particularly on Farm Areb.

Watercourses

The site is situated on a watershed between the Orange River and the Buffels River with the main freshwater features being a number of small ephemeral streams that drain the inselbergs for a short period following rainfall events, two small springs/well points and some ephemeral pans at Kangnas and Koeris farms. The ephemeral tributaries of the Buffels and Orange rivers within the site are considered to be in a largely natural to moderately modified ecological state.

The sediment loads of any drainage depressions or pans may increase due to the excavations on the site, the laying of linear infrastructure such as roads or power lines across drainage lines and other construction related activities.

SECTION 4: OBJECTIVES AND PERFORMANCE CRITERIA

The objectives of the storm water management plan are to:

- Preserve as best possible the natural habitats on site to minimise erosion, especially at the collection areas and discharge points on site.
- Preserve or recreate the structural integrity of natural plant communities, thereby reducing potential for soil erosion.
- Minimise, as far as possible, any increase in storm water runoff from new built surfaces, thereby reducing the potential for site specific flood damage.
- Prevent, as far as possible, an increase in non-point pollution and minimise pollutants in storm water runoff from the development to safeguard and to enhance other uses of water.
- Allow for natural surface and sub-surface flows so as not to impede the movement of water along drainage lines.
- Include measures to promote the dissipation of storm water run-off.
- To design to ensure that runoff from storm water does not result in erosion

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SECTION 5: KEY MANAGEMENT ACTIONS/CONTROL MEASURES

The purpose of the Storm Water Management Plan is to specify general guidelines and principles for storm water management so as to ensure that increased volumes of storm water from hard surfaces, roofs etc. do not result in ecological damage and erosion. Procedures for the management and control of storm water are described in this plan.

Audit Ref	Control Measure
Planning Phase	
SWM 1	All roads and parking areas must have stable surfaces and channels lined (where possible) with vegetation.
SWM 2	Points of storm water discharge must be stabilised and energy dissipation measures specified (ecological methods, such as gabions, perforated mattresses and vegetation, etc. are preferred).
SWM 3	All activities that affect surface drainage must be designed so as to ensure that storm water runoff does not lead to excessive surface erosion problems on the site.
SWM 4	Storm water infiltration must be promoted through minimising hard paved areas and using porous paving surfaces wherever possible.
SWM 5	Rainwater runoff from roofs and panels should be directed into natural, vegetated areas rather than into storm water drains wherever possible.
SWM 6	Waste traps must be planned and included in the storm water design to catch litter conveyed by surface runoff.
SWM 7	The harvesting of storm water for appropriate uses (such as cistern water or for irrigation) must be planned and incorporated into the design of the development where possible.
SWM 8	The majority of the access roads constructed for the Project will be gravel roads. To assist with storm water run-off, these gravel roads must typically be graded and shaped with a 3% crossfall back into the slope, allowing storm water to be channelled in a controlled manner towards the natural drainage lines and to assist with any surface water sheet flow on the site.
SWM 9	Where any proposed roads intersect the natural, defined drainage lines, either suitably sized pipe culverts or drive through causeways must be installed/constructed, which takes into account the hydrology criteria for a selected major storm as outlined above.
SWM 10	The gravel laydown area adjacent to the intake structure must be sloped at a minimum of 2% to allow surface storm water run-off to migrate off the laydown area.

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Construction Phase	
SWM 11	Remove only vegetation essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
SWM 12	Ensure that measures are in place to control the flow of excess water so that it does not impact on surface vegetation
SWM 13	The accumulation of water on the surface must be prevented. The drainage of the surface must be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
SWM 14	Runoff from roads must be managed to avoid erosion and pollution problems.
SWM 15	Prevent storm water or contaminated water directly entering any watercourse.
SWM 16	Install waste traps to catch litter conveyed by surface runoff.
SWM 17	Dissipate concentrated storm water flows through vegetated areas.
SWM 18	Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
SWM 19	All hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time.
SWM 20	The integrity of the impervious surface and bunded area must be inspected regularly and any maintenance work conducted must be recorded in a maintenance report.
SWM 21	Implement topsoil and storm water runoff control management measures to prevent the loss of topsoil.
SWM 22	Ensure that measures are in place to control the flow of excess water so that it does not impact on surface vegetation.
SWM 23	The accumulation of water on the surface must be prevented. The drainage of the surface must be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
Operational Phase	
SWM 22	Runoff from roads must be managed to avoid erosion and pollution problems.
SWM 23	Prevent storm water or contaminated water directly entering any watercourse.
SWM 24	All waste traps within the storm water system must be emptied/cleaned regularly to ensure efficient functioning.
SWM 25	Dissipate concentrated storm water flows through energy dissipaters or vegetated areas.
SWM 26	Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.

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TRAFFIC MANAGEMENT PLAN

PROPOSED WIND ENERGY FACILITY ON KANGNAS FARM NEAR SPRINGBOK IN THE NORTHERN CAPE



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ACRONYMS AND ABBREVIATIONS

DoT	Department of Transport
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
LEMP _r	Lifecycle Environmental Management Programme
NRTR	National Road Traffic Regulations
TRH	Technical Recommendations for Highways

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SECTION 1: INTRODUCTION

PROJECT DESCRIPTION

South Africa Mainstream Renewable Power Kangnas (Pty) Ltd (Mainstream) intends to develop a 140MW WEF on the farms near Springbok in the Northern Cape (DEA14/12/16/3/3/2/346 and DEA14/12/16/3/3/2/346/AM1). Associated with the proposed WEF would be a substation and transmission line (DEA/ DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1). Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mainstream.

The proposed projects entail the generation of electricity from wind resources. The construction period will entail approximately 12 - 18 months for the proposed WEF. The proposed WEF would consist of 140MW, the turbine sizes would range between 1.5MW – 3.5MW and consist of between 94 (using 1.5MW machines) to 40 turbines (using 3.5MW machines). An onsite connection is proposed via an existing 220 kilovolt Eskom line.

The subject of this plan is Erosion Management for the project known as Kangnas Wind Energy Facility (hereinafter referred to as the “Facility”).

Proposed WEF will comprise of the following infrastructure:

- Construction of 140MW capacity with wind turbines ranging between 94 (1.5MW) and 40 (3.5MW) capacity;
- Associated infrastructure including:
 - Hard stands of 40m by 40m alongside turbines;
 - Access roads of 4m to 10m wide between turbines;
 - Overhead or underground transmission line connecting turbines (these are covered under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1);
 - One main substation connecting the proposed energy facility to the Eskom line; and
 - Main substation and four satellite substation that would link sectors of the facility to a main substation with overhead lines (under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1).
- Associated infrastructure including:
 - Access roads of 4m to 10m wide; and
 - One main substation with overhead lines.

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PURPOSE AND SCOPE OF THIS PLAN

This plan confirms routes for abnormal loads that will need to be transported to the site near Kangnas from the Port Elizabeth, Cape Town or Saldanha Harbour. These are the only three origins identified by Kangnas from which abnormal loads will be transported to the site. Consequently, routes have been established to enable the abnormal load to pass safely and without obstruction from the two origins to the site.

This plan has been prepared in terms of the requirements of the Environmental Authorisation issued by the Department of Environmental Affairs for the proposed project and seeks to enable Kangnas WEF to identify and implement best practice requirements in respect of the transportation requirements associated with the project.

An Environmental Control Officer (ECO) will visit the site regularly (as per the requirements of the LEMPR) and will monitor retrospectively the implementation of this plan through the study of records provided by the various transport contractors. A copy of this plan must be maintained on site and must be made available to all transport contractors. Changes to the plan must be approved by the ECO and Project Manager, and updates and reasons for the changes incorporated into the plan.

This plan must be read together with the remainder of the LEMPR and shall apply during both the construction and operational phases of the project.

A plan for transportation management for the **decommissioning** of the project shall be formulated prior to the commencement of decommissioning, which will be in compliance with relevant legislative and best practice requirements at the time of decommissioning.

SECTION 2: DESCRIPTION OF LOADS

The dimensions and weights of the wind turbine components vary depending of the capacity and height of the wind turbine. Various specialised components will need to be imported from overseas countries and shipped to South Africa, where they will need to be transported by road to Kangnas from the Port Elizabeth, Cape Town or Saldanha Harbour. In terms of the size and number of turbine components that have to be transported to site, the information provided below is based on an approximate value.

- Foundation Inserts (steel, 27,5 tons)
- Tower sections
 - 10m base ,48 ton
 - 29m top, 33,5 ton
- Nacelle (houses the drive train, 40 tons)
- Drive Train (main shaft, the bearings, the gearbox and the generator, 30 tons)
- Hub (fixed to the drive train and the blades are fixed to the hub) and Nose Cone (combined weight 25 tons)
- Blades (longest component, requires specially transport trailer, up to 60m in length)

Based on the above it is envisaged that twelve individual trips per turbine will be required for the components only equating to 1128 trips for 94 turbines. Earth moving equipment required for construction will originate from Cape Town.

Construction vehicles are likely to make use of the existing roads, including the N14, to transport equipment and material to the construction site. For each wind turbine approximately 72 - 83 construction vehicles would be required to bring in construction materials and components (based on the N100 (2.5 MW) turbine transport requirements in Nordex Energy GmbH (Nordex), 2009). The proposed projects consist of up to 94 turbines hence approximately a maximum of 7802 construction vehicles trips would be required. The construction period would be divided into four phases with each phase construction period spread over 12 - 18 months. This equates to an

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approximate maximum of 25 construction vehicles trips per day, assuming an even spread over the minimum 12 months construction period for each phase (26 work days per month).

Due to the large size of many of the facility's components (e.g. tower and blades) and the need for them to be transported via "abnormal loads" from Port Elizabeth, Cape Town or Saldanha harbour, construction related transport could impact negatively on the traffic flow in the vicinity and on the integrity of the affected roads. This may exacerbate the risk of vehicular accidents. The necessary clearances from the respective Roads Authorities would need to be in place prior to the transporting of these loads.

Cumulatively, it is estimated by The GreenCape Initiative (2011) that some 13 abnormal loads would be on roads daily in the Western Cape until 2015. Most of these loads would use on the N1 or the N7 and many would extend to the Northern Cape.

NRTR REGULATIONS

The National Road Traffic Act (No. 93 of 1996) (as amended) (NRTA) and the National Road Traffic Regulations (2000), make provision for all matters pertaining to the use and management of roads within South Africa. The National Road Traffic Regulations (NRTR, 2000) stipulate the following vehicle and load conditions as being legally permissible **without** a permit:

- Length: truck and semi-trailer (tri-axle) – overall length including load projections 18.5 m; superlink (6m + 12 m trailers) – overall length of combination (no load projections) – 22.0 m.
- Width: 2.6 m.
- Height: 4.3 m measured from the ground.
- Weight: Load onto the roadway according to the axles and axle load groups.

Any loads that do not meet these criteria are deemed as abnormal loads and a permit will need to be applied for through the Department of Transport and Public Works for each province.

A vehicle / combination is dimensionally abnormal when any of the following dimensions exceeds the legal limitations:

- Length
- Width
- Height
- Overhangs
- Load projections
- Wheelbase

The maximum load that an abnormal vehicle will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicle, as rated by the manufacturer;
- the load which may be carried by the tyres;
- the damaging effect on pavements;
- the structural capacity on bridges and culverts;
- the power of the prime mover(s);
- the load imposed by the driving axles and
- the load imposed by the steering axles.

According to Technical Recommendations for Highways (TRH 11 – Aug 2009, 8th edition), special investigation of the effects of the abnormal load on bridge structures is only required when the laden mass of the vehicle exceeds

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125,000 kg. Since the largest load being carried is 40,000 kg, it is assumed that all bridges that will be crossed can accommodate the loads being carried.

The exact dimensions of all the components that will make up an abnormal load are not yet known.

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SECTION 3: DESCRIPTION OF ROUTES FROM ORIGIN TO DESTINATION

The wind turbine components are to be imported into South Africa via one of the ports in Southern Africa. Thus, the origin of the transportation routes to Kangnas WEF will start at Port Elizabeth, Cape Town or Saldanha Bay. Since the construction of a number of wind farms is currently in progress in South Africa, the transportation routes from the Port Elizabeth (Ports of Ngqura) and Saldanha Bay (Port of Saldanha) have been established.

- Route 1 – From the Port of Ngqura to Kangnas WEF (indicated in blue) via N10 and N14.
 - The total distance is 1 210 km of which 40 km is on gravel road.
- Route 2 – From the Port Saldanha to Kangnas WEF (indicated in blue) via N7 and N14.
 - The total distance is 695 km of which 40 km is on gravel road.

Cognisance needs to be taken of construction activities at the time of transport. The relevant transporter will need to establish construction activities along these routes from the respective road owners. Along both abnormal routes, Telkom, Eskom and local municipal overhead lines do occur and transporters will need to ascertain whether or not these lines conform to minimum clearances, which are 5.8 m for Eskom and other electrical power lines and 5.5 m for Telkom and other communication lines. Overhead bridge height clearances, apertures and widths of the bridges that have to be negotiated will need to be confirmed by transporters at the time of transport. Sign boards along national routes N1, N7, N14 and N10 may pose potential obstructions; however, these overhead sign boards are all SANRAL infrastructure and it is assumed that they have a minimum height clearance of 5.70 m as prescribed by SANRAL.

The final route selection will be subject to the limitations of the transportation permits and the transportation vehicles to be used by the logistics company appointed to transport the wind turbine components from the chosen Port to the Namies WEF.

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SECTION 4: TRAFFIC MANAGEMENT

TRANSPORT OF EQUIPMENT AND MATERIALS

All loads should have escort vehicles in front and behind with appropriate warning signage, flags, lights, and speed restriction signs according to TRH 11 (8TH Edition) standards. A municipal escort may be required depending on the local authority's regulations, especially in urban areas.

The abnormal load speeds should also be according to TRH 11 recommendations, depending on the number of escorts and the load's dimensions. Speeds over bridges are also important. The allowable abnormal load speed decreases as the mass of the load combination increases in order to decrease the forces that will be exerted onto the bridge structures.

Drivers shall be trained in driving techniques applicable to specific loads (capacity and type, e.g. hazardous substances) where necessary.

It is recommended that the abnormal loads travel outside of peak hours especially in urban areas in order to reduce delays and road safety hazards that may be caused by the abnormal load movements.

During an emergency stop or break-down, the abnormal loads are required to pull off the main road onto the shoulder and undertake repairs or actions necessary to get back onto the road. The N7 and N14 mostly have enough shoulder space or a pull over point to get the load off the roadway. However if there is not enough space to pull off the roadway or it is not possible to do so, then a stop/go control should be setup in front and behind the load in order to control traffic on a single lane two-way road. If there are dual lanes in each direction, then a flagman should be placed behind the load to indicate a breakdown and for vehicles to merge onto the available lane.

OVERNIGHT STOPPING

Stopping the load and escort convoy for overnight rest for the team is necessary and it is preferred to stop at the nearest town with a truck stop or a large enough unoccupied space to ensure that the load and all projections are completely off the roadway and that the abnormal load and its hauler do not cause any obstruction or inconvenience.

Before commencing the following day, check that all safety systems of the abnormal load carrier are fully functioning with no faults, such as the brakes, vehicle lights, warning signs, tyres, flag signs, etc. Also, check the stability of the load and all fastening connections to the trailer to make sure it is well secured.

The overnight stopping locations should be pre-planned by the selected transporter to ensure that the load has a suitable place to stop and meet all of the above requirements.

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APPENDIX 1

Cape Town to Kangnas



Bird and Bat Monitoring plan

PROPOSED WIND ENERGY FACILITY ON KANGNAS FARM NEAR SPRINGBOK IN THE NORTHERN CAPE



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ACRONYMS AND ABBREVIATIONS

EIA	Environmental Impact Assessment
LEMPR	Lifecycle Environmental Management Programme

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SECTION 1: INTRODUCTION

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 - One main substation connecting the proposed energy facility to the Eskom line; and
 - Main substation and four satellite substation that would link sectors of the facility to a main substation with overhead lines (under a separate EA but form part of this project DEA ref: DEA14/12/16/3/3/2/386 and DEA14/12/16/3/3/2/386/AM1).
- Associated infrastructure including:
 - Access roads of 4m to 10m wide; and
 - One main substation with overhead lines.

SECTION 2: SITE SPECIFIC INFORMATION

Birds (Avifauna)

A total of 115 bird species have been recorded from SABAP1 and SABAP2. Of the 115 species, seven are red-list species, 59 endemics or near endemics and three are red-listed endemics (Ludwig's

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Bustard, Red Lark and Sclater's Lark). All of the red-listed endemics are likely to breed within the greater development area of the WEF..

The following important aspects should be noted:

- (i) There are high levels of endemism within the general study area;
- (ii) Three species in the WEF development area are classified as Red Data species: Ludwig's Bustard (Vulnerable), Kori Bustard (Vulnerable) and Red Lark (Vulnerable). Thirty-six species in the WEF site are endemic or near-endemics (Appendix 2); significant species within this group included Jackal Buzzard (endemic, possibly breeding), Ludwig's Bustard (near-endemic, possibly breeding), Karoo Korhaan (endemic, possibly breeding), Northern Black Korhaan (endemic, possibly breeding), Red Lark (endemic, probably breeding), Sociable Weaver (endemic, breeding) and Southern Pale Chanting Goshawk (near-endemic, possibly breeding),
- (iii) Very few waterbirds were recorded. Previous atlas surveys have also recorded low proportions of waterbirds in the study area.

Additional specific observations that were noteworthy included:

- A Martial Eagle observed on the 220 kV transmission line running adjacent to the N14. Although no other sightings of this species were recorded it does provide some evidence that this species occurs in the general vicinity of the development sites making it susceptible to collisions with wind turbines;
- An old Secretarybird nest located just to the north of the WEF site. According to the farmer (Mr W. van Niekerk) a pair used the nest for at least the past few years.
- A Spotted Eagle-Owl was seen at one of the small boulder outcrops on the southern boundary of the WEF site;
- Small groups of Ludwig's Bustards (5-7 birds) and Karoo Korhaans (2-3 birds) were seen flying on the northern edge of the WEF site, close to the position of the meteorological mast; these birds were seen regularly in the same vicinity during subsequent days of the site visit.
- A pair of South African Shelduck were observed flying in a north-south direction through the western edge of the WEF site;
- A single Kori Bustard was captured on a camera trap placed in pentad (29 37.314S 18 19.914E). This was the only recorded evidence of this species during the site visit;
- Several pairs of Double-banded and Burchell's Coursers were observed within both WEF and SEF sites. These birds frequent the edges of the areas where the vegetation is over-utilised and sparse – especially if the area is strewn with pebbles. This species is uncommon and has a localised distribution in South Africa (Hockey et al. 2005).
- Five Sociable Weaver colonies were recorded in the study area; two colonies in the WEF site. The WEF colonies were located in a dead tree near the Kangnas farmhouse and on a telephone pole. Sociable Weavers were not recorded in the area during SABAP1 and according to the farmers (Mr W van Niekerk and Mr Agenbach) have moved into the area in the last 5-6 years.

Although intensive searches were conducted no active raptor nests were found during the site survey; it is strongly suspected however that there is a Verreaux's Eagle nest on the ridge where the pair was observed. These cliff lines and those in the WEF sites could hold resident breeding pairs of other raptors including Booted Eagle, Jackal Buzzard, Lanner Falcon and Rock Kestrel. Access difficulties and the rugged terrain within the development areas prevented a thorough investigation of cliff lines for raptor nests.

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The following species form part of the Namib-Karoo biome restricted bird assemblage (Barnes 1998) and which occur or probably occur in the development zones and surrounds: Ludwig's Bustard, Karoo Korhaan, Karoo Long-billed Lark, Karoo Lark, Red Lark, Stark's Lark, Karoo Chat, Tractrac Chat, Sickle-winged Chat, Rufous-eared Warbler, Layard's Tit-babbler, and Pale-winged Starling.

A total of 32 species have been recognised as priority species that are key in the avifaunal assessment. Most of these species have been identified based primarily on their national/international conservation status, occurrence (or likely occurrence) in relatively high numbers on site or the potential to be negatively affected by the development of a WEF. Seventeen species are listed as priority species by Retief et al. (2011) and five species were not recorded during SABAP1. Of the 32 species, the Kori Bustard is probably the most important in terms of possible impacts from wind turbines. It is probable that the species breeds in the area. Barn Swallow, Alpine and Little Swift have been included as they are aerial foragers with a high collision risk factor and they are likely to traverse and feed in the development zones. Booted Eagle, Rock Kestrel, Verreaux's Eagle, and Southern Pale Chanting Goshawk are included because they occur as residents and are likely to breed on site due to availability of suitable habitat.

Overall the most important aspects of the avifauna on the Kangnas WEF and the most relevant are:

- (i) Resident and breeding raptors, especially Verreaux's Eagle (at least one pair in the SEF site, and possibly breeding in the SEF site), Secretarybird (a known nest site just north of the WEF site), Martial Eagle, Rock Kestrel and Southern Pale Chanting Goshawk.
- (ii) Large terrestrial bird species, especially Ludwig's Bustard, Kori Bustard and Karoo Korhaan. All are susceptible to collisions with powerlines (Shaw et al. 2010a, b; Young et al. 2003); subsequently they are probably susceptible to turbine collision mortality and to displacement and disturbance by construction and operation of the WEF.
- (iii) Populations of localised/range-restricted or biome-restricted species particularly Red Lark, Stark's Lark, Karoo Lark and Sickle-winged Chat.

