Development of the Kokerboom 3 Wind Energy Facility, battery energy storage system and associated Infrastructure on Farms 1/214 and 2/214, Near Loeriesfontein in the Northern Cape

Scoping Report
Reference: 508620

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NEMA requirements for Scoping Reports		
Appendix 2	**Content as required by NEMA**	**Section/Chapter**
2 (1)	A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assess process, and must include –	
(a)	(i) details of the EAP who prepared the report; and	Control sheet, Section 1.5, Annexure A
	(ii) details of the expertise of the EAP to carry out scoping procedures.	
(b)	the location of the activity, including-	Section 1.2, and Chapter 4.
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Section 1.2,1.3 and Chapter 4
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including-	Chapter 4
	(i) all listed and specified activities triggered;	Section 2.2
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Chapter 4.
(e)	a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Chapter 2
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 4.4
(g)	a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including -	Chapter 5.
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 3.2, Section 3.3, Annexure C
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 3.4, Annexure C
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 5.
	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Chapter 6.
	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Annexure F.1 Section 3.3

	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 6, Section 7.1
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Chapter 6. Section 7.1
	(ix) the outcome of the site selection matrix;	Chapter 5
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Chapter 5
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Chapter 5 and Chapter 7, Annexure F.1
(h)	a plan of study for undertaking the environmental impact assessment process to be undertaken, including-	Annexure F
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	
	(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;	
	(iii) aspects to be assessed by specialists;	
	(iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists;	
	(v) a description of the proposed method of assessing duration and significance;	
	(vi) an indication of the stages at which the competent authority will be consulted;	
	(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and	
	(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;	
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts determine the extent of the residual risks that need to be managed and monitored.	
(i)	an undertaking under oath or affirmation by the EAP in relation to-	Annexure A
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(j)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	
(k)	where applicable, any specific information required by the competent authority; and	Email correspondence from the Department Forestry, Fisheries and Environment form part of Annexure B.
(l)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A
(2)	Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a scoping report, the requirements as indicated in such notice will apply.	

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GLOSSARY OF TERMS

Environment	The surroundings (biophysical, social and economic) 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 wellbeing.
Environmental Impact Assessment (EIA)	A study of the environmental consequences of a proposed course of action.
Environmental Impact Assessment Report	A report assessing the potential significant impacts as identified during the Scoping Phase.
Environmental impact	An environmental change caused by some human act.
Environmental Management Programme (EMPr)	A document that provides procedures for mitigating and monitoring environmental impacts, during the pre-construction, construction, operation and decommissioning phases.
Public Participation Process	A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.
Scoping	A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail.
Scoping Report	A scoping report contains all the information that is necessary for a proper understanding of the nature of issues identified during scoping.
Wind Turbine	A wind turbine is a rotary device that extracts energy from the wind.

ABBREVIATIONS

BID	Background Information Document
BVI	Business Venture Investments No.1788 (Pty) Ltd
BW	Bidding Window
CAA	Civil Aviation Authority
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
COP	Convention of the Parties
CRR	Comments and Response Report
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DENC	Department of Environment and Nature Conservation
DFFE	Department of Forestry, Fisheries and the Environment

DM	District Municipality
DoE	Department of Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EAR	Enviro Acoustic Resources
ECA	Environmental Conservation Act (Act 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
EMF	Environmental Management Framework
GN	Government Notice
I&APs	Interested and Affected Parties
IDZ	Industrial Development Zone
IEIM	Integrated Environmental Information Management
IPP	Independent Power Producer
IRP	Integrated Resource Plan
LM	Local Municipality
MTS	Main Transmission Substation
NBKB	Ngwao Boswa Kapa Bokone Northern Cape Provincial Heritage Resources Authority
NCDAERL	Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform
NCNCA	Northern Cape Nature Conservation Act (Act 9 of 2009)
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (No. 25 of 1999)
NRTA	National Road Traffic Act (Act 93 of 1996)
NWA	National Water Act (Act 36 of 1998)
PPP	Public Participation Process
REFIT	Renewable Energy Feed-In Tariffs
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SACNSP	South African Council for Natural Scientific Professions
SDF	Spatial Development Framework
SKA	Square Kilometre Array
ToR	Terms of Reference
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WEF	Wind Energy Facility
WESSA	Wildlife and Environment Society of South Africa

UNITS OF MEASUREMENT

c/kWh	Cent per kilowatt hour
GW	Gigawatt
GWh	Gigawatt hours
ha	Hectares
kL	Kilolitre
km	kilometres
Km/h	Kilometre per hour
kV	Kilovolt
Mm	millimetre
m/s	Metres per second
MW	Megawatts
Rpm	Revolutions per minute

1 INTRODUCTION AND BACKGROUND

1.1 Renewable Energy in South Africa

South Africa's electricity sector is based largely on old and "dirty"[1], emission-intensive coal-fired power, which makes South Africa the world's 14th largest emitter of greenhouse gases (GHGs) (Timperley & McSweeney, 2018) and the second highest CO_2 emitter per capita, behind Russia (which is a cold climate country), when compared with the BRICS countries (Our World in Data, 2017). Eskom currently relies on fossil-fuels to produce approximately 86.97% (World Atlas, 2016) of the country's electricity, using over 90 million tonnes of coal per annum (Eskom, Understanding Electricity, 2019). Many of South Africa's coal fired power stations are approaching end-of-life and will soon need be decommissioned and the capacity replaced. Despite South Africa's high per capita CO_2 levels, the country also suffers with a high level of extreme poverty, inequality and underdevelopment and is in desperate need for further economic development and upliftment.

South Africa therefore experiences major challenges. It has a clear need to continue to develop the country on socioeconomic grounds and lift people out of poverty, which requires more energy, but absolute imperative to curb its high CO_2 per capita emissions rates. Add to this that South Africa's energy supply is currently highly constrained, it has a growing population that is increasing demand through ongoing electrification programmes leading to an oversubscribed power supply and the sporadic need for load shedding. This harms the country's economy, discourages investment and furthers the country's coal burning addiction. New generation capacity is urgently needed to bridge the current shortfall in the short term, as well as to supply long-term energy security to support a growing economy. It is hard to motivate for any other form of generation other than renewables that can quickly, and cost effectively fill this gap while meeting our CO_2 emission reduction commitments and creating a diversified energy supply. This is because it only takes on average two years or less from construction to operation for winds farms and the lowest cost of energy for a wind farm in the last REIPPPP round (round 4) in south African came in at under 60c/ kWh. Nuclear is another low carbon option of producing electricity but it has very long lead times, and at present would take the form of a large-scale project which have significant lead times, upfront costs and related debt burden for the government (a plethora of economic considerations) and is thus not a quick or short to medium term solution. This is recognised in the government's latest 2019 Integrated Resource Plan (IRP2019), as detailed below, which has more wind energy planned between