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Bats

Many bat species roost in large communities and congregate in small areas. Therefore, any major disturbances within and around the roosting areas can adversely impact individuals of different communities within the same population concurrently.

The inselbergs found on site can prove useful as roosting sites for bats. The two small caves found in the study area can offer roosting space as well as the farm buildings. Precipitation in the area is very low, and channels or streams are temporary, such that surface water on this site is very limited. This reduces the likelihood of the use of the site for foraging. Drainage lines and open water sources are generally used for foraging.

The following bat species could possibly occur in the study area: Geoffroy's horseshoe bat (*Rhinolophus clivosus*), Darling's horseshoe bat (*Rhinolophus darling*), Egyptian slit-faced bat (*Nycteris thebaica*), Roberts's flat-headed bat (*Sauromys petrophilus*), Egyptian free-tailed bat (*Tadarida aegyptiaca*), Natal long-fingered bat (*Miniopterus natalensis*), Angolan wing-gland bat (*Cistugo seabrae*), Long-tailed serotine (*Eptesicus hottentotus*), Temmink's myotis (*Myotis tricolor*) and Cape serotine (*Neoromicia capensis*).

The main method of bat detection involved the use of a bat detector which is a device that is capable of recording ultrasonic bat calls that is not always audible to the human ear for computer analysis afterwards. One species was identified and confirmed in the study area, using this method, during the site survey, namely the Egyptian free-tailed bat (*Tadarida aegyptiaca*). The Egyptian free-tailed bat is a very common bat and can typically be found roosting in crevices and roofs of houses.

Many bat species roost in large aggregations and concentrate in small areas. Furthermore, the reproductive rates of bats are also much lower than those of most other small mammals- usually only 1-2 pups per female annually. Therefore any major disturbance to a small area within which a bat population resides would impact on the whole population and the recovery of the population would be very slow. Since bats have highly sophisticated navigation by echolocation, it is not understood why they are hit by rotating turbine blades. A number of theories exist, one theorizing that under natural circumstances bats' echolocation is designed to track down and pursue smaller insect prey or avoid stationary objects, not focus on unnatural objects moving sideways across the flight path. Another is that bats may be attracted to the large turbine structure as roosting space or that swarms of insects get trapped in low air pockets around turbines and subsequently attracts bats. Whatever the reasons, it has been found internationally that wind turbines can have a negative impact on bats either through physical injury or through barotrauma, the leading cause of bat mortality. This is a condition where the lungs of a bat collapse in the low air pressure around the moving blades, causing severe and fatal internal haemorrhage.

These potential impacts are particularly relevant to migrating bats. However, the migration paths of South African bats in the Northern Cape Province are not well studied and are virtually unknown. Cave dwelling species like *Miniopterus natalensis* and *Myotis tricolor* undertake annual migrations and the caves on the site could possibly provide roosting space.

SECTION 3: BIRD MONITORING PROGRAMME

Pre-construction walkthrough and micro-siting

Prior to the commencement of the construction phase, the bird specialist shall be appointed to undertake and pre-construction site walkthrough and record any new nest sites and make any other

observations that may influence the facility layout. If required the bird specialist may then make recommendations pertaining to the micro-siting of infrastructure to avoid impacts associated with these “current” observations. These minor changes together with the motivations are to be captured in a final layout and submitted to the DEA for their records. Micro-siting must take cognisance of “no-go” areas, buffers and sensitive areas identified in the EIA, and micro-siting must avoid these previously identified areas (Refer to the layout map contained in the LEMPR).

Monitoring Programme

For effective mitigation to take place a long-term monitoring programme is required to better understand how birds utilise the study area, pre- and post-construction, and in particular the impact zone. Bird monitoring pre-construction should be undertaken in the same manner during post construction in order to form scientific rigidity (i.e. discount seasonal variances) and baseline information to inform findings.

The Bird and Wind Energy Specialist Group (BAWESG), a group formed under the auspices of the Wildlife and Energy Programme of the Endangered Wildlife Trust (EWT) and BirdLife South Africa (BLSA), recognised the lack of empirical information of the effects of wind developments on birds and produced a guideline document to measure these effects in order to identify and mitigate and detrimental impacts on threatened or potentially threatened species (Jenkins 2011a,b). The document outlines how this data needs to be gathered in a structured, methodical and scientific way in order to provide defensible answers to critical questions. The third edition (2015) is attached herewith and should form the basis for post-construction monitoring by the ornithological specialist appointed by the Developer (Birds and Wind Best Practice guidelines_3rd_2015). Monitoring studies should be carried out by an expert ornithologist or under the supervision of such an expert.

Objectives of bird monitoring programme

- i. Determine the densities of birds resident within the impact area of the WEF before construction of the facility, and afterwards, once the facility, or phases of the facility, become operational.
- ii. Document patterns of bird activity and movements in the vicinity of the proposed WEF before construction, and afterwards, once the facility is operational.
- iii. Monitor patterns of bird activity and movement in relation to weather conditions, time of day and season for at least a full calendar year after the WEF are commissioned.
- iv. Register and as far as possible document the circumstances surrounding all avian collisions with the WEF turbines for at least a full calendar year after the facility becomes operational.
- v. Share key findings with the industry and other relevant stakeholders to ensure that the collective knowledge and understanding of the interface between South African birds and wind energy development is advanced as quickly and accurately as possible.

Ultimately the monitoring study should focus on rare and/or endemic and potentially collision or disturbance prone species. It should provide comprehensive quantitative information on how the WEF impact on the abundance and occurrence of birds, and the risks it poses to the local avifauna, and serve to inform and improve mitigation to reduce this risk. The study will establish a research precedent and provide opportunities to contribute to a collective understanding within the wind energy sector of the effects of WEFs in South Africa.

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Methodology

Jenkins (2011a) suggests that monitoring should take place once per quarter for a period of up to 12 months prior to construction and 12 months after construction (operation phase). Aspects to consider in the monitoring programme should cover the following (Jenkins 2011a):

- Bird population surveys
- Collision assessments/surveys

For the bird population surveys the following monitoring should take place:

- Avian densities in the first year of operation shall be determined using transect counts and compared with the pre-construction baseline used for the EIA or observations made during the pre-construction walkthrough.
- Bird activity monitoring, counting priority species flying over or past the WEF impact zone, and opportunistic surveys of raptors and cranes and bustards
- Passage rates of priority bird species using specific vantage points to count individuals or flocks of priority species, all raptors and any additional stipulated species flying within 500 m of the actual periphery of the WEF and in particular to the envisaged or actual array of turbines.

Data gathered and analysed from the pre- and post-construction monitoring may well be used to refine mitigation for both phases and affect the construction or operational phases of the development.

For the collision surveys, two components are required:

- Experimental assessment of search efficiency and scavenging rates of bird carcasses on site, and
- Regular searches of the vicinity of the WEF for collision casualties.

The bird specialist may train a members of the developer's staff to undertake these weekly inspections and record findings. Note that bird carcasses may not be removed from the site or transported without relevant DENC permits, where applicable.

It is important to carry out experimental work to determine the accuracy of the survey method, as this will determine how valuable this exercise will be when actually searching for collision mortalities. This process, involving the random distribution of not less than 20 'acquired' or dummy carcasses around the site, should be carried out opportunistically for the first two months of the monitoring period. The proportion of the carcasses located in the surveys will indicate the statistical efficiency of the survey method. Scavenger rates should also be monitored during this time to determine scavenger and decomposition rates which would aid in adjusting the frequency of collision surveys to be undertaken.

When the collision surveys take place the area within a radius of 50 m of the outer arc of the blades of each turbine should be checked, and this should be done at least weekly for the first two months of the study. Further to this, quadrants in the larger WEF (such as these proposed projects) should be set up and each carefully searched for signs of a bird collision (carcass, feathers, injured birds, dismembered body parts). It is imperative that all suspected collision events be comprehensively documented, and physical evidence collected (bagged) and labelled for further examination. Injured birds should be placed in a box and taken to the nearest local office of the provincial Nature Conservation authority (or failing this to inform the monitoring specialist) whereupon they should be transported to the closest veterinary hospital or wildlife rehabilitation centre.

References

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Jenkins AR, Smallie JJ and Diamond M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International* 20: 263-278
Jenkins AR 2011a. Winds of change: birds and wind energy development in South Africa. *Africa – Birds & Birding* 15(6): 35-38.
Jenkins AR 2011b. Witberg renewable energy facility – bird impact assessment. Report to ERM Pty (Ltd).

SECTION 4: BAT MONITORING PROGRAMME

Pre-construction walkthrough and micro-siting

Prior to the commencement of the construction phase, the bat specialist shall be appointed to undertake and pre-construction site walkthrough and make any observations that may influence the facility layout. If required the specialist may then make recommendations pertaining to the micro-siting of infrastructure to avoid impacts associated with these “current” observations. These minor changes together with the motivations are to be captured in a final layout and submitted to the DEA for their records. Micro-siting must take cognisance of “no-go” areas, buffers and sensitive areas identified in the EIA, and must avoid these previously identified areas (Refer to the layout map contained in the LEMPR).

Monitoring programme

Operational phase monitoring and research programs across North America and Europe have identified bats to be vulnerable to mortality due to wind turbines. Bats are particularly vulnerable to non-natural causes of mortality as they are long-lived animals with low reproductive fecundity. Additionally, there is relatively little scientific knowledge about bat populations and migration routes. It is recommended that a minimum of two year operational monitoring be undertaken as soon as turbines are commissioned, with annual auditing continuing throughout the lifespan of the Kangnas WEF.

The primary objectives of the operational phase monitoring programme are to:

- Determine the bat fatality rates for the Kangnas WEF;
- Determine the fatality rates for species of concern;
- Determine the fatality rates for migratory and resident bat species;
- Study the relation of bat fatalities within all habitats, geology and vegetation types found in turbine areas;
- Compare the bat fatality rates with those from wind farms in similar habitat types where possible;
- Determine the relationship between bat activity and bat fatality;
- Understand the relationship between bat fatality and weather conditions;
- Study the temporal distribution of bat fatalities across the night and seasons;
- Determine whether mitigation measures are necessary to reduce bat fatality rates, and if necessary recommend additional detailed mitigation measures

Methodology

Operational monitoring methodology is divided into two components, namely acoustic monitoring and carcass searches. On conclusion of the first year an adapted methodology will be outlined for the second year of monitoring.

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Acoustic monitoring

Acoustic detectors and ultrasonic microphones will be used to monitor bat activity. They will be installed on the meteorological mast and/or a sub-sample of turbine nacelles to monitor activity in the rotor-swept path of high risk and select turbines.

Carcass searches

Carcass searches will be undertaken to determine bat fatality rates. This component of the methodology will be combined with that of the carcass searches for the bird monitoring programme.

Local or developers staff will be trained in proper search techniques to carry out the carcass searches and to record and collect all carcasses located. Searches will begin as early in the morning as possible to reduce carcass removal by scavengers. The order in which turbines are searched will ideally be randomly selected for each day to reduce carcass removal by predators from specific turbines before they can be searched. Search intervals will be a maximum of one week.

All necessary information will be recorded when a carcass is found. The carcass will then be bagged and labelled and kept refrigerated for species identification and to determine the cause of death by the specialist. Fatality monitoring will be carried out over all seasons of the year.

The necessary searcher efficiency and scavenger removal trials will be carried out at least once per season to calculate field bias and error estimation.

Wind turbine mitigation

Data collected throughout the monitoring programme will be used to inform and direct mitigation if the Kangnas WEF or specific turbines is found to be causing significant bat mortalities. If mitigations are implemented, monitoring the effectiveness of the applied techniques will be necessary to evaluate and refine the success and economic efficiency of the mitigation /

Quarterly monitoring reports should be submitted to DEA for the first year. On conclusion of the first year an adapted reporting and methodology schedule will be outlined for the second year of monitoring. Reports should include descriptions of the field protocols and sampling methods. Raw data will be included in the reports as appendices, and methods for data analysis shall be transparent.

A contingency plan will be compiled which informs immediate actions to be taken in the case of a significant mortality event, or if mitigation measures fail. A contingency plan should consist of additional mitigation measures to be implemented in the event that significant negative impacts are observed from a single mortality survey. An adaptive management approach to the operational monitoring programme.

The methodology of the assessment must comply with requirements pertaining to the South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (attached herewith, SAGPG for Operational Monitoring_1st_2014).

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**ANNEXURE C
ENVIRONMENTAL
AUTHORISATION FOR KANGNAS
WINDFARM**



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

NEAS Reference: DEA/EIA/0001222/2012

DEA Reference: 14/12/16/3/3/2/346

Enquiries: Ms Sindiswa Dlomo

Telephone: (012) 395 1856 **Fax:** (012) 320 7539 **E-mail:** Sdlomo@environment.gov.za

Mr Hendrik Reyneke
South Africa Mainstream Renewable Power Kangnas (Pty) Ltd
PO Box 45063
Claremont
CAPE TOWN
7735

Telephone Number: (021) 657 4050
Fax Number: (021) 671 5665

PER FACSIMILE / MAIL

Dear Mr Reyneke

APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998: GN R. 543/544/545/546 FOR THE PROPOSED WIND ENERGY FACILITY ON KANGNAS FARM, FARM KANGNAS (FARM NO. 77, PORTION 3) AND SMORGENSCHADUWE (REMAINDER OF FARM NO. 127), NEAR SPRINGBOK, WITHIN THE NAMA-KHOI LOCAL MUNICIPALITY, NORTHERN CAPE

With reference to the above application, please be advised that the Department has decided to grant authorisation. The environmental authorisation (EA) and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the EA, of the Department's decision in respect of your application as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile: 0123207561;
By post: Private Bag X447,
Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Building, North Tower,
Cnr. Lilian Ngoyi (Van der Walt) and Pretorius Streets,
Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department (*Attention: Director: Integrated Environmental Authorisations*) in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

Appeals must be submitted in writing to:

Mr Z Hassam Director: Appeals and Legal Review, of this Department at the above mentioned addresses or fax number. Mr Hassam can also be contacted at:

Tel: 012-310-3271

Email: AppealsDirectorate@environment.gov.za

The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours faithfully



Mr Ishaam Abader

Deputy Director-General: Legal, Authorisations, Compliance and Enforcement

Department of Environmental Affairs

Date: 12/06/2014

CC:	Ms L. Corbett	Aurecon South Africa (Pty) Ltd	Tel: 021-526-6027	Fax: 086-667-3532
	Mr A Mabunda	Northern Cape: DENC	Tel: 053-807-7491	Fax: 053-831-3530
	Mr A Baartman	Nama-Khol Local Municipality	Tel: 027-718-8101	Fax: 027-712-1635

APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 (THE REGULATIONS) AS PER GN R. 543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION (EA)

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive EA from the relevant Competent Authority (the Department of Environmental Affairs [DEA]).	1. Receive EA from Applicant/Consultant.
2. Within 12 days of date of the EA notify all IAPs of the EA and draw their attention to their right to appeal against the EA in terms of Chapter 7 of the Regulations.	2. N/A.
3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA with the Minister of Water and Environmental Affairs (the Minister).	3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA, with the Minister of Water and Environmental Affairs (the Minister).
4. After having submitted your notice of intention to appeal to the Minister, provide each registered IAP with a copy of the notice of intention to appeal within 10 days of lodging the notice.	4. After having submitted your notice of intention to appeal to the Minister, provide the applicant with a copy of the notice of intention to appeal within 10 days of lodging the notice.
5. The Applicant must also serve on each IAP: <ul style="list-style-type: none"> • a notice indicating where and for what period the appeal submission will be available for inspection. 	5. Appellant must also serve on the Applicant within 10 days of lodging the notice, <ul style="list-style-type: none"> • a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.
6. The appeal must be submitted in writing to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.	6. The appeal must be submitted to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.
7. Any IAP who received a notice of intention to appeal may submit a responding statement to that appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.	7. An Applicant who received notice of intention to appeal may submit a responding statement to the appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.

NOTES:

1. **An appeal against a decision must be lodged with:-**
 - a) the Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
 - b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
2. **An appeal lodged with:-**
 - a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
 - b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;
3. **An appeal must be:-**
 - a) submitted in writing;
 - b) accompanied by:
 - a statement setting out the grounds of appeal;
 - supporting documentation which is referred to in the appeal; and
 - a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62.





environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

In terms of Regulation 36 of the Environmental Impact Assessment Regulations, 2010

140 MW Wind Energy Facility on Kangnas Farm, Farm Kangnas (Farm No. 77, Portion 3) and Smorgenschaduwe (Remainder of Farm No. 127), near Springbok, within the Nama-Khoi Local Municipality

Namakwa District Municipality

Authorisation register number:	14/12/16/3/3/2/346
NEAS reference number:	DEA/EIA/0001222/2012
Last amended:	First issue
Holder of authorisation:	South Africa Mainstream Renewable Power Kangnas (Pty) Ltd
Location of activity:	Farm Kangnas (Farm No. 77, Portion 3) Smorgenschaduwe (Remainder of Farm No. 127) Nama-Khoi Local Municipality Namakwa District Municipality NORTHERN CAPE PROVINCE

This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activities specified below.

Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the EIA regulations.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act 107 of 1998) and the Environmental Impact Assessment Regulations, 2010 the Department hereby authorises –

SOUTH AFRICA MAINSTREAM RENEWABLE POWER KANGNAS (PTY) LTD

with the following contact details –

Mr Hendrik Reyneke

South Africa Mainstream Renewable Power Kangnas (Pty) Ltd

PO Box 45063

Claremont

CAPE TOWN

7735

Telephone Number: (021) 657-4050

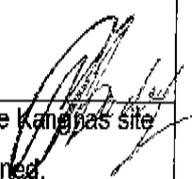
Fax Number: (021) 671-5665

Cellphone Number: (083) 264-3884

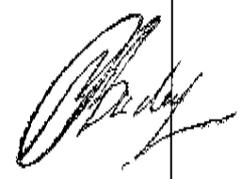
E-mail Address: Hendrik.reyneke@mainstreamrp.com



to undertake the following activities (hereafter referred to as "the activity") indicated in Listing Notices 1, Listing Notice 2 and Listing Notice 3 (GN R. 544, 545 and 546):

Listed activities	Activity/Project description
<p><u>GN R. 544 Item 10:</u> <i>"The construction of facilities or infrastructure for the transmission and distribution of electricity –</i> (i) <i>Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts"</i></p>	<p>The transmission line between the proposed Koenis substation and Eskom's grid will be (132 – 400 kV) (the existing Eskom grid onsite to be connected to is 220 kV, through discussions with Eskom it has been noted that Eskom is doing away with all 220 kV line's across the national network over time. At this time there no clarity has been received from Eskom if the line would be upgraded or downgraded to 400 or 132 kV, or at what point in time this will happen).</p>
<p><u>GN R. 544 Item 11:</u> <i>"The construction of</i> (iii) <i>bridges</i> (x) <i>building exceeding 50m² in size, or</i> (xi) <i>infrastructure or structures covering 50m² or more, where such construction occurs within a watercourse or within a 22 of a watercourse, measured from the edge of the watercourse, excluding where such construction will occur behind the development line."</i></p>	<p>A few wetlands and drainage lines are scattered across the proposed site and one or more roads are likely to cross these line.</p>
<p><u>GN R. 544 Item 18:</u> <i>"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from:</i> <i>watercourse."</i></p>	<p>More than 5 cubic metres of the material need to be excavated /removed from a watercourse during the construction of the facility</p>
<p><u>GN R. 544 Item 22:</u> <i>"The construction of a road, outside urban areas,</i> (ii) <i>where no reserve exists where the road is wider than 8 metres."</i></p>	<p>Roads for the project site will be 6 – 10 m wide. Certain roads sections might be up to 12 m wide to accommodate transportation of the abnormal loads.</p>
<p><u>GN R. 544 Item 47:</u> <i>"The widening of a road by more than 6 metres, or the</i></p>	<p>Certain of the existing roads on the Kangas site will need to be widened or lengthened.</p> 

Listed activities	Activity/Project description
lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the existing road is wider than 8 metres.”	
<u>GN R. 545 Item 1:</u> “The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”	The proposed wind and solar energy facilities will be 140 MW.
<u>GN R. 545 Item 15:</u> “Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more...”	The proposed facility will be developed on underdeveloped farmland. The proposed project site is approximately 22000 ha in extent with the project footprint (actual disturbed land) equating a less than 5% of the total project site.
<u>GN R. 546 Item 4:</u> “The construction of a road wider than 4 metres with a reserve less than 13,5 metres. (a) Northern Cape province (i) Outside urban areas, in (bb) National Protected Area Expansion Strategy Focus areas.....”	Access roads to the proposed wind energy facility will be approximately 6 m in width and they fall within the National Protected Areas Expansion Strategy Focus Areas.
<u>GN R. 546 Item 12:</u> “The clearance of an areas of 300 square metres or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation” (b) Within critical biodiversity areas identified in bioregional plans;”	The footprint of the proposed facility will be greater than 300 square metres and would be located in an area of at least 75% indigenous vegetation.
<u>GN R. 546 Item 13:</u> “The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (a) National Protected Areas Expansion Strategy Focus Areas. (c) Northern Cape province (ii) Outside urban areas, in (bb) National Protected Area Expansion Strategy” Focus	The footprint of the proposed facility will be greater than 1 ha and would be located in indigenous vegetation and in a National Protected Areas Expansion Strategy Focus Areas.



Listed activities	Activity/Project description
<i>areas"</i>	
<p><u>GN R. 546 Item 14:</u> <i>"The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation,</i> (a) Northern Cape All areas outside urban areas.</p>	<p>A vegetated area of approximately 110 ha or more would need to be cleared for the proposed project, which is located in a rural area. The vegetation comprises of 75% or more of indigenous vegetation.</p>
<p><u>GN R. 545 Item 16:</u> <i>"The construction of:</i> (iv) <i>Infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse,</i> (a) Northern Cape province (ii) Outside urban areas, in (bb) National Protected Area Expansion Strategy Focus areas."</p>	<p>The footprint of the proposed wind energy facility, which will be constructed within a National Protected Area Expansion Strategy Focus area, would be greater than 10 square metres.</p>

as described in the Environmental Impact Assessment Report (EIAr) dated February 2013 and additional information received on March 2014 at:



Preferred alternative	Longitude	Latitude
Kangnas centre of site	18° 21' 18.04" E	29° 37' 0.18" S
Kangnas substation	18° 20' 59.07" E	29° 36' 11.50" S
Kangnas laydown area	18° 20' 30.57" E	29° 36' 13.34" S
Kangnas O&M Building	18° 21' 9.56" E	29° 36' 19.44" S

- for the proposed construction of the 140 MW Wind Energy Facility on Kangnas Farm, located on Farm Kangnas (Farm No. 77, Portion 3 and the Remainder) and Farm Smoegenschaduwe (Remainder of Farm No. 127), near Springbok, within the Nama-Khoi Local Municipality, of the Namakwa District Municipality, Northern Cape Province, hereafter referred to as "the property".

The infrastructure associated with this facility includes:

- ✓ Between 94 (1.5 MW) to 40 (3.5 MW) turbines with final generation capacity of 140 MW;
- ✓ Hard standing of 40m x 40m alongside turbines;
- ✓ Access roads of 4 – 10 m wide between turbines;
- ✓ Overhead or underground transmission line connecting turbine (these will be covered in a separate EA which forms part of this project (DEA Ref: 14/12/16/3/3/2/386);
- ✓ One main substation connecting the proposed energy facilities to the Eskom line; and
- ✓ Main substation and four satellite substation that would link sectors of the facility to a main substation with overhead lines ((These will be covered in a separate EA which forms part of this project (DEA Ref: 14/12/16/3/3/2/386)

Conditions of this Environmental Authorisation

Scope of authorisation

1. The preferred site for the construction of a 140 MW Wind Energy facility, located on the Farm Kangnas (Farm No. 77, Portion 3 and the Remainder) and Farm Smoegenschaduwe (Remainder of Farm No. 127), near the town of Pringbok as per the abovementioned geographic coordinates is approved.
2. Authorisation of the activity is subject to the conditions contained in this authorisation, which form part of the environmental authorisation and are binding on the holder of the authorisation.

3. The holder of the authorisation is responsible for ensuring compliance with the conditions contained in this environmental authorisation. This includes any person acting on the holder's behalf, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.
4. The activities authorised may only be carried out at the property as described above.
5. Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.
6. This activity must commence within a period of three (03) years from the date of issue of this authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.
7. Commencement with one activity listed in terms of this authorisation constitutes commencement of all authorised activities.
8. The holder of an environmental authorisation must notify the competent authority of any alienation, transfer and change of ownership rights in the property on which the activity is to take place.

Notification of authorisation and right to appeal

9. The holder of the authorisation must notify every registered interested and affected party, in writing and within 12 (twelve) calendar days of the date of this environmental authorisation, of the decision to authorise the activity.
10. The notification referred to must –
 - 10.1. specify the date on which the authorisation was issued;
 - 10.2. inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the Environmental Impact Assessment Regulations, 2010;
 - 10.3. advise the interested and affected party that a copy of the authorisation will be furnished on request; and
 - 10.4. give the reasons of the competent authority for the decision.



11. The holder of the authorisation must publish a notice –
 - 11.1. informing interested and affected parties of the decision;
 - 11.2. informing interested and affected parties where the decision can be accessed; and
 - 11.3. drawing the attention of interested and affected parties to the fact that an appeal may be lodged against this decision in the newspaper(s) contemplated and used in terms of regulation 54(2)(c) and (d) and which newspaper was used for the placing of advertisements as part of the public participation process.

Management of the activity

12. A copy of the final site layout map must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following:
 - 12.1 Position of the wind facility and its associated infrastructure;
 - 12.2 Labelled / numbered turbine positions;
 - 12.3 Foundation footprint;
 - 12.4 Internal roads indicating width;
 - 12.5 Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;
 - 12.6 All sensitive features e.g. heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;
 - 12.7 Substation(s) inverters and/or transformer(s) sites including their entire footprint;
 - 12.8 Connection routes (including pylon positions) to the distribution/transmission network;
 - 12.9 All existing infrastructure on the site, especially roads;
 - 12.10 Buildings, including accommodation;
 - 12.11 All “no-go” and buffer areas; and
 - 12.12 A map combining the final layout plan superimposed (overlain) on the environmental sensitivity map. This map must reflect the proposed location of turbines as stated in the EIA dated 27 February 2013 and this authorisation.
13. Furthermore, a shapefile of the approved development layout/footprint must be submitted to the Department within two months from the date of this decision. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the

.avl and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to:

Postal Address:

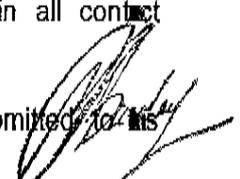
Department of Environmental Affairs
Private Bag X447
Pretoria
0001

Physical address:

Department of Environmental Affairs
Fedsure Forum Building (corner of Pretorius and Lillian Ngoyi Streets)
4th Floor South Tower
315 Pretorius Street
Pretoria, 0002

For Attention: Mr Muhammad Essop
Integrated Environmental Authorisations
Strategic Infrastructure Developments
Telephone Number: (012) 395 1734
Fax Number: (012) 395 7539
Email Address: MEssop@environment.gov.za

14. The Environmental Management Programme (EMPr) submitted as part of the EIA dated February 2013 is not approved and must be amended to include measures as dictated by the final site lay-out map and micro-siting; and the provisions of this environmental authorisation. The EMPr must be submitted to the Department for written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to.
15. The EMPr is amendable and must be implemented and strictly enforced during all phases of the project. It shall be seen as a dynamic document and shall be included in all contract documentation for all phases of the development when approved.
16. Changes to the EMPr, which are environmentally defensible, shall be submitted to the Department for acceptance before such changes could be effected.



17. The Department reserves the right to amend the EMPr should any impacts that were not anticipated or covered in the EIAr dated February 2013 be discovered.
18. The provisions of the approved EMPr including recommendations and mitigation measures in the EIAr dated February 2013 and specialist' studies shall be an extension of the conditions of this EA and therefore noncompliance with them would constitute noncompliance with the EA.
19. The EMPr amendment must include the following:
 - 19.1 All recommendations and mitigation measures recorded in the EIAr dated February 2013.
 - 19.2 All mitigation measures as listed in the specialist reports must be included in the EMPr and implemented.
 - 19.3 The requirements and conditions of this authorisation.
 - 19.4 The final site layout map.
 - 19.5 An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.
 - 19.6 A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be completed by a vegetation specialist familiar with the site in consultation with the ECO and be implemented prior to commencement of the construction phase.
 - 19.7 A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must 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.
 - 19.8 A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and the afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.
 - 19.9 A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must 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 must promote the dissipation of storm water runoff.
- 19.10 An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.
- 19.11 An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.
- 19.12 Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.
- 19.13 An avifauna and bat monitoring programme to document the effect of the operation of the energy facility on avifauna and bats. This must be compiled by a qualified specialist.
- 19.14 An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
- 19.15 A map combining the final layout map superimposed (overlain) on the environmental sensitivity map. This map must reflect the proposed location of the turbines as stated in the EIA in the amended layout dated February 2014 and this authorisation.

Environmental Control Officer (ECO) and duties

20. The holder of this authorisation must appoint an independent qualified Environmental Control Officer (ECO) with experience or expertise in the field for the construction phase of the development. The ECO will have the responsibility to ensure that the conditions referred to in this authorisation are implemented and to ensure compliance with the provisions of the EMPr.
21. The ECO must be appointed before commencement of any authorised activity.
22. The ECO must meet with the contractors to discuss the conditions of the EA and the contents of the EMPr prior to any site clearing occurring.
23. Once appointed, the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring of the Department.
24. The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.
25. The ECO must:
- 

- 25.1 Keep record of all activities on site, problems identified, transgressions noted and a schedule of tasks undertaken by the ECO.
- 25.2 Keep and maintain a detailed incident (including spillage of bitumen, fuels, chemicals, or any other material) and complaint register on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.
- 25.3 Keep and maintain a daily site diary.
- 25.4 Keep copies of all reports submitted to the Department.
- 25.5 Keep and maintain a schedule of current site activities including the monitoring of such activities.
- 25.6 Obtain and keep record of all documentation, permits, licences and authorisations such as waste disposal certificates, hazardous waste landfill site licences etc. required by the facility.
- 25.7 Compile a monthly monitoring report.

Recording and reporting to the Department

26. The holder of this authorisation must keep all records relating to monitoring and auditing on site and make it available for inspection to any relevant and competent authority in respect of the development.
27. All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this authorisation, must be submitted to the Director: Compliance Monitoring at the Department.

Environmental audit report

28. The holder of the authorisation must submit an environmental audit report to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities.
29. The environmental audit report must:
 - 29.1 Be compiled by an independent environmental auditor;
 - 29.2 Indicate the date of the audit, the name of the auditor and the outcome of the audit;
 - 29.3 Evaluate compliance with the requirements of the approved EMP and this environmental authorisation;

- 29.4 Include measures to be implemented to attend to any non-compliances or degradation noted;
- 29.5 Include copies of any approvals granted by other authorities relevant to the development for the reporting period;
- 29.6 Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed;
- 29.7 Include a copy of this authorisation and the approved EMPr;
- 29.8 Include all documentation such as waste disposal certificates, hazardous waste landfill licences etc. pertaining to this authorisation; and
- 29.9 Include evidence of adherence to the conditions of this authorisation and the EMPr where relevant such as training records and attendance records.

Commencement of the activity

30. The authorised activity shall not commence within twenty (20) days of the date of signature of the authorisation.
31. An appeal under section 43 of the National Environmental Management Act (NEMA), Act 107 of 1998 (as amended), does not suspend an environmental authorisation or exemption, or any provisions or conditions attached thereto, or any directive, unless the Minister, MEC or delegated organ of state directs otherwise.
32. Should you be notified by the Minister of a suspension of the authorisation pending appeal procedures, you may not commence with the activity until such time that the Minister allows you to commence with such an activity in writing.
33. The holder of this authorisation must obtain a Water Use Licence from the Department of Water Affairs (DWA) prior to the commencement of the project should the holder impact on any wetland or water resource. A copy of the license must be kept by the ECO.

Notification to authorities

34. Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence. This notification period may coincide with the Notice of Intent to Appeal period, within which construction may not commence.

Operation of the activity

35. Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.
36. The holder of this authorisation must compile an operational EMPr for the operational phase of the activity or alternatively, if the holder has an existing operational environmental management system, it must be amended to include the operation of the authorised activity.
37. The EMPr must form part of the contract with the EPC Contractor appointed to construct the proposed facility, and must be used to ensure compliance with environmental specifications and management measures.

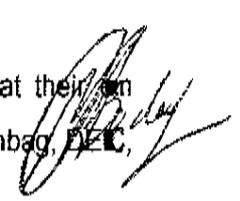
Site closure and decommissioning

38. Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

Specific conditions

Biodiversity and offsets

39. The holder of this environmental authorisation must sign an offset agreement with the provincial Department of Environmental Affairs and Nature Conservation (DENC) no later than when Financial Closure is reached for the proposed project.
40. The holder of this environmental authorisation must offset by purchasing the Oranjefontein Farm (RE/129 RD Namaqualand), from Mr van Niekerk within six months of the initiation of construction activities of the wind farm, and this farm must be transferred to DENC as part of the biodiversity agreement.
41. The holder of this environmental authorisation must assist in negotiation with Mr Agenbag, van Niekerk and Kennedy about Stewardships on the Inselbergs.
42. The holder of this environmental authorisation must engage with Mr Agenbag (at their own expense) and assist with the negotiations for the purchase of Kaip between Mr Agenbag, DENC, Leslie Hill or any other 3rd party which DENC may want to involve.



43. The holder of this environmental authorisation must appoint a lawyer to draft the legal terms for the offset agreement on receipt of this environmental authorisation.
44. Copies of the above agreements must be submitted to this Department for record keeping.

Avifauna and bats

45. A bird and bat monitoring programme must be implemented to document the effect of the operation of the energy facility on avifauna and bats. Active breeding nests in the immediate surroundings must be monitored during the construction phase and further mitigation measures must be discussed with the avifaunal specialist and implemented if necessary.
46. No turbines must be located within a 1000 m buffer surrounding the Spotted – Eagle Owl nest and all active nest sites must be avoided.
47. The results of the pre-construction bird monitoring programme dated October 2013 must inform the final layout and the construction schedule of the energy facility.
48. A construction monitoring plan must to survey bird communities on the Wind Energy Facility must be implemented to monitor impacts resulting from the infrastructure installations. This plan must have a minimum duration of at least 1 (one) year.
49. Post-construction avifauna and bat monitoring by an independent monitor should take place for at least two years after operation has commenced. It is recommended that this is done in accordance with BirdLife South Africa/Endangered Wildlife Trust: Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in Southern Africa.
50. Reports regarding bird monitoring must be submitted to the relevant provincial environmental department, BirdLife South Africa, the Endangered Wildlife Trust (EWT) and this Department on a quarterly basis. The report will assist all stakeholders in identifying potential and additional mitigation measures and to establish protocols for a bird monitoring programme for wind energy development in the country.
51. The facility must be designed to discourage the use of infrastructure components as perching or roosting substrates by birds and bats.
52. During construction the applicant must restrict the construction activities to the footprint area. No access to the remainder of the property is allowed.
53. Anti-collision devices such as bird flappers must be installed where power lines cross avifaunal corridors (e.g. grasslands, rivers, wetlands, and dams). The input of an avifaunal specialist must be obtained for the fitting of the anti-collision devices onto specific sections of the line once the

exact positions of the towers have been surveyed and pegged. Additional areas of high sensitivity along the preferred alignment must also be identified by the avifaunal specialist for the fitment of anti-collision devices. These devices must be according to Eskom's Transmission and EWT's Guidelines.

54. All powerlines linking wind turbines to each other and to the internal substation must be buried. Only powerlines linking the wind energy facility to the grid may be above the ground.
55. A pre-construction walk through on the selected powerline alignment by a bat specialist, avifaunal specialist and ecologist, must be conducted to ensure that the micro-siting of the turbines has the least possible impact, there are no nests sites of priority species on or close to the construction corridor, and all protected plant species impacted are identified.

Vegetation, wetlands and water resources

56. Vegetation clearing must be limited to the authorised footprint.
57. Before the clearing of the site, the appropriate permits must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act and from the relevant provincial department for the destruction of species protected in terms of the specific provincial legislation. Copies of the permits must be kept by the ECO.
58. Construction activities must be restricted to demarcated areas to restrict the impact on sensitive environmental features.
59. All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs. Reclamation activities shall be undertaken according to the rehabilitation plan to be included in the final EMPr.
60. Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation.
61. No exotic plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised.
62. No activities will be allowed to encroach into a water resource without a water use license being in place from the Department of Water Affairs.
63. Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing and must be temporarily stored in a demarcated area.
64. Removal of alien invasive species or other vegetation and follow-up procedures must be in accordance with the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

65. The holder of this authorisation must ensure that all the "No-go" and buffer areas are clearly demarcated (using fencing and appropriate signage) before construction commences.
66. Contractors and construction workers must be clearly informed of the no-go areas.
67. Where roads pass right next to major water bodies, provision shall be made for fauna such as toads to pass under the roads by using culverts or similar structures.
68. Bridge design must be such that it minimise impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora.
69. The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction.
70. Electric fencing should not have any strands within 30cm of the ground, which should be sufficient to allow smaller mammals, reptiles and leopard tortoises to pass through, but still remain effective as a security barrier.
71. Disturbed areas must be rehabilitated as soon as possible after construction with locally indigenous plants to enhance the conservation of existing natural vegetation on site.
72. Wetlands, rivers and river riparian areas must be treated as "no-go" areas and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, fuel, oil, bitumen or waste must be allowed into these areas without the express permission of and supervision by the ECO, except for rehabilitation work in these areas.
73. Workers must be made aware of the importance of not destroying or damaging the vegetation along rivers and in wetland areas and this awareness must be promoted throughout the construction phase.
74. Freshwater ecosystems located in close proximity to the construction areas must be inspected on a regular basis by the ECO for signs of disturbance from construction activities. If signs of disturbance are noted, immediate action must be taken to remedy the situation and, if necessary, a freshwater ecologist must be consulted for advice on the most suitable remediation measures.
75. No discharge of effluents or polluted water must be allowed into any rivers or wetland areas.
76. If construction areas are to be pumped of water (e.g. after rains), this water must be pumped into an appropriate settlement area, and not allowed to flow into any rivers or wetland areas.
77. Workers must be made aware of the importance of not polluting rivers or wetlands and of not undertaking activities that could result in such pollution, and this awareness must be promoted throughout the construction phase.
78. Freshwater ecosystems located in close proximity to the site must be inspected on a regular basis (but especially after rainfall) by the ECO for signs of sedimentation and pollution. If signs of sedimentation or pollution are noted, immediate action must be taken to remedy the situation.

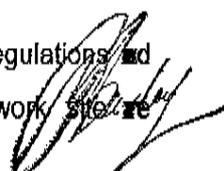
and, if necessary, a freshwater ecologist must be consulted for advice on the most suitable remediation measures.

Roads and transportation

79. Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.
80. Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuter, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.
81. Internal access roads must be located to minimize stream crossings. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity.
82. A designated access to the site must be created and clearly marked to ensure safe entry and exit.
83. Signage must be erected at appropriate points warning of turning traffic and the construction site.
84. Construction vehicles carrying materials to the site should avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.
85. Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak.
86. Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.
87. All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.

Noise

88. The holder of this authorisation must ensure that the National Noise Control Regulations and SANS10103:2008 are adhered to and measures to limit noise from the work site are implemented.



89. The holder of this authorisation must ensure that the construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment.
90. The holder of this authorisation must ensure that all equipment and machinery are well maintained and equipped with silencers.
91. The holder of this authorisation must provide a prior warning to the community when a noisy activity e.g. blasting is to take place.
92. All wind turbines should be located at a setback distance of 500m from any homestead and a day/night noise criteria level at the nearest residents of 45dB(A) should be used to locate the turbines. The 500m setback distance can be relaxed if local factors; such as high ground between the noise source and the receiver, indicates that a noise disturbance will not occur.
93. Positions of turbines jeopardizing compliance with accepted noise levels should be revised during the micro-siting of the units in question and predicted noise levels re-modelled by the noise specialist, in order to ensure that the predicted noise levels are less than 45dB(A).
94. Construction staff must be trained in actions to minimise noise impacts.

Visual resources

95. The holder of this authorisation must reduce visual impacts during construction by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques and restoring exposed soil as closely as possible to their original contour and vegetation.
96. A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.
97. Lighting of main structures (turbines) and ancillary buildings should be designed to minimise light pollution without compromising safety, and turbines must be lit according to Civil Aviation Regulations.
98. Signage on or near wind turbines must be avoided unless they serve to inform the public about wind turbines and their function.
99. Commercial messages and graffiti on turbines must be avoided.

Human health and safety

100. A health and safety programme must be developed to protect both workers and the general public during construction, operation and decommissioning of the energy facility. The programme must establish a safety zone for wind turbines from residences and occupied buildings, roads,

- right-of-ways and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines.
101. Potentials interference with public safety communication systems (e.g. radio traffic related to emergency activities) must be avoided.
 102. The holder of this authorisation must ensure that the operation of the wind facility shall comply with the relevant communication regulations or guidelines relating to electromagnetic interference, e.g. microwave, radio and television transmissions.
 103. The holder of this authorisation must obtain approval from the South Africa Civil Aviation Authority that the wind facility will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance (CNS) equipment, especially the radar, prior to commencement of the activity. A copy of the approval must be kept on site by the ECO.
 104. The holder of this authorisation must obtain approval from the South Africa Weather Services (WeatherSA) that the energy facility will not interfere with the performance of their equipment, especially radar, prior to commencement of the activity. A copy of the approval must be kept on site by the ECO.
 105. The holder of this authorisation must train safety representatives, managers and workers in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant act.
 106. Liaison with land owners/farm managers must be done prior to construction in order to provide sufficient time for them to plan agricultural activities.
 107. No unsupervised open fires for cooking or heating must be allowed on site.

Hazardous materials and waste management

108. Areas around fuel tanks must be bunded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.
109. Leakage of fuel must be avoided at all times and if spillage occurs, it must be remedied immediately.
110. Hazardous waste such as bitumen, oils, oily rags, paint tins etc. must be disposed of at an approved waste landfill site licensed to accept such waste.
111. No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity.



112. Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.
113. Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore, no chemicals must be stored nor may any vehicle maintenance occur within 350m of the temporal zone of wetlands, a drainage line without an extensive floodplain or hillside wetlands.
114. Temporary bunds must be constructed around chemical storage to contain possible spills.
115. Spill kits must be made available on-site for the clean-up of spills.
116. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling and re-use options where appropriate. Where solid waste is disposed of, such disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environment Management Waste Act, 2008 (Act 59 of 2008).
117. The holder of this authorisation must provide sanitation facilities within the construction camps and along the road so that workers do not pollute the surrounding environment. These facilities must be removed from the site when the construction phase is completed as well as associated waste to be disposed of at a registered waste disposal site.
118. The holder of this authorisation must take note that no temporary site camps will be allowed outside the footprint of the development area as the establishment of such structures might trigger a listed activity as defined in the Environmental Impact Assessment Regulations, 2010.

Excavation and blasting activities

119. Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses.
120. Foundations and trenches must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.
121. Borrow materials must be obtained only from authorized and permitted sites. Permits must be kept on site by the ECO.
122. Anti-erosion measures such as silt fences must be installed in disturbed areas.

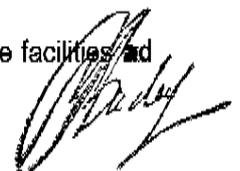


Air emissions

123. Dust abatement techniques must be used before and during surface clearing, excavation, or blasting activities.
124. Appropriate dust suppression techniques must be implemented on all exposed surfaces during periods of high wind. Such measures may include wet suppression, chemical stabilisation, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas.

Historical / cultural / paleontological resources

125. All buffer zones recommended in the specialist environmental reports be respected; the archaeology, which is largely clustered around hills and pans, will be protected by these buffers;
126. The location identified as sensitive should also be protected by buffers. These should be 1.5km in diameter for Orange Hill, 1.5km east/west and 1.9km north/west for SMS Hill, 1.2km east/west and 1.3 km north/south for Gobees se Pan, 0.9 km east/west and 1.0 km north/south for Springbokvlei and 1.0 km in radius from the Kromneus rock art site. KNG2012/007 does not require a buffer.
127. The potential graves and grave ARB2012/007 should be protected and conserved. A temporary fence must be built around them during construction. Fence must be placed 2 meters away from the perimeter of the graves, No development is allowed within 20 meters from the fence the surrounding the burials. Alternatively, if the areas fall within the development footprint, an excavation must be undertaken, upon receipt of a permit from SAHRA.
128. Final layout for the turbines must take cognisance on the above and must be submitted to the CAN to ensure that all identified heritage resources If concentrations of archaeological heritage material, fossils and human remains are uncovered during construction, all work must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) (01 642 4502) so that a systematic and professional investigation/ excavation can be undertaken.
129. Construction managers/foremen must be informed before construction starts on the possible types of heritage sites and cultural material they may be encountered and the procedures to follow when they find sites.
130. All buffers and no-go areas stipulated in this report must be adhered to for both the facilities and all roads and power lines.



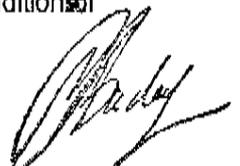
131. Should any human remains be uncovered during development they must be immediately protected *in situ* and reported to the heritage authorities or to an archaeologist. The remains will need to be exhumed at the cost of the developer.
132. All construction and maintenance crew and vehicles (except small vehicles which may use existing farm tracks) should be kept out of the buffer zones.
133. The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected.

Turbines position

134. Turbines must be positioned in such a way that shadow flicker does not affect any farm buildings.
135. The final placement of turbines must follow a micro-siting procedure involving a walk-through and identification of any sensitive areas by botanical and avifaunal specialists.

General

136. A copy of this authorisation and the approved EMP must be kept at the property where the activity will be undertaken. The authorisation and approved EMP must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.
137. The holder of the authorisation must notify both the *Director: Integrated Environmental Authorisations* and the *Director: Compliance Monitoring* at the Department, in writing and within 48 (forty eight) hours, if any condition of this authorisation cannot be or is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.
138. National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of authorisations set out in this document or any other subsequent document emanating from these conditions of authorisation.



Date of environmental authorisation: 12 JUNE 2014



Mr Ishaam Abader

Deputy Director-General: Legal, Authorisations, Compliance and Enforcement
Department of Environmental Affairs

Annexure 1: Reasons for Decision

1. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration -

- a) The information contained in the EIAr dated February 2013, amended layout and additional information dated March 2014;
- b) The comments received in the EIAr dated February 2013 included *inter alia*: the South African Heritage Resources Agency (SAHRA), Birdlife South Africa, Namakwa District Municipality, Department of Water Affairs, Eskom, Department of Agriculture, Forestry and Fisheries (DAFF), Northern Cape Department of Environmental Affairs and Nature Conservation (DENC), Square Kilometre Array (SKA), Science and Technology, Department of Mineral Resources and affected parties;
- c) Mitigation measures as proposed in the EIAr dated February 2013 and the EMPr;
- d) The information contained in the specialist studies contained in the EIR dated February 2013;
- e) The information contained in the specialist studies contained within Annexure E - M of the EIAr dated February 2013 included, *inter alia*:

Title	Prepared by	Date
Botanical Impact Assessment	Bergwind Botanical Surveys & Tours CC: Dr David J McDonalds	August 2012
Avifaunal Impact Assessment	Dr Dough M. Harebottle	August 2012
Bat Study	Animalia Zoological and ecological consultation: Werner Marais	September 2012
Heritage Impact Assessment	ACO Associates cc: Jayson Orton and Lita Webley	August 2012
Palaeontological Impact Assessment	Natura Viva cc: John E. Almond Phd	August 2012
Visual Impact Assessment	Visual Resource Management Africa cc: Stephan Stead	August 2012
Freshwater Impact Assessment	Toni Belcher	August 2012
Environmental Noise Impact Assessment	M ² Environmental Connections cc: M. de Jager	August 2012
Socio-Economic Impact Assessment	Urban -Econ Development Economist: Craig van Niekerk	2012

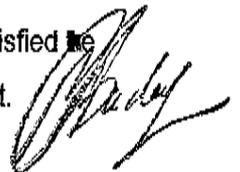
	and Alex Kempthorne	
Soil and Agricultural Impact Assessment	SiVest: Kurt Barichievy	August 2012
12 Months Bat & Bird Monitoring	Bio ³	October 2013

- f) The findings of the site visit conducted on 24 April 2013; and
- g) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act 107 of 1998).

2. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

- a) The findings of all the specialist studies conducted and their recommended mitigation measures.
- b) The 12 months (four (4) seasons) Bat and Avifaunal Monitoring Report dated October 2013.
- c) The need for the proposed project stems from the provision of electricity to the national grid in terms of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) and the provision of electricity from Independent Power Producers (IPPs) as required by the Department of Energy.
- d) The confirmation received from the Department of Mineral Resources stating that the proposed project will not impact or interfere with mining or any other activities incidental thereto.
- e) Approval from DAFF regarding the subdivision of the farm properties required for the proposed development.
- f) Final comments from DENC regarding biodiversity comments as per condition 39 – 44 of this environmental authorisation.
- g) Nearest SKA station is 156 km from the proposed facility, therefore the proposed Kangnas Wind Energy Facility poses a very low risk of detrimental impact on the SKA.
- h) The EIAr dated February 2013 identified all legislation and guidelines that have been considered in the preparation of the EIAr dated February 2013.
- i) The methodology used in assessing the potential impacts identified in the EIAr dated February 2013 and the specialist studies have been adequately indicated.
- j) A sufficient public participation process was undertaken and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2010 for public involvement.



3. Findings

After consideration of the information and factors listed above, the Department made the following findings -

- a) The identification and assessment of impacts are detailed in the EIA dated February 2013 and sufficient assessment of the key identified issues and impacts have been completed.
- b) The procedure followed for impact assessment is adequate for the decision-making process.
- c) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.
- d) The information contained in the EIA dated February 2013 is deemed to be accurate and credible.
- e) EMP measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the EIA dated February 2013 and will be implemented to manage the identified environmental impacts during the construction process.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The environmental authorisation is accordingly granted.





environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Environment House · 473 Steve Biko, Arcadia · PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 14/12/16/3/3/2/346/AM1

Enquiries: Mr Vincent Chauke

Telephone: (012) 399 9399 E-mail: VChauke@environment.gov.za

Mr Hendrik Reyneke
South Africa Mainstream Renewable Power Kangnas (Pty) Ltd
PO Box 45063
Claremont
CAPE TOWN
7735

Telephone Number: (021) 657 4050
Email address: hendrik.reyneke@mainstreamrp.com

PER EMAIL / MAIL

Dear Mr Reyneke

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION (14/12/16/3/3/2/346/1) ISSUED ON 12 JUNE 2014 FOR THE PROPOSED WIND ENERGY FACILITY ON KANGNAS FARM, FARM KANGNAS (FARM NO. 77, PORTION 3) AND SMORGENSCHADUWE (REMAINDER OF FARM NO. 127), NEAR SPRINGBOK, WITHIN THE NAMA-KHOI LOCAL MUNICIPALITY, NORTHERN CAPE

The Environmental Authorisation (EA) issued for the above application by this Department on 12 June 2014, your application form for amendment of the EA received on 15 July 2014 and your amended application form received by this Department on 18 August 2014 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the EA dated 12 June 2014 as follows:

Amendment 1: Amendment to the activity authorised in the EA:

"GN R. 545 Item 16:

"The construction of:

- (iv) *Infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse.*
- (a) *Northern Cape province*
- (ii) *Outside urban areas, in*
- (bb) *National Protected Area Expansion Strategy Focus areas."*

Is hereby amended to:

"GN R. 546 Item 16:

"The construction of:

- (i) Infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse.
- (a) Northern Cape province
- (ii) Outside urban areas, in
- (bb) National Protected Area Expansion Strategy Focus areas."

Amendment 2: Amendment to condition 1 of the EA:

"The preferred site for the construction of a 140 MW Wind Energy facility, located on the Farm Kangnas (Farm No. 77, Portion 3 and the Remainder) and Farm Smoegenschaduwe (Remainder of Farm No. 127), near the town of Pringbok as per the abovementioned geographic coordinates is approved."

Is hereby amended to:

"The preferred site for the construction of a 140 MW Wind Energy facility, located on the Farm Kangnas (Farm No. 77, Portion 3 and the Remainder) and Farm Smoegenschaduwe (Remainder of Farm No. 127), near the town of Springbok as per the abovementioned geographic coordinates is approved."

Amendment 3: Amendment to the project description:

Page 6 of the EA:

"Overhead or underground transmission line connecting turbine (these will be covered in a separate EA which forms part of this project (DEA Ref: 14/12/16/3/2/386)."

Is hereby amended to:

"Overhead or underground transmission line connecting the wind energy facility to the grid."

Amendment 4: Amendment to Condition 55 of the EA:

"A pre-construction walk through on the selected powerline alignment by a bat specialist, avifaunal specialist and ecologist, must be conducted to ensure that the micro-siting of the turbines has the least possible impact, there are no nests sites of priority species on or close to the construction corridor, and all protected plant species impacted are identified."

Is hereby amended to:

"A pre-construction walk through on the selected powerline alignment by a bat specialist, avifaunal specialist and ecologist, must be conducted to ensure that the micro-siting of the turbines and pylons has the least possible impact, there are no nests sites of priority species on or close to the construction corridor, and all protected plant species impacted are identified."

Amendment 5: Amendment to Condition 13 of the EA:

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided **not to amend** the EA dated 12 June 2014 by removing condition 13. The reasons for the decision are provided below:

Following a review of the application for amendment to the EA dated 12 June 2014 and the supporting motivation provided, this Department advises that the condition to remove the requirement to submit the shapefile is hereby refused. The shapefile to be submitted is of the layout that was included in the final EIAr. An amended shapefile can be submitted when the layout plan and EMPr is submitted to this Department for approval.

This proposed amendment letter must be read in conjunction with the EA dated 12 June 2014.

In terms of Regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the Department's decision in respect of the amendments made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By post: Private Bag X447,
Pretoria, 0001; or
By hand: Environment House
473 Steve Biko Road
Pretoria
0083

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

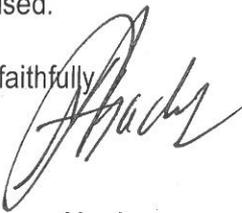
Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:

Tel: 012-399-9356
Email: AppealsDirectorate@environment.gov.za

The authorised activities shall not commence within twenty (20) days of the date of signature of the decision. Further, please note that in terms of section 43(7) of the National Environmental Management Act, 1998, an appeal under section 43 of that Act will suspend the decision or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

Yours faithfully



Mr Ishaam Abader
Deputy Director-General: Legal, Authorisations, Compliance and Enforcement
Department of Environmental Affairs

Date: 12/12/2014

cc	Ms Louise Corbett	Aurecon SA (Pty) Ltd	Tel: (021) 526 6027	Email: Louise.corbett@aurecongroup.com
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ANNEXURE D
OFFSET AGREEMENTS



**MAINSTREAM
RENEWABLE POWER
SOUTH AFRICA**

South Africa Mainstream Renewable Power Developments (Pty) Ltd
1st Floor St Albans on Cavendish
2 Osborne Road
Claremont
Cape Town 7700
South Africa

Tel: +27 (0)21 657 4040
Fax: +27 (0)21 671 5665
info-southafrica@mainstreamrp.com
www.mainstreamrp.co.za

COLLABORATION HEADS OF TERMS

This Collaboration Heads of Terms is entered on 4 August 2014

Between:

- 1) BirdLife South Africa (Nonprofit Registration No. 001-298 NPO), Lewis House, 239 Barkston Drive, Blairgowrie, Randburg 2194, Gauteng, South Africa
- 2) Koeris Wind (Pty) Ltd, (Company Registration No. 2014/037981/07), Head Office 4th Floor Mariendahl House, Newlands on Main, Corner Main Road and Campground, Claremont, Cape Town, 7735, Western Cape, South Africa.
- 3) South Africa Mainstream Renewable Power Kangnas (Pty) Ltd, (Company Registration No. 2012/052675/07), Head Office 4th Floor Mariendahl House, Newlands on Main, Corner Main Road and Campground, Claremont, Cape Town, 7735, Western Cape, South Africa.

Hereafter Koeris Wind (Pty) Ltd and South Africa Mainstream Renewable Power Kangnas (Pty) Ltd will jointly be referred to as Mainstream.

Relating to: The development of wind energy facilities and conservation of the Red Lark

Mainstream plans to bid two wind energy projects in round 4 of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) scheduled to be on 18th of August 2014. During the environmental impact assessment for the two projects it was discovered that the Red Lark, *Calendulauda burra*, is found in unusually high numbers on both proposed wind farm sites. The Red Lark is globally Vulnerable; it is endemic to South Africa and has a small, restricted range. Although the impact assessment indicated that the risk of collision is likely to be low, there is a concern that the wind farm(s) could impact on the species through causing habitat loss and/or disturbance. Mainstream and BirdLife consulted several experts (including Chris van Rooyen, Andrew Jenkins, Mark Anderson, Warwick Tarboton, Richard Dean, Peter Ryan and Derek Engelbrecht) to determine the likely significance of this risk. Unfortunately due to the current limited understanding of Red Lark behaviour and its habitat preferences, there was low confidence in any predications relating to the impacts.

This Collaboration Heads of Terms serves to highlight the solutions identified by Mainstream and BirdLife South Africa to conserve, protect and better understand the Red Lark, particularly in light of the potential expansion of renewable energy facilities within the species' range.

The following agreements have been reached in order for the parties to collaborate to:



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SOUTH AFRICA**

1) improve current levels of understanding of the Red Lark behaviour, life-history and habitat use and requirements; and

2) mitigate potential impacts of the wind farm(s) on the species.

These agreements will only take effect once and if one (or both) of the projects are awarded preferred bidder status in terms of the REIPPP, and achieve Financial Close.

- Mainstream will fund a PhD study on the Red Lark.
- BirdLife South Africa will be responsible for initiating, scoping and identifying the relevant university (or individual) including monitoring of the PhD progress during the study. Preference will be given to identifying a previously disadvantaged PhD candidate.
- The PhD study will extend beyond the wind farm boundaries to include the range of the Red Lark in South Africa. The PhD study would be over and above the post-construction bird monitoring to take place in accordance with the BirdLife South Africa / Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa (although where possible and appropriate the outcomes of the two studies should be integrated).
- Mainstream and BirdLife South Africa agree that current land use practices/grazing regime that appear to be advantageous to Red Larks should not change unless post-construction monitoring and/or PhD results indicates that a change is desirable for the species. This will be included in the project's Environmental Management Programme submitted to the Department of Environmental Affairs for approval.
- Mainstream will enter into a Memorandum of Understanding with the landowners to ensure that the condition of the vegetation on the wind farm site is not significantly altered, by increasing the intensity of the current grazing methods. This is to ensure the Red Larks on the property are protected throughout the lifespan of the wind farm(s).
- Mainstream will, to their best endeavours, engage the wind farm project site land owners to implement the recommendations of the PhD study and/or post-construction monitoring to further the conservation of the species on site.
- Mainstream will engage with relevant land owners and authorities to ensure long term protection of the site, ideally through formal biodiversity stewardship agreement should the Northern Cape Department of Environment and Nature Conservation agree to this.

The above discussed solutions for the Red Larks are a joint effort between Mainstream and BirdLife South Africa, with both parties contributing and satisfied with the current identified solutions.

The full details of this collaboration agreement will be discussed in the project's environmental management plan, the final to be drafted once the projects are preferred



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bidders and before construction starts, for the approval of Department of Environmental Affairs.

The signatory signing for and on behalf of South Africa Mainstream Renewable Power Kangnas (Pty) Ltd being duly authorised thereto.

Name: Hendrik J Reyneke

Date: 5 August 2014

The signatory signing for and on behalf of Koeris Wind (Pty) Ltd being duly authorised thereto.

Name: Hendrik J Reyneke

Date: 5 August 2014

The signatory signing for and on behalf of BirdLife South Africa being duly authorised thereto.

Name: Mark D. Anderson

Date: 4 August 2014

TRIPARTITE BIODIVERSITY OFFSET AGREEMENT

BETWEEN

KOERIS WIND PROPRIETARY LIMITED
Registration Number 2014/037981/07

herein represented by Hendrik Reyneke
as duly authorized thereto

(“Koeris Wind”)

AND

SOUTH AFRICA MAINSTREAM RENEWABLE POWER KANGNAS PROPRIETARY
LIMITED
Registration Number 2012/052675/07

herein represented by Hendrik Reyneke
as duly authorized thereto

(“Mainstream Kangnas”)

AND

THE NORTHERN CAPE DEPARTMENT OF ENVIRONMENT AND NATURE
CONSERVATION

herein represented by Denver van Heerden
as duly authorized thereto

(“DENC”)

(collectively “the Parties”)

PREAMBLE

WHEREAS section 2(4) of the NEMA provides that sustainable development requires *inter alia* the consideration of all relevant factors including that:

- i. the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- ii. the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- iii. negative impacts on the environment and on people's environmental rights are anticipated and prevented, and where they cannot be altogether prevented are minimised and remedied;

AND WHEREAS Koeris Wind and Mainstream Kangnas wish to develop Renewable Energy Facilities at Kangnas and Koeris, near Springbok in the Northern Cape Province, and has made the following commitments to DENC in pursuit of minimising and remedying any loss of biological diversity occasioned by Koeris Wind and/or Mainstream Kangnas in connection with the Kangnas and Koeris REF Projects, being to purchase and declare the Oranjefontein property as a Nature Reserve, and to assist DENC to secure and manage for the conservation of biodiversity three other nearby properties;

AND WHEREAS the purpose of a biodiversity offset is to ensure an equivalent or better biodiversity outcome to the sites where biodiversity values may be lost due to impacts that may be caused by the Kangnas and Koeris REF Projects; to improve the long-term protection and viability of the biodiversity and its associated habitats; and to ensure that the developed site is ecologically sustainable;

AND WHEREAS the Environmental Authorisations contain certain conditions requiring Koeris Wind and/or Mainstream Kangnas to enter into with DENC, and to implement, a Biodiversity Offset Agreement in accordance with the minimum requirements set out in those conditions;

AND WHEREAS the Parties have identified the Oranjefontein property to secure as an offset, and for which DENC wishes to pursue the declaration and management of the said property as a Nature Reserve;

AND WHEREAS Koeris Wind and Mainstream Kangnas wish to contribute to the effective conservation of Goegap Provincial Nature Reserve through assisting with the

effective conservation thereof and supporting the establishment of local enterprises which may undertake ecological rehabilitation and protected area management activities on the aforementioned properties and Nature Reserve;

NOW THEREFORE the Parties agree to enter into this Agreement for the establishment of a biodiversity offset, and for the implementation thereof.

INTERPRETATION AND DEFINITIONS

- 1.1. For the purposes of this Agreement, the following words/expressions shall have the meanings set out below, unless a contrary intention clearly appears from the context of the terms of this Agreement:
- 1.1.1. “**Agreement**” shall mean this Biodiversity Offset Agreement entered into between the Parties, including all the attached annexures thereto;
- 1.1.2. “**Biodiversity Offset**” shall mean the land conservation initiatives specified in clause 4 of this Agreement to be implemented by Koeris Wind and/or Mainstream Kangnas in accordance with the Environmental Authorisations for the Kangnas and Koeris REF Projects as well as the preamble to this Agreement;
- 1.1.3. “**Business Day**” shall mean any day of the year that is not a Saturday, Sunday or public holiday;
- 1.1.4. “**DEA**” shall mean the national Department of Environmental Affairs;
- 1.1.5. “**DENC**” shall mean the provincial Department of Environment and Nature Conservation, Northern Cape Province;
- 1.1.6. “**EMP**” shall mean the Environmental Management Plan prepared by Koeris Wind and/or Mainstream Kangnas or their service provider in connection with the EIA and approved by DEA in terms of Section 24 of NEMA in connection with the Environmental Authorisation;
- 1.1.7. “**Environmental Authorisations**” shall mean the Environmental Authorisations issued by DEA to Koeris Wind and Mainstream Kangnas in terms of section 24 of NEMA and in respect of the Kangnas and Koeris REF Projects; with DEA EA registration numbers 14/12/16/3/3/2/346 and 14/12/16/3/3/2/346/1
- 1.1.8. “**EIA**” shall mean the Environmental Impact Assessment Report (number 6428A/108495) dated February 2013 compiled by Aurecon in terms of NEMA in connection with the Kangnas and Koeris REF Projects;

- 1.1.9. **“Financial Closure Date”** shall mean the date upon which Koeris Wind and/or Mainstream Kangnas secures financial closure on either the Kangnas or the Koeris REF project.
- 1.1.10. **“Inselberg Properties”** shall mean properties in the Namaqualand Region, primarily situated in the Nama-Khoi Municipality, Northern Cape Province not presently owned by Koeris Wind or Mainstream Kangnas, nor necessarily intended to be owned by Koeris Wind or Mainstream Kangnas, which properties (either in part or in full) contain conservation worthy biodiversity and which properties are more fully described in Annex **“B”**;
- 1.1.11. **“Kaip property”** shall mean Remainder of the Farm Kaip No 130, in the Magisterial District of Namaqualand, Division of Namaqualand, Northern Cape Province, being In extent: 3403.5089 (three thousand four hundred and three comma five zero eight nine) hectares and held by title deed number T54873 - 1988
- 1.1.12. **“Kangnas and Koeris REF Projects”** shall mean the renewable energy operations and/or activities described in the EIA to be undertaken by Koeris Wind and Mainstream Kangnas on the lease area near Springbok, Northern Cape Province and pursuant to the Environmental Authorisations;
- 1.1.13. **“Koeris Wind”** shall mean KOERIS WIND PROPRIETARY LIMITED Registration Number 2014/037981/07
- 1.1.14. **“Liaison Committee”** shall mean the body established by the Parties from time to time to assist the Parties with the effective implementation of the Agreement and the day to day management of the Protected Area, established in terms of clause 11;
- 1.1.15. **“Mainstream Kangnas”** shall mean SOUTH AFRICA MAINSTREAM RENEWABLE POWER KANGNAS PROPRIETARY LIMITED Registration Number 2012/052675/07
- 1.1.16. **“Mainstream Lease Area”** shall mean the areas on the properties more fully described in Annex **“A”** hereto;
- 1.1.17. **“Management Authority”** shall mean the Management Authority appointed in terms of clause 8 of this Agreement and which shall be responsible for implementing the Management Plan to be prepared in terms of this Agreement;
- 1.1.18. **“Management Plan”** shall mean the plan to be prepared in terms of clause 9 of this Agreement;

- 1.1.19. "**MEC**" shall mean the Member of the Executive Council for Environment and Nature Conservation, Northern Cape;
- 1.1.20. "**NEMA**" shall mean the National Environmental Management Act (Act No. 107 of 1998), as amended;
- 1.1.21. "**Oranjerfontein property**" shall mean the farm Oranjerfontein (RE of 129 RD Namaqualand) being 4945,3288 ha in extent held by title deed T71044 - 2003
- 1.1.22. "**Parties**" shall mean the parties to this Agreement, namely KOERIS WIND PROPRIETARY LIMITED and SOUTH AFRICA MAINSTREAM RENEWABLE POWER KANGNAS PROPRIETARY LIMITED and DENC and "Party" shall mean either one of them as the context may require;
- 1.1.23. "**Protected Area**" shall mean the land required to be secured by Koeris Wind and/or Mainstream Kangnas and declared by the MEC as a nature reserve in terms of section 23 of the Protected Areas Act, respectively, in terms of clause 6 of the Agreement;
- 1.1.24. "**Protected Areas Act**" shall mean the National Environmental Management: Protected Areas Act (Act No. 57 of 2003), as amended;
- 1.1.25. "**Service Provider**" shall mean the entity identified and agreed to by the parties in terms of clause 7.1 of this Agreement;
- 1.2. The headnotes to the clauses in this Agreement are for purposes of convenience and reference only and do not affect the interpretation of the terms of this Agreement.
- 1.3. Words importing the singular include the plural and vice versa. Words importing any gender include the other genders and words importing persons include partnerships, trusts, bodies corporate, government departments and public entities. A reference to the Parties to this Agreement shall include their successors in title.
- 1.4. When this Agreement prescribes any number of days, they must be reckoned exclusively of the first and inclusively of the last day. If the last day falls on a day that is not a Business Day, it must be deemed to be the next Business Day.
- 1.5. Where any term is defined within the context of any particular clause in this Agreement, the term so defined shall, unless it appears clearly from the clause in question that it has limited application to the relevant clause, bear

the meaning ascribed to it for all purposes in terms of this Agreement, notwithstanding that the term has not been defined in this clause.

- 1.6. The rule of construction that a contract shall be interpreted against the Party responsible for the drafting thereof, shall not apply.

2. INTRODUCTION

- 2.1. The Biodiversity Offset is required to offset and/or to compensate for the adverse biodiversity impacts that may be occasioned by the Kangnas and Koeris REF Projects in a manner consistent with the commitments made by Koeris Wind and Mainstream Kangnas.
- 2.2. The potential impacts (and associated potential biodiversity loss) associated with the Kangnas and Koeris REF Projects are described in the EIA Report.
- 2.3. The Parties recognise and agree that this Agreement is entered into with a view to addressing the requirements in the Environmental Authorisations regarding the biodiversity offset referred to therein, and that this Agreement is in fulfilment of the relevant conditions of the Environmental Authorisations relating to the Biodiversity Offset (including, specifically, Conditions 39 to 44 of the Environmental Authorisation registration numbers 14/12/16/3/3/2/346 and 14/12/16/3/3/2/346/1)
- 2.4. DENC herein records that it is satisfied that the implementation of this Agreement and the Biodiversity Offset contemplated herein is aimed at achieving the requirements of minimising and remedying the loss of biological diversity occasioned by the Kangnas and Koeris REF projects.

3. GENERAL DUTIES OF THE PARTIES

- 3.1. The Parties agree to co-operate in good faith regarding the implementation and execution of the Biodiversity Offset and with a view to ensuring the ongoing protection and maintenance of the areas of land contemplated in clause 6.
- 3.2. Koeris Wind and Mainstream Kangnas shall not be considered to be in breach of any of their obligations under this Agreement, if due to no fault of their own (i.e. where any such delays are beyond the direct control of Koeris Wind and/or Mainstream Kangnas), the declaration of Protected Areas contemplated in clause 6 have not been finalised to the point where the requisite notices have been published in the *Gazette*. Koeris Wind and/or Mainstream Kangnas shall provide documentary evidence to DENC (including but not limited to a written offer to purchase and/or lease the Oranjefontein property and written rejections of such offers) in support of any such reliance on this clause.

- 3.3. Koeris Wind and/or Mainstream Kangnas and DENC shall implement and execute the Biodiversity Offset in accordance with the relevant clauses of this Agreement and/or the provisions of the Management Plan (where applicable) to be prepared in terms of this Agreement.
- 3.4. The Parties shall have the right to appoint sub-contractors to assist them in the exercise of their performance in terms of this Agreement, provided that any appointment shall be with the concurrence, in writing, of the other Party to this agreement, which consent shall not be unreasonably withheld, and provided further that such appointments are compliant with any applicable procurement requirements.

4. BIODIVERSITY OFFSET

- 4.1. It is recorded that the Biodiversity Offset contemplated in this Agreement shall consist of the following components:
- 4.1.1. The purchase and securing by Koeris Wind and/or Mainstream Kangnas of the Oranjefontein property and doing all that is necessary for its part to expedite the declaration thereof, in perpetuity, as a Nature Reserve in terms of Section 23 of the Protected Areas Act.
- 4.1.2. If Koeris Wind and/or Mainstream Kangnas so chooses, after consultation with DENC, the transfer of the Oranjefontein property secured in terms of clause 6 to, and registration thereof, in the name of the "Northern Cape Provincial Government", or alternatively, in the name of a Public Benefit Organisation as contemplated in clause 6.4.
- 4.1.3. That DENC shall be responsible for the preparation and submission of all documents and the management of all processes necessary to have the Oranjefontein property declared a nature reserve as contemplated in clause 6.3.
- 4.1.4. The assignment of the responsibility for managing the Oranjefontein property to the Management Authority.
- 4.1.5. The preparation by the Management Authority, and submission to the MEC for approval, of a Management Plan for the Oranjefontein property.

5. PROTECTION AND MANAGEMENT OF THE KOERIS WIND AND/OR MAINSTREAM KANGNAS LEASE AREA

- 5.1. In accordance with the terms of this Agreement, Koeris Wind and/or Mainstream Kangnas hereby agree to protect the biodiversity and ecological functioning of the Mainstream Lease Area through appropriate provisions, restrictions and monitoring mechanisms as contained and/or to be contained in the EMP.
- 5.2. The areas of the Mainstream Lease Area that are required to be protected in terms of clause 5.1 are those attached as Annex "A".
- 5.3. The Parties acknowledge and agree that the protection of the Mainstream Lease Area shall be managed and implemented through the EMP.

6. DECLARATION OF THE ORANJEFONTEIN PROPERTY AS A NATURE RESERVE

- 6.1. Koeris Wind and/or Mainstream Kangnas shall, within two (2) years of the Financial Closure Date or six (6) months of the commencement of the activities outlined in the Environmental Authorisations, whichever is the later, purchase, at its sole and exclusive cost, the Oranjefontein property.
- 6.2. The property required to be secured by Koeris Wind and/or Mainstream Kangnas in terms of clause 6.1 shall be set aside, and made available to DENC for and declared as a nature reserve in terms of sections 23 of the Protected Areas Act.
- 6.3. DENC shall, as soon as reasonably possible after the Oranjefontein property has been made available in terms of clause 6.2, cause the property to be declared, by way of publication of the requisite notice in the *Gazette*, in terms of the Protected Areas Act as a nature reserve.
- 6.4. Koeris Wind and/or Mainstream Kangnas shall, after consultation with DENC in terms of clause 4.1.2, determine whether to retain title to the Oranjefontein Property, or to donate and transfer it to the Province of the Northern Cape, or to donate and transfer it to a registered Public Benefit Organisation that has, as one of its objectives, the protection and maintenance of biological diversity in the Republic of South Africa.

7. ASSISTANCE REGARDING THE KAIP PROPERTY AND THE INSELBERG PROPERTIES

- 7.1. The parties shall identify and agree on a suitable Service Provider to assist with securing the Kaip property.

- 7.2. Koeris Wind and/or Mainstream Kangnas shall make available to the Service Provider, within two (2) months after presentation of a budget from DENC, or within six (6) months of the commencement of the activities outlined in the Environmental Authorisations, whichever is the later, the funds necessary to:
- 7.2.1. compile a complete application to the Leslie Hill Succulent Karoo Trust as administered by the World Wide Fund for Nature- South Africa for the purchase of the Kaip Property; and
- 7.2.2. negotiate and conclude, if possible, an offer to purchase with the owner of the property referred to in clause 7.2.1.
- 7.2.3. negotiate, conclude, and if possible, to enter into the appropriate agreements, as the case may be, envisaged in Sections 23 or 28 of the Protected Areas Act for the protection of the conservation worthy portions of the Inselberg Properties as delineated in Annex B.
- 7.3. The budget contemplated in clause 7.2 shall not exceed the sum of One Hundred Thousand (100,000.00) Rand, or as agreed by the parties.
- 7.4. Koeris Wind and/or Mainstream Kangnas shall use their best endeavours to assist the suitable service provider referred to in 7.1 to achieve the items in 7.2.

8. MANAGEMENT AUTHORITY

- 8.1. The Parties agree that in respect of the Oranjefontein property DENC shall be the Management Authority for the Protected Area and to which responsibility shall be assigned by the MEC in terms of the Protected Areas Act;
- 8.2. To the extent required by law, Koeris Wind and/or Mainstream Kangnas and DENC hereby record their consent to the assignment of the responsibility for managing the Protected Areas by the MEC in terms of the Protected Areas Act, in the terms set out in this clause 8.

9. MANAGEMENT PLAN

- 9.1. In respect of the Oranjefontein property, the Management Authority shall prepare and submit the relevant Management Plan to the MEC, for

approval in terms of the Protected Areas Act, within twelve (12) months of being assigned as the Management Authority of the Protected Area.

- 9.2. The object of the Management Plan shall be to ensure the protection, conservation and management of the Protected Area in a manner which is consistent with the objectives of the Protected Areas Act and the purpose for which the area was declared.
- 9.3. The Management Plan referred to above shall, where appropriate, contain the following information:
 - 9.3.1. the planning measures, controls and performance criteria as may be prescribed by the Management Authority;
 - 9.3.2. a programme for the implementation of the Management Plan and its costing;
 - 9.3.3. the zoning of the different land areas indicating what activities may take place in different sections of the Protected Area (and the conservation objectives of each of those sections);
 - 9.3.4. any financial and other support/mechanisms to ensure effective administration and implementation of the Management Plan, and/or any spending of revenue generated from the Protected Areas;
 - 9.3.5. all other measures, controls and performance criteria as indicated under Section 21 of the Protected Areas Act.

10. FINANCIAL PROVISIONS

- 10.1. All payments made by Koeris Wind and/or Mainstream Kangnas in connection with the implementation and execution of the Biodiversity Offset shall be made in accordance with this Agreement.
- 10.2. The funds contemplated in clause 7.1 shall be payable directly to the Service Provider.
- 10.3. In order to ensure transparency and to provide for appropriate monitoring in respect of the utilisation of the funds received in terms of this Agreement, the Service Provider shall put in place accounting mechanisms necessary to ensure that the use of all funds received are “ring-fenced” and traceable to the implementation objective for which they were utilised.

Payments in respect of maintenance and operation of the Biodiversity Offset

- 10.4. The Parties record that Koeris Wind and/or Mainstream Kangnas will make certain commitments to Enterprise Development ("ED") and Socio Economic Development ("SED") in respect of the REF Projects.
- 10.5. These commitments are linked to revenue generated by the REF Projects and in terms of which Koeris Wind and/or Mainstream Kangnas are obliged to spend a certain percentage of revenue on ED and SED ("ED/SED Commitment"). The spend must qualify as either ED Contributions or SED Contributions ("Contributions") as determined by the B-BBEE codes which Contributions shall become available once revenue has been generated.
- 10.6. Provided the REF Projects have generated revenue and Contributions have become available, Koeris Wind and/or Mainstream Kangnas wish, in addition to any costs that may be incurred by Koeris Wind and/or Mainstream Kangnas in securing the properties contemplated in clause 6.1, to make the following financial contributions in respect of the maintenance and operational costs of the Protected Areas.
- 10.7. During the initial ten (10) year period calculated from the date of declaration of the Oranjefontein Property as a protected area, Koeris Wind and/or Mainstream Kangnas shall make Qualifying ED Contributions of no less than ten (10) % of its ED Commitment in the establishment and ongoing support of a local enterprise ("ED Beneficiary"), being at least 51% black owned, which shall undertake ecological rehabilitation and protected area management activities, in respect of, without limitation, the Protected Area.
- 10.8. During the initial ten (10) year period calculated from the date of declaration of the Oranjefontein Property as a protected area, Koeris Wind and/or Mainstream Kangnas shall make Qualifying SED Contributions of no less than ten (10) % of its SED Commitment in the education, training and skills development of persons engaged in or to be engaged in ecological rehabilitation and protected area management activities.

11. ESTABLISHMENT OF A LIAISON COMMITTEE

- 11.1. The Parties agree that a Liaison Committee shall be established. The Liaison Committee shall have such responsibilities as are described in the Management Plan to be prepared in terms of this Agreement, including management and operational issues relating to the Biodiversity Offset.

12. MONITORING AND VERIFICATION OF THE COMPLETION OF THE OFFSET

- 12.1. An Independent Auditor shall verify completion of the Biodiversity Offset in terms of clause 4 by providing a certificate to this effect to the parties.
- 12.2. The term "**completion**" when used in this clause shall mean the implementation and execution of the Biodiversity Offset, but excludes the continued management and maintenance of the Protected Area thereafter.

13. BREACH AND PENALTIES

Breach of this Agreement

- 13.1. Should Koeris Wind or Mainstream Kangnas fail to comply with any of their obligations in terms of this Agreement and remain in breach for a period of sixty (60) days after receipt by Koeris Wind or Mainstream Kangnas of written notification from DENC to remedy the breach, then DENC shall be entitled to:-
- 13.1.1. claim specific performance by Koeris Wind or Mainstream Kangnas of their obligations under this Agreement; or
- 13.1.2. cancel the agreement and claim damages. The Parties agree that the damages suffered shall be limited to no more than the purchase price of the Oranjefontein property, as recorded in the 'offer to purchase' procured by Mainstream Kangnas on 14th May 2014, as escalated by the applicable inflation measure provided for in that 'offer to purchase' as well as the amount referred to in clause 7 of this Agreement.
- 13.2. Should DENC be in breach of the Agreement in so far as it fails properly to oversee the submission of any pertinent documentation to the Service Provider or any third implicated in clause 7.2 and/or the declaration of the Protected Area and/or properly to perform its functions as Management Authority or otherwise, and remain in breach for a period of sixty (60) days after receipt from Koeris Wind and/or Mainstream Kangnas of written notification to remedy the breach, then Koeris Wind and/or Mainstream Kangnas shall be entitled to:
- 13.2.1. claim specific performance;
- 13.2.2. substitute the Management Authority, with a suitable service provider;

- 13.2.3. request the MEC to assign the management functions being conducted by DENC at the time of breach to Koeris Wind or Mainstream Kangnas and/or an entity elected by Koeris Wind or Mainstream Kangnas to perform the management functions of the Protected Area contemplated in clause 6 above.
- 13.3. Any notice referred to in this clause:
- 13.3.1. shall contain a detailed description of the alleged breach;
- 13.3.2. shall contain a demand that the defaulting party remedy the alleged breach within sixty (60) days of receipt of the notice; and
- 13.3.3. shall be sent, via registered post or electronic mail, to the defaulting party's chosen *domicilium citandi et executandi*.

Penalties

- 13.4. In so far as the property referred to in clause 6.1 has not been secured by Koeris Wind or Mainstream Kangnas within two (2) years of the Financial Closure Date or six (6) months of the commencement of the activities outlined in the Environmental Authorisations, then:
- 13.4.1. DENC shall provide written notice to Koeris Wind and Mainstream Kangnas calling upon Koeris Wind or Mainstream Kangnas to remedy their breach within sixty (60) days of receipt of notice calling upon them to do so; and
- 13.4.2. failing which an amount of Five Million One Hundred Ninety Five Thousand Rand (R5,195,000) shall be immediately due and payable by Koeris Wind or Mainstream Kangnas to the Service Provider.
- 13.5. The monies payable to the Service Provider in terms of clause 13.4.2 shall exclusively be used by DENC to further the objectives of this Agreement and to secure conservation-worthy properties within the target area for the expansion of the Goegap Provincial Nature Reserve.
- 13.6. In addition to clause 13.4 above, DENC shall be entitled to levy a penalty on Koeris Wind or Mainstream Kangnas in an amount of ten per centum (10%) of the total amount calculated in terms of clause 13.4.2. This penalty is to be paid into the account nominated by DENC, and to be utilised by it to further the objectives of this Agreement.

14. AUTOMATIC LAPSING

This Agreement shall automatically lapse if Koeris Wind and Mainstream Kangnas do not commence with any of the listed activities authorised in the Environmental

Authorisation within three (3) years of the date of issue of the Environmental Authorisation, or such extended period approved by the issuing authority in terms of NEMA.

15. EARLY SETTLEMENT

Nothing in this Agreement shall prohibit Koeris Wind and/or Mainstream Kangnas from accelerating any or all of the obligations due in terms of this Agreement.

16. DISPUTE RESOLUTION

- 16.1. If any dispute of whatever nature arises between the Parties in respect of any matter arising from or connected with the Agreement, the Parties shall be obliged to use their best endeavours acting in good faith to resolve the relevant dispute amongst themselves.
- 16.2. If the Parties cannot resolve a dispute within thirty (30) Business Days of the date upon which such dispute arose, or in the event of a dispute that must be resolved on an objectively urgent basis, on the same date that the dispute arose, any of the Parties to this Agreement may refer the dispute to arbitration.
- 16.3. Should a Party wish to refer a dispute to arbitration, that Party shall provide written notice to that effect to the other Parties.
- 16.4. An arbitrator or members of an arbitration panel, as the case may be, shall be appointed by the Parties by agreement. If agreement cannot be reached upon a particular arbitrator or arbitration panel within three (3) Business Days after the arbitration has been demanded in writing then the Arbitration Foundation of South Africa shall nominate the arbitrator or arbitration panel, as the case may be.
- 16.5. The arbitrator, or in the event of an arbitration panel being appointed, at least one of the arbitrators shall be either a senior advocate with no less than twenty (20) years' experience, alternatively a retired judge of the High Court, Supreme Court of Appeal or Constitutional Court of South Africa.
- 16.6. Such Arbitration shall be held in Kimberley, in accordance with the Arbitration Act (Act No. 42 of 1965) (as amended or re-enacted from time to time).
- 16.7. The costs of the arbitration, including costs of the arbitrator, the costs of the venue, the recording and transcribing of the proceedings and the costs of either Party in preparing for and conducting the arbitration, shall be costs in the cause, and the arbitrator shall be required to make an award in respect thereof.

16.8. Pending the making of any award for costs, the Parties shall be liable for such costs relating to the venue, transcription and costs of the arbitrator in equal shares as and when they fall due for payment.

16.9. The arbitrator shall, with reasons, determine in his award, which of the Parties is liable for the costs incurred by the Parties in the proceedings

16.10. The arbitrator shall have the fullest and freest discretion to determine the procedure to be adopted, it being the agreed intention that, if possible, the arbitration shall be held and concluded within twenty one (21) Business Days after it has been demanded.

16.11. The Parties agree to the arbitration award being made an order of Court.

16.12. Nothing contained herein shall prevent any party to approach a Court of Law for urgent relief.

17. FORCE MAJEURE

17.1. A party will not be liable for a failure to perform its obligations in terms of this Agreement if such failure is as a result of a *force majeure* (i.e. the happening of an event out of that Party's control).

17.2. If a Party asserts *force majeure* as an excuse for failure to perform that Party's obligation, then the non-performing Party must prove that it took reasonable steps to minimise any delay or damages and that the other party was timely notified of the likelihood or actual occurrence of the *force majeure*.

18. SUSPENSIVE CONDITION

18.1. This Agreement is subject to the fulfillment of the following suspensive condition, namely that –

18.1.1. Koeris Wind or Mainstream Kangnas commences with the listed activities which are the subject of the Environmental Authorisations.

18.2. The suspensive condition provided for in this clause 18 is for the benefit of Koeris Wind or Mainstream Kangnas, which shall be entitled to waive or relax the suspensive condition by giving written notice of such waiver or relaxation (as the case may be) to DENC.

18.3. Notwithstanding clause 21, any provisions of this Agreement which are separable and severable from the remaining provisions of this Agreement, shall not be of immediate force and effect and shall not be given effect to prior to the fulfillment of the suspensive condition.

- 18.4. If the suspensive condition contained in 18.1.1 has not been fulfilled or waived within three (3) years of the date of issue of the Environmental Authorisations, or such extended period approved by the issuing authority in terms of NEMA, then this Agreement will automatically fail and will be of no further force or effect.
- 18.5. Koeris Wind and/or Mainstream Kangnas shall notify DENC in writing as and when the suspensive condition is fulfilled. Such notification shall conclusively evidence the fulfilment of the suspensive condition.

19. WHOLE AGREEMENT

This Agreement together with its Annexures constitutes the whole agreement between the Parties as to the subject matter hereof and no agreements, representations or warranties between the Parties regarding the subject matter hereof other than those set out herein are binding on the Parties.

20. NON-VARIATION

No amendments to or variations of this Agreement shall be valid unless reduced to writing and signed by both Parties.

21. SEVERABILITY

If any clause and/or term of this Agreement is found to be defective or unenforceable or is cancelled for any reason (whether by any competent Court or otherwise) then the remaining clauses of this Agreement shall continue to be of full force and effect. Subject to clause 18, any term of this Agreement shall be construed as entirely separate and separately enforceable in the widest sense from any the other provisions and/or terms of this Agreement.

22. NOTICES AND DOMICILIA

- 22.1. The Parties hereby choose *domicilium citandi et executandi* for purposes of receiving notices under this Agreement at their respective addresses being:

22.1.1. **Koeris Wind and Mainstream Kangnas:**

Postal address: PO Box 45063,
Claremont,
CAPE TOWN
7735

Physical address: 4th Floor, Mariendahl House,
Newlands on Main
CLAREMONT
7735

22.1.2. **DENC:**

Postal address: Private Bag X6102
Physical address: Head of Department's Office
Metlife Towers Building
Cnr Knight and Stead streets
KIMBERLEY
8300

22.2. Any notices for all purposes of this Agreement shall:

22.2.1. be in writing; and

22.2.2. be addressed to the respective Parties at their chosen *domicilium citandi et executandi* in terms of this Agreement.

Signed at _____ on this _____ day of _____ 2014.

AS WITNESS:

1. _____

2. _____

For and on behalf of
Koeris Wind (who warrants that he/she is duly authorised thereto)

AS WITNESS:

1. _____

3. _____

For and on behalf of
Mainstream Kangnas (who warrants that he/she is duly authorised thereto)

Signed at _____ on this _____ day of _____ 2014.

AS WITNESS:

1. _____

2. _____

For and on behalf of
DENC (who warrants
that he/she is duly
authorised thereto)

ANNEXURES TO THIS AGREEMENT

Annexure	Description
A	Mainstream Lease Area
B	List of Inselberg Properties and their conservation worthy portions

Annexure A

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Site Coordinates:
 X Coordinate: 18.4884
 Y Coordinate: -29.6418



Revision: None

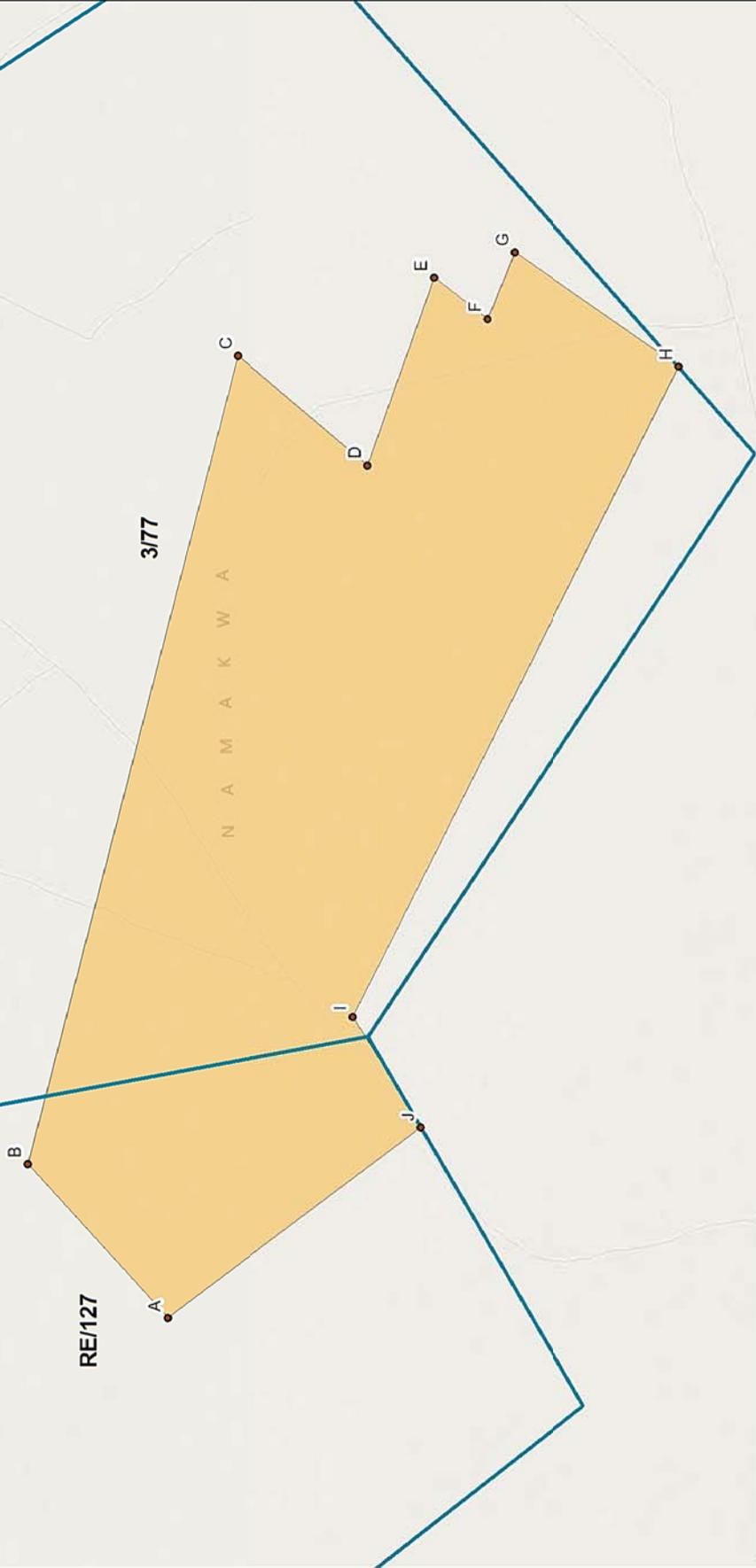
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 Reference: WGS84 UTM ZONE 34S
 Created By: DAVID DEAN
 Checked By: SHELDON VANDREY
 Date: 04 JUNE 2014

Project: Kangnas Wind Farm

Map Title: Project Facility



LABEL	X_UTM34S	Y_UTM34S	X_HHLO19	Y_HHLO19	X_DD	Y_DD	X_DMS	Y_DMS
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C	248901.6472	6721230.514	-57439.24985	-3277418.351	18.40697986	-29.61351152	18° 24' 25.13" E	29° 36' 48.64" S
D	247743.1183	6719871.687	-58620.66617	-3278756.521	18.39471103	-29.6255281	18° 23' 40.96" E	29° 37' 31.90" S
E	249728.1476	6719174.642	-56648.63162	-3279487.492	18.41503428	-29.63221356	18° 24' 54.12" E	29° 37' 55.97" S
F	249290.9511	6718614.424	-57095.28896	-3280039.891	18.41039318	-29.63717634	18° 24' 37.42" E	29° 38' 13.83" S
G	249996.5205	6718329.232	-56394.98462	-3280337.129	18.41760928	-29.63988968	18° 25' 3.39" E	29° 38' 23.60" S
H	248789.235	6716607.892	-57631.41656	-3282036.783	18.40475102	-29.65516557	18° 24' 17.10" E	29° 39' 18.60" S
I	241908.082	6720022.661	-64450.14166	-3278504.912	18.33453674	-29.62297007	18° 20' 4.33" E	29° 37' 22.69" S
J	240738.9172	6719313.009	-65630.94501	-3279194.012	18.32230377	-29.62912464	18° 19' 20.29" E	29° 37' 44.85" S



Legend

- Coordinates
- Kangnas Wind Lease Area
- Kangnas Land Parcels



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Site Coordinates:
 X Coordinate: 18.4884
 Y Coordinate: -29.6418



Revision:
None

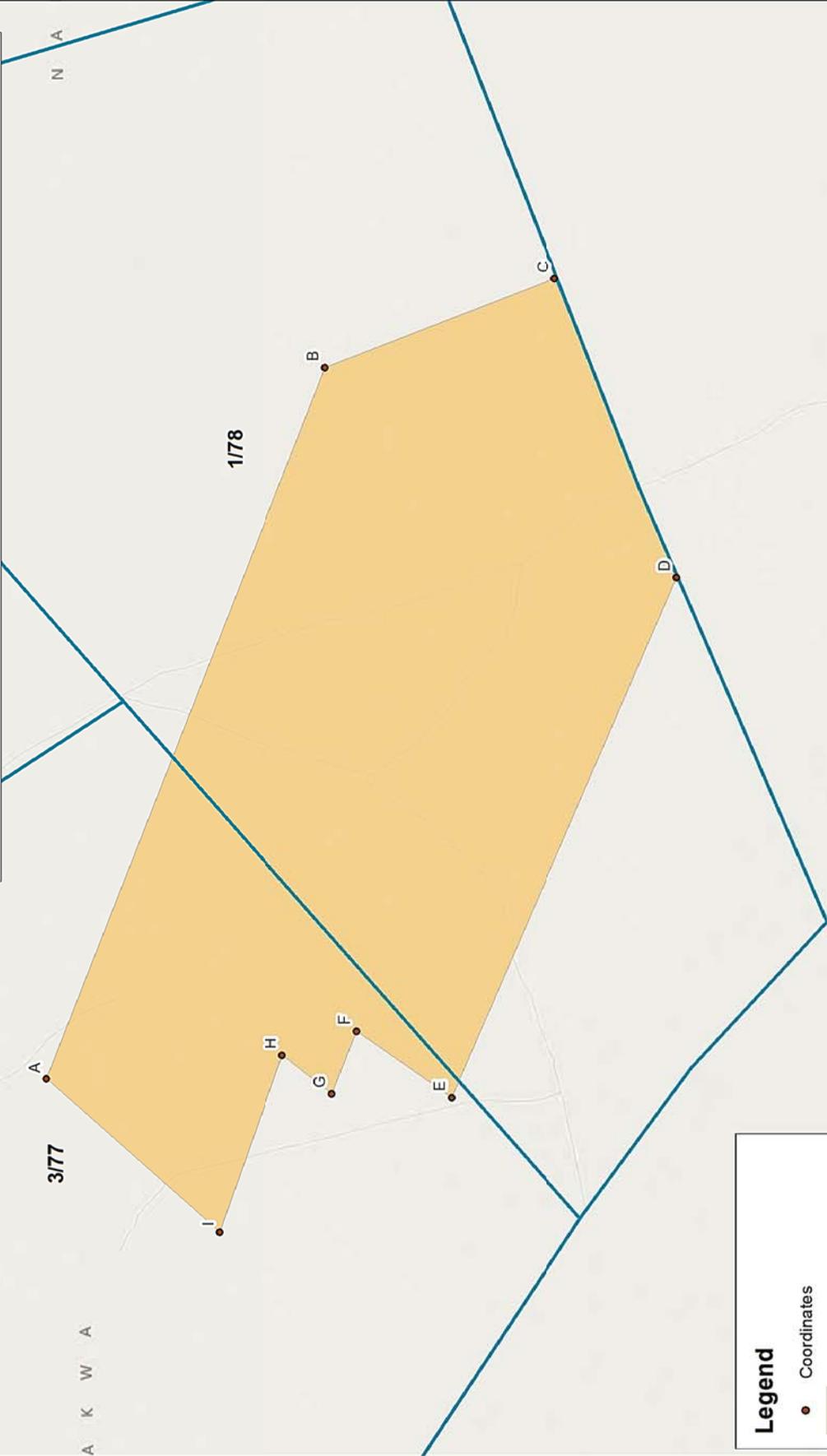
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 Created By: DAVID DEAN
 Checked By: SHELDON VANDREY
 Date: 04 JUNE 2014

Project:
Koeris Wind Farm

Map Title:
Project Facility



LABEL	X_UTM34S	Y_UTM34S	X_HHLO19	Y_HHLO19	X_DD	Y_DD	X_DMS	Y_DMS
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B	257559.8902	6718686.5	-48828.94762	-3280110.624	18.49575117	-29.63816645	18° 29' 44.70" E	29° 38' 17.40" S
C	258574.0547	6716094.814	-47859.99749	-3282718.681	18.50564209	-29.66173177	18° 30' 20.31" E	29° 39' 42.23" S
D	255170.8262	6714720.719	-51285.44735	-3284033.344	18.47019883	-29.67345477	18° 28' 12.72" E	29° 40' 24.44" S
E	249248.9072	6717260.406	-57160.69593	-3281392.527	18.40964658	-29.64937548	18° 24' 34.73" E	29° 38' 57.75" S
F	250002.4831	6718331.731	-56388.9817	-3280334.733	18.41767139	-29.63986835	18° 25' 3.62" E	29° 38' 23.53" S
G	249290.6224	6718612.632	-57095.64847	-3280041.677	18.41038937	-29.63719243	18° 24' 37.40" E	29° 38' 13.89" S
H	249731.1001	6719167.847	-56645.79779	-3279494.335	18.41506318	-29.63227542	18° 24' 54.23" E	29° 37' 56.19" S
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Legend

- Coordinates
- Koeris Wind Land Lease Area
- Koeris Land Parcels



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Annexure "B"

The Inselberg Properties and the delineation of the conservation worthy portions :

"Number"	"Deeds Office Description"
1.	Portion 3 of the Farm Kangnas No 77, in the Magisterial District of Namaqualand, Division of Namaqualand, Northern Cape Province. In extent: eight thousand seven hundred and ninety nine (8799) hectares.
2.	Remainder of the farm Kangnas No 77, in the Magisterial District of Namaqualand, Division of Namaqualand, Northern Cape Province. In extent: eleven thousand seven hundred and five (11705) hectares.
3.	Remainder of the farm Smorgen Schaduwe 127, in the Magisterial District of Namaqualand, Division of Namaqualand, Northern Cape Province. In extent: nine thousand six hundred and twelve (9612) hectares.

ANNEXURE E

CURRICULUM VITAE



CURRICULUM VITAE

Name of Firm:	Aurecon South Africa (Pty) Ltd
Name of Staff:	Patrick James Killick
First Language:	English
Profession:	Senior Environmental Practitioner
Year of Birth:	1980
Years with Firm:	11
Years' experience:	11
Nationality:	South African
Key Qualification:	MPhil Environmental Management

Patrick has considerable construction site environmental management experience in the areas of supervision and hands-on environmental management, including practical site remediation solutions, monitoring of construction related environmental impacts and occupational health and safety. His supervision experience was gained on a range of projects including dams, roads, pipelines, underground works, weirs, and residential villages, which includes four years' experience in a full time environmental management officer role on the award-winning Berg River Dam Project near Franschhoek. As a result of which he is fully versed in the typical site management systems, processes and the practicalities of environmental site management. Patrick then moved into an environmental consulting role and gained a further seven years' experience in the impact assessment field whilst undertaking a myriad of environmental impact studies and other regulatory and planning processes for various developments within South Africa, Mozambique, Tanzania and Namibia. His project experience focuses on the areas of municipal bulk water supply and wastewater treatment infrastructure, bulk thermal power generation, wind energy facilities, seawater desalination (RO) and open pit mining and associated mining infrastructure. With a keen interest in the technical aspects of his projects and being a learner at heart, he enjoys exposure to new industries and the challenges of learning about and understanding technologies and processes and the environmental challenges associated with them. Patrick's core competency is seated in the compilation and implementation of construction and operational phase Environmental Management Plans and the associated compliance monitoring programs. He has a growing interest in the coastal and marine component of projects after acting as project leader and environmental site manager on several contentious seawater desalination impact assessments. Patrick also plays a key role in the management and development of proposals for various prospects pursued throughout the African continent and contributes to the maintenance of several internal planning databases in this regard.

PROJECT EXPERIENCE:

2014-07 to 2015-01 Project manager	10M³/d Desalination Plant, Swakopmund, Namibia: Appointed by Rio Tinto Rössing Uranium Limited (RUL) to undertake a social and environmental impact assessment and develop a lifecycle social and environmental management plan for a proposed desalination plant located at the existing Mile 4 Salt works north of Swakopmund. The plant is designed to produce an average 8.2M ³ /d of clearwater, which meets the Rössing Uranium Mine's current water demands and at a cost substantially less than that of the current water supply (the Areva desalination plant at Wlotzkasbaken)
2013-11 to Ongoing Project manager	Wolf Wind Farm, Wolwefontein, Eastern Cape, South Africa: Appointed by Juwi Renewable Energies (Pty) Ltd to conduct an environmental impact assessment process in terms of the National Environmental Management Act for an ~80MW Wind Energy Facility (WEF).
2013-10 to 2015-07 Project Manager	Upgrading of Distillery Road, Wellington, South Africa: Appointed by SKCMasakhizwe Engineers (Pty) Ltd on behalf of the Drakenstein Municipality to undertake routine compliance monitoring in terms of the Environmental Authorisation and Environmental Management Plan during the 17 – 21 month upgrade of Distillery Road in Wellington.
2013-08 to 2013-08 Team member	Strategic Environmental Assessment for the Awoja catchment area, Uganda: Compile an SEA for the Awoja catchment area identifying key social and environmental issues requiring detailed consideration in developing a catchment management plan.
2013-08 to 2013-06 Specialist	Eden Bulk Water supply options analysis: Appointed by Eden District Municipality to investigate suitable integrated bulk water supply options for the Bitou and Knysna Municipalities. This involved a preliminary identification of major environmental constraints and limitations associated with specific scheme or site options and the facilitating the screening and raking of scheme options using a Multi-Criteria Decision Making (MCDM) model.
2013-03 to 2014-10 Project manager	Outeniqua Wind Farm, near Uniondale: Appointed by Juwi Renewable Energies (Pty) Ltd to conduct an environmental impact assessment process in terms of the National Environmental Management Act for a 39MW Wind Energy Facility (WEF).
2012-05 to 2012-06 EMP Specialist	Construction of the Bulk Water Supply Scheme to the town of Aussenkehr, Namibia: Compilation of a lifecycle environmental management plan for the bulk water supply scheme for the town of Aussenkehr
2012-04 to 2012-05 EMP Specialist	Environmental and Socio-Economic Impact Assessment for a coal-fired power station in the Erongo Region, Namibia: Appointed to compile an EIA and EMP for a 150MW, 300MW or 800MW coal fired power station located in the Erongo Region of Namibia. The preferred site located at the town of Arandis.
2012-02 to 2012-05 Lead consultant & EMP Specialist	Mineral Exploration environmental Management Plan for License Areas No 3450L and 3451L, Moatize District: Compilation of an Environmental Management Plan for mineral exploration drilling (Diamond core and percussion drilling) in Licence Area no's 3450L and 3451L of the Moatize coal fields.

2011-08 to 2011-09 EMP Specialist	450 MW Khanyisa coal fired power station; Compilation of construction and operations phase Environmental Management Programmes for a 450 MW coal-fired power station and associated infrastructure, including ash disposal dumps.
2010-05 to 2012-06 Project manager	15Mℓ/d Emergency Desalination Plant, Mossel Bay: Compilation of a Section 24G application in terms of the National Environmental Management Act for an emergency 15Mℓ/d seawater reverse osmosis plant as a result of more than 1:150 year drought situation in the Southern Cape, inclusive of a construction phase Environmental Management Plan and Environmental Control Officer services. Winner of CESA Engineering Excellence Award, 2011.
2010-02 to 2010-06 Lead consultant	New Sulphuric Acid Storage Tank at the Rössing Uranium Mine: Commissioned by Rössing Uranium to compile of a Social and Environmental Management Plan for the proposed new 15Kt Sulphuric Acid Storage Tank located within the mine precinct.
2009-12 to 2014-11 (incomplete) Lead consultant	2Mℓ/d Emergency Desalination Plant, Plettenberg Bay: Compilation of a Section 24G application in terms of the National Environmental Management Act for an emergency 2Mℓ/d seawater reverse osmosis plant as a result of more than 1:150 year drought situation in the Southern Cape, inclusive of a construction phase Environmental Management Plan and Environmental Control Officer services
2009-11 to 2011-12 Lead consultant	Upgrading the Keurbooms Pumpstation, Abstraction Works and Rising Main: Appointed by the Bitou Municipality to compile an EMP associated with the proposed urgent upgrading of the Keurbooms Pump station, abstraction works and a 650 m length of 500 mm diameter steel rising raw water main. Appointed by the Bitou Municipality to compile an EMP associated with the proposed urgent upgrading of the Keurbooms Pump station, abstraction works and a 650 m length of 500 mm diameter steel rising raw water main.
2009-10 to 2009-11 Lead consultant	Emergency upgrading of Keurbooms rising main and pumps: Appointed by the Bitou Municipality to undertake an Emergency application for the upgrading of a 295m section of perished pipeline, with 500 mm diameter steel pipe and the upgrading of pump impellers to increase abstractions from 100ℓ/s to 120ℓ/s out of the Keurbooms River. Appointed by the Bitou Municipality to compile an EMP and to function as the ECO for the Emergency application and subsequent upgrading of a 295m section of perished pipeline, with 500 mm diameter steel pipe and the upgrading of pump impellers to achieve a greater abstraction rate.
2009-06 to 2011-06 Lead consultant	Decommissioning of the Sonae Novobord fibreboard factory Appointed by the Sonae Novobord to compile an Environmental Management Plan and act as the Environmental Control Officer for the decommissioning of their factory in George Industria, with a focus on the recovery and handling of salvageable materials and the lawful recovery and disposal of hazardous wastes and contaminated soil.
2009-05 to 2009-10 Project manager	Upgrading of the Merweville Wastewater Treatment Works: Appointed by the Beaufort West Municipality to undertake waste license application involving the compilation of a Basic Assessment Report and a construction, operation and decommissioning phase Environmental Management Plan for the upgrading of the Merweville Wastewater Treatment Works.
2009-02 to 2011-03 Environmental Control Officer	Pipeline for Reclamation of Water from Wastewater Treatment Works: Appointed by Water and Wastewater Engineering to facilitate the requisite environmental process, including Environmental Management Plan for the implementation of a Waste Water Reclamation Plant for Beaufort West Municipality.
2008-11 to 2010-04 Lead consultant	Social and Environmental Management for Mineral Exploration Drilling Plan: Commissioned by Rössing Uranium Limited to compile a Social and Environmental Management Plan for the proposed exploration drilling activities within the Namib-Naukluft Park and mine licence area.
2008-04 to 2009-12 Lead consultant	Social and Environmental Management Plan for a bulk sulphur handling facility: Commissioned by Rössing Uranium to compile of a Social and Environmental Management Plan for the proposed bulk sulphur importation, stockpiling and handling facility in the port of Walvis Bay.
2008-04 to 2009-08 Team member	Environmental & Socio-Economic Impact Assessment for proposed NamPower coal-fired power station: Appointment as lead consultant for the Environmental & Socio-Economic Impact Assessment for proposed NamPower coal-fired power station at Walvis Bay that includes a site screening and selection process, scoping study and ESEIA, supported by an EMP.
2008-04 to 2009-07 Lead consultant & Environmental Control Officer	40 Mℓ Off-channel Dam in Karatara: Compiled the construction phase environmental management plan for a 40,000m ³ off channel reservoir, in channel abstraction works and associated pipe work. Also appointed as Environmental Control Officer to supervise the implementation of the EMP and undertake compliance monitoring and reporting.
2008-04 to 2008-08 Team member	Paratus Emergency Generation Facility: Assisted in the environmental process management and compilation of documentation in relation to a proposed 50MW Heavy Fuel Oil emergency generation facility located in the industrial port area.
2008-03 to 2011-12 Team member	Phase II Mine Life Extension for the Rössing Uranium Mine, Namibia: Compilation of a Social and Environmental Management Plan for various activities associated with the life extension of the Rössing Uranium Mine, including, the extension of the open pit operations, acid manufacturing plant, ore sorting plant, extended waste rock disposal areas and tailings facilities.
2007-09 to 2008-06 Team member	Review of the biodiversity components of municipal Spatial Development Frameworks in the C.A.P.E domain, and to prioritisation of SDFs & IDPs requiring input to improve these components: Appointed by SANBI to provide an overview of the requirements for biodiversity in SDFs, and an assessment of the current status of biodiversity in these SDFs. Appointed by SANBI to undertake the review as Phase I of a process to improve the input of biodiversity priorities in Spatial Planning documents and processes.

2007-08 to 2007-12 Team member	Relocation of the Sedgefield Water Treatment and Supply Infrastructure: Conduct a Basic Assessment process for the construction of a 4.5Mℓ water treatment works, a 1.8km, 300mm rising raw water pipeline and the decommissioning and upgrading of the Ruigtevlei water treatment works into a pump station. Compilation of the Construction, Operational and Decommissioning Phase EMPs for the construction of a 4.5Mℓ water treatment works, a 1.8km 300mm rising raw water pipeline and the decommissioning and upgrading of the Ruigtevlei water treatment works into a pump station.
2007-06 to 2010-03 Team member	Outeniqua Pale (Pty) Ltd Creosote and CCA Timber pole treatment facility: Assisting in the undertaking of an environmental impact assessment for the decommissioning of Outeniqua Pale creosote and CCA pole treatment facility in Groot Brak and its re-establishment on a new site in Albertinia. Appointed by Outeniqua Pale (Pty) Ltd to compile a construction, operation and decommission phase Environmental Management Plan for a Creosote and CCA pole treatment facility in conjunction with a NEMA Basic Assessment process
2007-06 to 2008-03 Team member	Phase I Mine Life Extension for the Rössing Uranium Mine, Namibia: Compilation of a Social and Environmental Impact Assessment for various activities associated with the life extension of the Rössing Uranium Mine, including, a sulphuric acid manufacturing plant with associated sulphur storage on the mine, and the transport of sulphur from the Port of Walvis Bay; a radiometric ore sorter plant; and mining of an ore body known as SK4;
2007-06 to 2007-11 Lead consultant	Chemical storage & distribution facility: Conduct a Section 24G retrospective application for authorisation of illegal activities, relating to the storage of various hazardous chemicals used in water purification industry, and the development of an associated Operational Phase EMP for incorporation into an ISO 14001 EMS.
2007-03 to 2008-02 Team member	Overhead power lines between Ha Lejone and the Liphobong and Kao diamond mines: Assisted in the compilation of an Environmental Impact Assessment for a 38km, 132kV overhead power line and associated step-up and step-down substations.
2007-01 to 2011-12 Lead consultant & Environmental Control Officer	Keurbooms River Raw Water Pipeline, Plettenbergbay: Appointed by the Bitou municipality to provide <i>ad hoc</i> environmental planning and undertake routine audits and compliance monitoring of the implementation of the EMP and ROD conditions of approval for the installation of a 9km, raw water pipeline and the rehabilitation of the construction servitude on completion.
2007-01 to 2009-02 Team member	Independent review of EIA applications: Appointed by Department of Environmental Affairs and Tourism to assist in the review of various Section 22 EIA applications in terms of the Environmental Conservation Act (Act 73 of 1989) for the Department of Economic Affairs, Environment & Tourism (DEAET).
2006-05 to 2007-06 Team member	Alien Vegetation Eradication and Rehabilitation Plan Fancourt Golf Estate: Appointed by Fancourt Golf and Country Estate to formulate an alien vegetation eradication and rehabilitation plan (Afromontane Forest) for their landholding on the Malgas River.
2004-03 to 2007-03 Team member	Berg Water Project, Franschhoek, South Africa: Seconded by Ninham Shand to Berg River Consultants (BRC) as full time Environmental Monitor. Project entailed the construction of bulk water supply infrastructure to service the greater Cape Town Metropolitan area which is comprised of the Berg River Dam, large diameter water transfer pipelines, two heavy duty pump stations, scheme control centre, balancing dam, several gauging weirs, diversion weir, asphalt access road and an eighty unit residential village and associated bulk services. Daily personal responsibilities included: <ul style="list-style-type: none"> • Construction supervision, • Environmental monitoring and reporting, • Review and assistance with construction method statements, • Monitoring health and safety aspects and legal compliance, and • Investigating and advising internal and external entities on environmental issues.

EMPLOYMENT RECORD:

2009 to date	Senior Environmental Practitioner, Aurecon, George, South Africa: Assisting with the compilation of Environmental Impact Assessments (EIA's) and Environmental management Plans (EMP's). Other duties include the compiling project proposals, compilation of construction phase Environmental Management Plans, compliance monitoring and ad hoc environmental regulatory processes and planning.
2007 - 2009	Junior Environmental Practitioner, Ninham Shand, George, South Africa: Assisting with the compilation of Environmental Impact Assessments (EIA's) and Environmental management Plans (EMP's). Other duties include construction phase Environmental Management Plan compliance monitoring and ad hoc environmental regulatory processes and planning.
2004 - 2007	Contract Environmental Practitioner, Berg River Consultants, Cape Town, South Africa: Seconded by Ninham Shand to Berg River Consultants (BRC) as full time Environmental Monitor for the Berg Water Project entailing the construction phase related environmental management, monitoring and supervision. Experience was gained in report writing, data capture and assessment, environmental monitoring techniques, contract administration and general ad hoc problem solving.
2003 - 2003	Student lecturer at PE Technikon, Saasveld Campus: Lectured first year forestry students on the history of forestry in South Africa.
2002 - 2002	Silvicultural surveyor and research assistant, Government of Manitoba, Manitoba, Canada: Conducting Forest Regeneration and Free-to-Grow surveys in replanted forest areas and later, undertaking stem-rot surveys, assessments and data collection for pockets of indigenous boreal forest. During this period, experience was gained in surveying and mapping techniques, general orienteering involving the use of maps, compasses, GPS's, satellite and aerial imagery.
2002 - 2002	Trainee Forester, Jonkersberg Plantation, SAFCOL / MTO (South African Forestry Company Limited / Mountain to Ocean), Western Cape, South Africa: Exposure to most aspects of plantation management with a focus on borrow-area

rehabilitation planning and herbicide research on Pampas Gras (*Cortaderia selloana*).

2000 - 2000

Trainee Forester, Jessievale Plantation, SAFCOL, Lothair, Mpumalanga, South Africa: General plantation management, with a particular focus on silvicultural and harvesting operations in pine, saw-timber stands. Broader experience was also gained in the areas of fire protection, prevention and combat, as well as occupational health and safety management (NOSA) within the forestry context.

EDUCATION:

Tertiary education:

- 2005: M-Phil (Environmental Management), University of the Freestate
- 2003: B-Tech (Forestry) P.E. Technikon, Saasveld, George, South Africa
- 2002: N-Dip (Forestry), P.E. Technikon, Saasveld, George, South Africa

Research projects:

- Killick. P. 2005. "An investigation into the control of sedimentation of the Berg River as a result of construction activities through the optimisation of settling ponds located within the dam basin and the use of chemical flocculants". Mini-dissertation submitted in partial fulfilment of the requirements for the degree of Masters of Philosophy, University of the Freestate, Bloemfontein, South Africa.

Short courses:

- 2013: Susop® Level 1 Participant Training
- 2012: Workshop on creative and constructive conflict resolution
- 2009: Basic Principles of Ecological Rehabilitation and Mine Closure

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

- Member of the International Association for Impact Assessment South African Affiliate (IAIASa)

COUNTRIES OF WORK EXPERIENCE:

- | | |
|--------------|-----------------------|
| • Canada | • South Africa |
| • Mozambique | • Tanzania (Zanzibar) |
| • Namibia | |

LANGUAGES:

Language	Speaking proficiency	Reading proficiency	Writing proficiency
English	Excellent	Excellent	Excellent
Afrikaans	Fair	Fair	Fair

Curriculum vitae: Mr DJ PRETORIUS

Name : **PRETORIUS, DIRK JACOBUS**
Date of Birth : 17 May 1986
Profession/Specialisation : Environmental Scientist
Years with Firm : 2
Nationality : South African
Years of experience : 5

Key qualifications

Dirk is an environmental scientist with Aurecon's Environment and Advisory Services unit in George. He has worked on various projects comprising environmental impact assessments (EIA) for renewable energy projects in the Northern, Eastern and Western Cape Provinces and the compilation of environmental reports to obtain authorisation from government departments. His international experience includes environmental input in to the development of a master plan for the Mtwara/Mikindani Municipality in Southern Tanzania to support the Spatial Development Initiative on the Mtwara Gas to Industry project. He also gained valuable experience as Environmental Assessment Practitioner working on a myriad of environmental impact assessments (EIA) and applications for a reverse osmosis desalination plant at Port Nolloth, a road upgrade in Garies, several sewage and waste facility applications in the Northern Cape and an application for upgrading Laingville Waste Water Treatment Works (WWTW) in the Western Cape.

Dirk obtained a BSc (Hons) Conservation Ecology degree from Stellenbosch University and is working towards becoming an Environmental Impact Assessment (EIA) Specialist in multi-sectorial and multi-disciplinary fields within Africa.

Employment record

08/2012 - Date Aurecon, Environmental Scientist
03/2010 - 07/2012 Enviro Logic, Environmental Assessment Practitioner

Experience record

Master plan for the Mtwara/Mikindani Municipality (Mtwara District, Southern Tanzania) 09/2014 - Date. *Environmental Scientist.* This project consisted of an environmental screening and baseline study to inform the development of a master plan for the Mtwara/Mikindani Municipality in to support the Spatial Development Initiative on the Mtwara Gas to Industry project. Responsible for environmental input. Involved for 1 person-month. (Development Bank of South Africa).

Cost estimate of solid waste management for Beaufort West Municipality (Western Cape Province, South Africa) 07/2014. *Project Staff.* The project entailed the cost estimate of solid waste management for the Beaufort West Municipality. Responsible for site visits and report write-up. Involved for 0.2 person-months. (Mubesko Africa).

Cost estimate of solid waste management for Swellendam Municipality (Western Cape Province, South Africa) 07/2014. *Project Staff.* The project entailed the cost estimate of solid waste management for the Swellendam Municipality. Responsible for site visits and report write-up. Involved for 0.2 person-months. (Mubesko Africa).

Cost estimate of solid waste management for Magareng Municipality (Northern Cape Province, South Africa) 07/2014. *Project Staff.* The project entailed the cost estimate of solid waste management for the Magareng Municipality. Responsible for report write-up. Involved for 0.2 person-months. (Mubesko Africa).

Three proposed solar power facilities for Namibia (Namibia) 05/2014 - 08/2014. *Project Staff.* To address the energy demand and diversify supply, NamPower intends to generate solar power at three proposed 10MW PV facilities at separate locations in Namibia namely, Mariental, Omaruru and Okahandja. Aurecon was appointed to undertake a multicriteria decision making (MCDM) process to select the three preferred sites to consider in the environmental impact assessment (EIA). An environmental management plan (EMP) was also compiled to ensure that all potential socio-economic and biophysical impacts would be mitigated as far as possible. Responsible for non-technical summaries of EIA and summary of specialist reports. Involved for 0.1 person-months. (NamPower).

Relocation of Diageo's bottling plant (KwaZulu-Natal Province, South Africa) 03/2014 - Date. *Project Staff.* This project entailed an environmental screening of four potential development sites, two in Kwazulu-Natal and two in Gauteng, for the relocation of Diageo's bottling plant currently at Isipingo. Responsible for the legislative review of preferred alternative sites. Involved for 0.2 person-months. (Diageo Great Britain Limited).

Environmental impact assessment (EIA) for Wolf Wind Farm (Eastern Cape Province, South Africa) 09/2013 - Date. *Environmental Scientist.* Full scoping and environmental impact assessment for the Wolf Wind Farm near Wolwefontein in the Eastern Cape Province. Responsible for site visits, report write-up, managing specialists and public participation. Involved for 2 person-months. (Juwi Renewable Energies (Pty) Ltd).

Environmental impact assessment (EIA) for Outeniqua Wind Farm (Western Cape Province, South Africa) 08/2013 - Date. *Environmental Scientist.* The project comprised of a full scoping and environmental impact assessment (EIA) for the Outeniqua Wind Farm near Uniondale in the Western Cape Province. Responsible for site visits, report write-up and public participation. Involved for 2 person-months. (Juwi Renewable Energies (Pty) Ltd).

Environmental impact assessment (EIA) for Namies Wind Farm (Northern Cape Province, South Africa) 05/2013 - Date. *Environmental Scientist.* The project entailed a full scoping and environmental impact assessment (EIA) for the Namies Wind Farm near Aggeney's in the Northern Cape Province. Responsible for site visits, report write-up, managing specialists and public participation. Involved for 2 person-months. (Juwi Renewable Energies (Pty) Ltd).

Proposed geometric improvements on national route 2 (N2) section 7 between Hoekwil and Kleinkrantz (Western Cape Province, South Africa) 11/2012 - 12/2012. *Public Participation Facilitator.* Facilitation of the public participation process (PPP) with regards to the proposed geometric improvements on national route 2 (N2) section 7 between Hoekwil (km 39.4) and Kleinkrantz (km 42.0). Responsible for the facilitation of the public participation process (PPP). Involved for 0.2 person-months. (Vela VKE and SANRAL).

Environmental authorisation and operational environmental management programme for the Garden Route Casino in Mossel Bay (Western Cape Province, South Africa) 11/2012 - 12/2012. *Project Staff.* The project involved an external environmental compliance audit report for the environmental authorisation and operational environmental management programme for the Garden Route Casino in Mossel Bay. Responsible for the costing, proposal and on-site audit of the environmental management plan (EMP) and compilation of the audit report. Involved for 0.3 person-months. (Garden Route Casino).

Cost estimate of solid waste management for Swellendam Municipality (Northern Cape Province, South Africa) 09/2012. *Project Staff.* The project entailed the cost estimate of solid waste management for the Swellendam Municipality. Responsible for site visits and report write-up. Involved for 0.2 person-months. (Swellendam Municipality and Mubesko Africa CC).

Bitou Municipality environmental management framework (EMF) (Northern Cape Province, South Africa) 08/2012 - Date. *Project Staff.* The project entailed the compilation of an environmental management framework (EMF) for the Bitou Municipality. Responsible for data capturing and attending meetings. Involved for 0.2 person-months. (Bitou Municipality).

Cost estimate of solid waste management for Hantam Municipality (Northern Cape Province, South Africa) 08/2012. *Project Staff.* The project entailed a cost estimate of solid waste management for Hantam Municipality. Responsible for the report review and submission. Involved for 0.1 person-months. (Hantam Municipality and Mubesko Africa CC).

Re-gravelling and maintenance of sections of divisional roads, main roads and minor roads in the Western Cape (Western Cape Province, South Africa) 08/2012 - Date. *Project Staff.* The compilation of an environmental management plan (EMP) as the basis for seeking authorisation from the Department of Mineral Resources (DMR) for various material sources identified for use in proposed maintenance and re-gravelling projects. Responsible for the compilation of the environmental management plan (EMP). Involved for 3 person-months. (Western Cape Provincial Department of Transport and Public Works).

Cost estimate of solid waste management for Beaufort West Municipality (Northern Cape Province, South Africa) 08/2012. *Project Staff.* The project entailed the cost estimate of solid waste management for

the Beaufort West Municipality. Responsible for site visits and information review. Involved for 0.2 person-months. (Beaufort West Municipality and Mubesko Africa CC).

Upgrading of Laingville Waste Water Treatment Works (WWTW) (Western Cape Province, South Africa) 11/2011 - 07/2012. *Environmental Assessment Practitioner.* The project entailed the upgrade of the existing Laingville Waste Water Treatment Works (WWTW) to accommodate a hydraulic capacity of 1825 m³/day. The upgrade included the construction of an additional pipe at the inlet works, an additional anoxic reactor, removal of the existing aerators and installation of higher aeration efficient aerators, the reinstating of the secondary clarifier, the construction of an additional maturation pond, the abandonment of the existing chlorination building and construction of a new building and contact channels at the outlet of the proposed maturation pond and the construction of proposed sludge drying beds. Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping and environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 2 person-months. (Element Consulting Engineers and Saldanha Bay Municipality).

Road upgrading and mining permits (Northern Cape Province, South Africa) 07/2011 - 07/2012. *Environmental Assessment Practitioner.* The project entailed the upgrading of the DR2963 road from the N7 National road for approximately 11 km towards Klipfontein and the upgrading of the OG120 road for about 8 km towards the MR 739 (Garies - Hondeklipbaai road), the upgrading of the MR 739 road from the connection for 54 km towards Hondeklipbaai and the upgrading of the access road in Hondeklipbaai for approximately 1.3 km to link up with Wag Way Street. Material sources included five new identified quarry sites in close proximity to the road. Responsible for the compilation of key documents relating to the basic assessment report (BAR), including background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP) including holding of workshops, participation in meetings with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Port Nolloth sewage facility (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project comprised the construction of sewer oxidation and evaporation ponds as well as a 1.7 km sewer pipeline and pump station. Services included scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Sanddrift sewage facility (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project involved the construction of sewer oxidation and evaporation ponds as well as a 1.3 km sewer pipeline and pump station. Installation of a 4 km sewer network in Sanddrift and an access road of 0.6 km towards the sewage facility. Services included scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with Interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Eksteensfontein solid waste disposal sites (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project comprised the construction of a 3.3 ha general waste disposal facility and a 0.05 km access road. Services included, scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Kuboes sewage facility (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental*

Assessment Practitioner. The project entailed the construction of sewer oxidation and evaporation ponds as well as a 1.1 km sewer pipeline and pump station. Services included scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Lekkersing solid waste disposal sites, scoping and environmental impact report (EIR) (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project involved the construction of a 2.8 ha general waste disposal facility and a 0.95 km access road. Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers/ Richtersveld Municipality).

Kuboes solid waste disposal sites (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project involved the construction of a 5.9 ha general waste disposal facility and a 0.2 km access road. Services included, scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers/ Richtersveld Municipality).

Sanddrift solid waste disposal sites (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project entailed the construction of a 7.7 ha general waste disposal facility and a 0.3 km access road. Services included, scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Port Nolloth solid waste disposal sites (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project comprised the construction of a 26 ha general waste disposal facility and a 0.9 km access road. Services included, scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Eksteensfontein sewage facility (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project involved the construction of sewer oxidation and evaporation ponds as well as a 1.7 km sewer pipeline, a sewage pump station and 0.4 km access road. Services included scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Lekkersing sewage facility (Northern Cape Province, South Africa) 10/2011 - 06/2012. *Environmental Assessment Practitioner.* The project comprised the construction of sewer oxidation and evaporation ponds as well as a 1.2 km sewer pipeline, a sewage pump station and 0.3 km access road. Services included

scoping and an environmental impact report (EIR). Responsible for the compilation of key documents relating to the environmental impact assessment (EIA), scoping, environmental impact report (EIR), background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP), consultation with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 3 person-months. (BVI Consulting Engineers and Richtersveld Municipality).

Lepelsfontein water supply pipeline (Northern Cape Province, South Africa) 11/2010 - 06/2011. *Environmental Assessment Practitioner.* This project entailed the construction of a 2.5 km underground water supply pipeline from two existing boreholes to the existing raw water reservoirs. Services also included the building of air- and scour valve chambers along the pipeline route. Responsible for the compilation of key documents relating to the basic assessment report (BAR), including bid's, environmental management plan (EMP)'s, public participation process (PPP) including holding of workshops, participation in meetings with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 2 person-months. (BVI Consulting Engineers and Kamiesberg Municipality).

Reverse osmosis and a basic assessment of a Desalination Plant (Northern Cape Province, South Africa) 09/2010 - 02/2012. *Environmental Assessment Practitioner.* The installation of 1.5 mega litre/day reverse osmosis seawater desalination plant to supplement the potable water supply of Port Nolloth. The proposed desalination plant will provide 1.5 ML of fresh water per day when running at full capacity. This will require abstracting about 3.8 ML (182m³/h) of water from the sea through a series of beach wells, of which about 2.3 ML will be returned to the sea as concentrated seawater. Responsible for the compilation of key documents relating to the basic assessment report (BAR). Including background information documents (BID)'s, environmental management plan (EMP)'s, public participation process (PPP) including holding of workshops, participation in meetings with interested and affected parties (I&Aps) and compilation of comment and response forms. Also responsible for the compilation of advertisements and site notices, mapping and background research. Involved for 5 person-months. (BVI Consulting Engineers/ Richtersveld Municipality).

Education

2010 : BSc (Hons) Conservation Ecology, Stellenbosch University, South Africa

Languages

	Reading	Writing	Speaking
English	Good	Good	Good
Afrikaans	Excellent	Good	Excellent

Publications

De Bruyn, K. and Pretorius, D.J. 2013. "Addressing contemporary recycling problems inherited from poor environmental planning in rural South Africa". Paper presented at the 2013 annual IAIA conference.

Referees

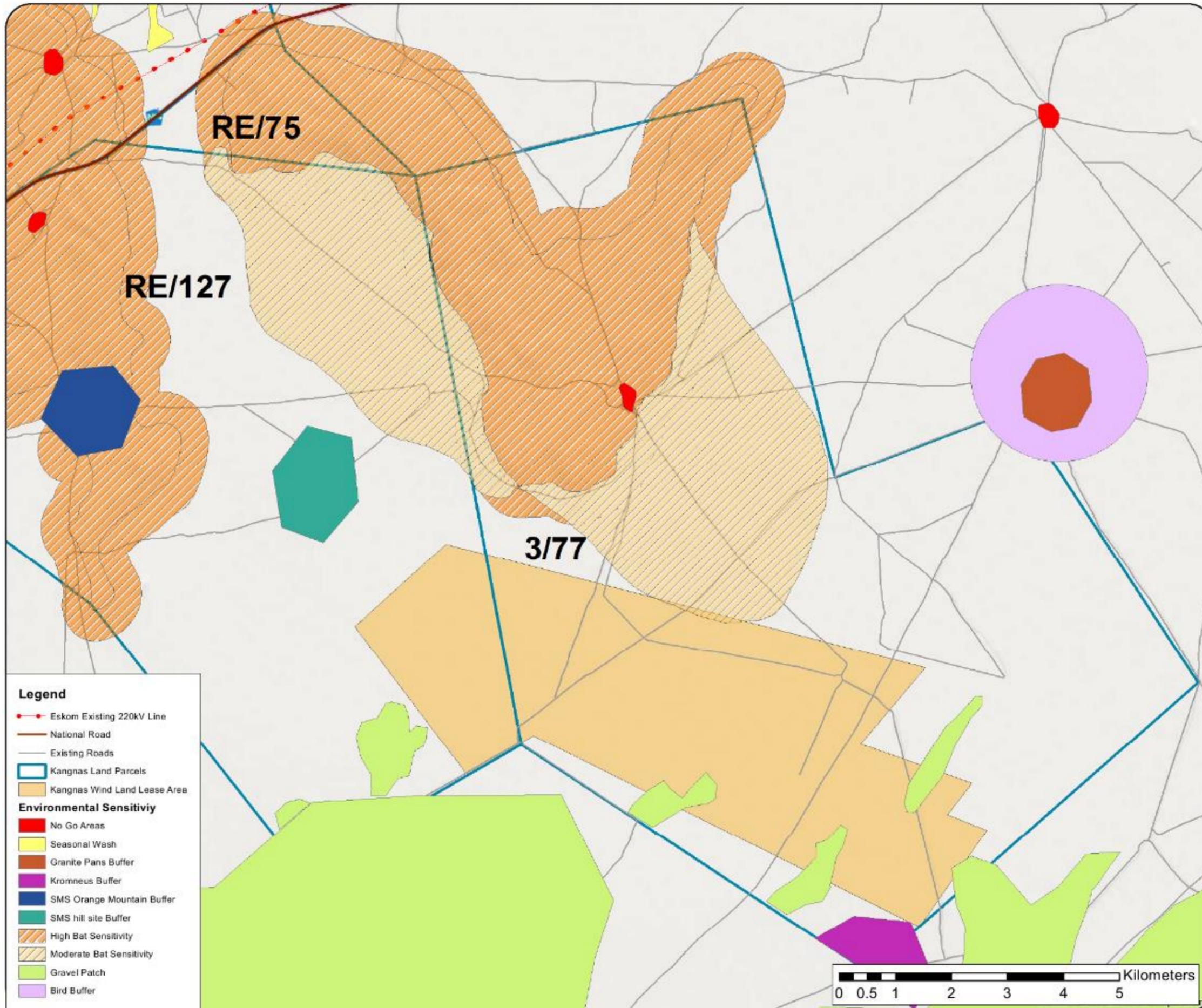
Company	Contact Person	Telephone nr.
BVi Consulting Engineers	Mr Maritz Myburgh	+27 27 712 9990
Element Consulting Engineers	Mr Mark Marais	+27 83 728 3180
Garden Route Casino (Pty) Ltd	Mr Alwyn Maasz	+27 44 606 7519
Juwi Renewable Energies (Pty) Ltd	Mr Mark van Niekerk	+27 21 831 6131
Kamiesberg Municipality	Mr Gert Maarman	+27 27 652 8000
Richtersveld District Municipality	Mr Joseph Cloete	+27 82 898 78 53
Saldanha Bay Municipality	Mr James Fortuin	+27 22 701 7000
Vela VKE	Mr George Küstner	+27 21 417 2916
Western Cape Department of Transport and Public Works	Mr Llewellyn Truter	+27 21 483 2020

By my signature below I certify the correctness of the information above and my availability to undertake this assignment.

Signature of Staff Member

Date

ANNEXURE F MAPS AND DRAWINGS



Legend

- Eskom Existing 220kV Line
- National Road
- Existing Roads
- Kangnas Land Parcels
- Kangnas Wind Land Lease Area

Environmental Sensitivity

- No Go Areas
- Seasonal Wash
- Granite Pans Buffer
- Kromneus Buffer
- SMS Orange Mountain Buffer
- SMS hill site Buffer
- High Bat Sensitivity
- Moderate Bat Sensitivity
- Gravel Patch
- Bird Buffer

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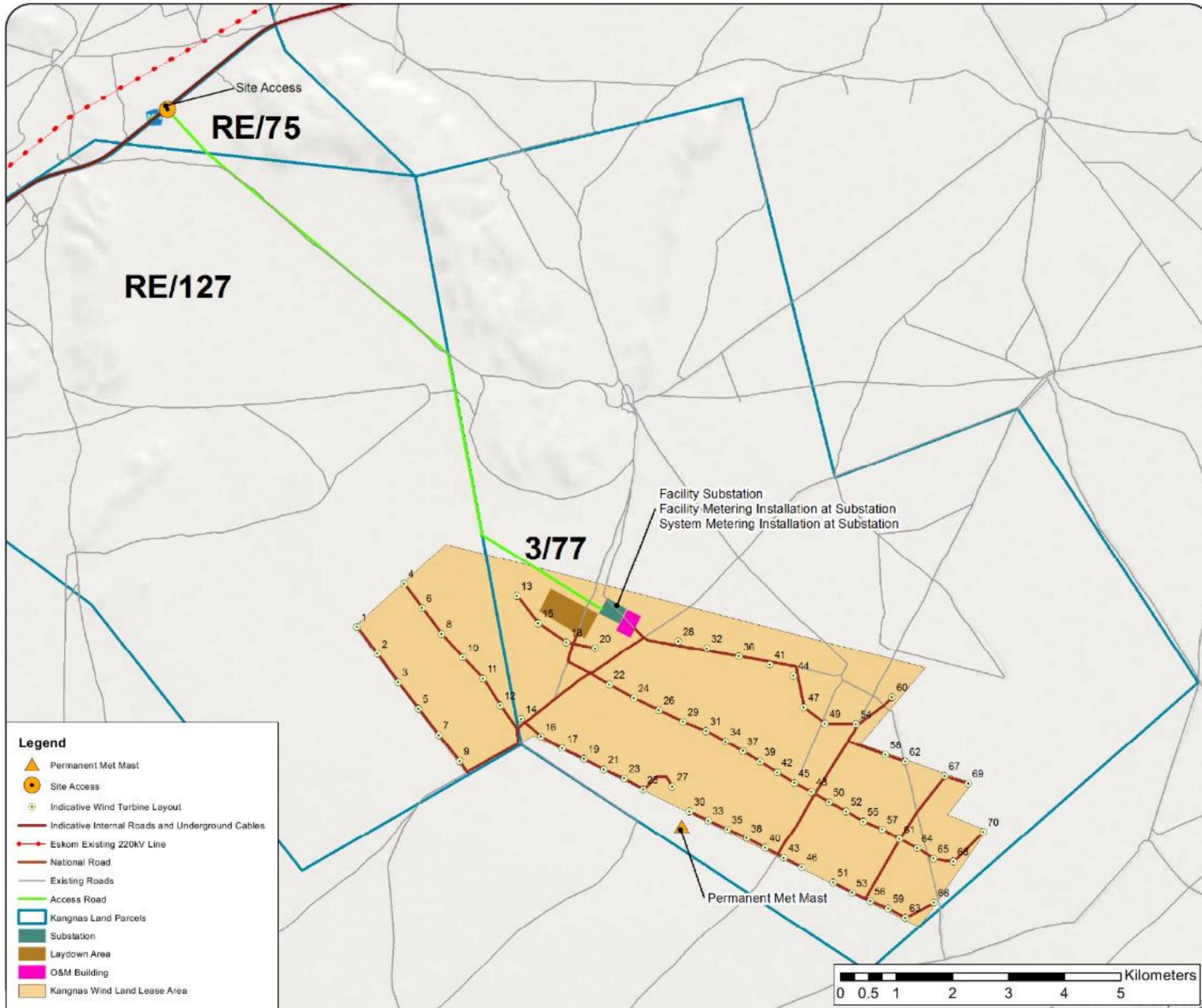
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 X-Coordinate: 18.359
 Y-Coordinate: -29.8177

Revision:
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Scale on A3:
Reference: WGS84 UTM ZONE 34S
 Created By: DAVID DEAN
 Checked By: SHELDON VANDREY
 Date: 20 NOVEMBER 2015

Project:
Kangnas Wind Farm

Map Title:
Environmental Sensitivity



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Site Coordinates:
 X-Coordinate: 18.359
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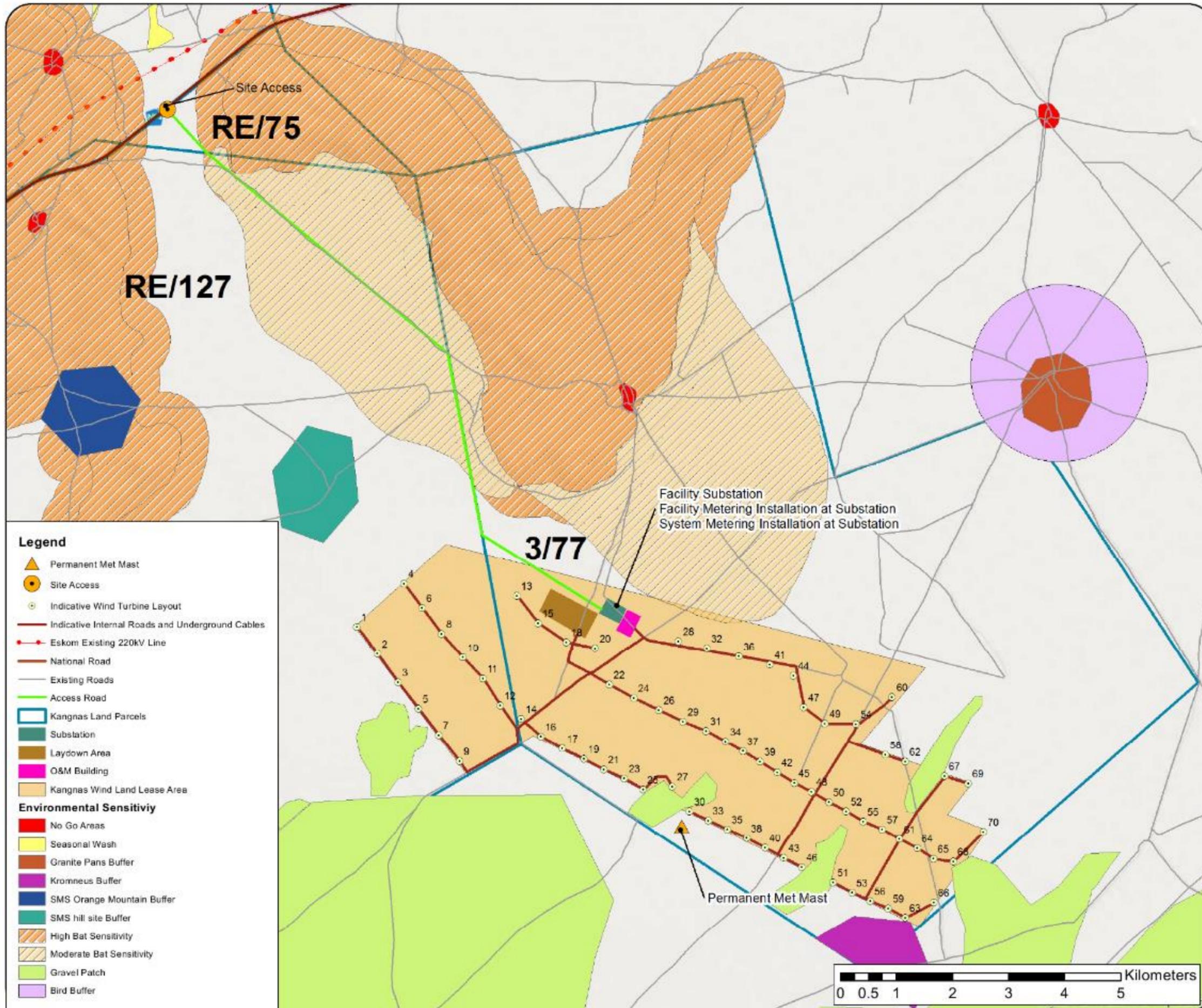
Revision:
 None

Scale on A3:
 Reference: WGS84 UTM ZONE 34S
 Created By: DAVID DEAN
 Checked By: SHELDON VANDREY
 Date: 20 NOVEMBER 2015

Project:
Kangnas Wind Farm

Map Title:
Project Layout





Legend

- Permanent Met Mast
- Site Access
- Indicative Wind Turbine Layout
- Indicative Internal Roads and Underground Cables
- Eskom Existing 220kV Line
- National Road
- Existing Roads
- Access Road
- Kangnas Land Parcels
- Substation
- Laydown Area
- O&M Building
- Kangnas Wind Land Lease Area

Environmental Sensitivity

- No Go Areas
- Seasonal Wash
- Granite Pans Buffer
- Kromneus Buffer
- SMS Orange Mountain Buffer
- SMS hill site Buffer
- High Bat Sensitivity
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Site Coordinates:
 X-Coordinate: 18.359
 Y-Coordinate: -29.8177

W N E S

BOTSWANA MOZAMBIQUE
 Gaborone Pretoria Maseru
 SOUTH AFRICA
 Cape Town
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Revision: None

Scale on A3:
 Reference: WGS84 UTM ZONE 34S
 Created By: DAVID DEAN
 Checked By: SHELDON VANDREY
 Date: 20 NOVEMBER 2015

Project:
Kangnas Wind Farm

Map Title:
Project Layout and Environmental Sensitivities

MAINSTREAM RENEWABLE POWER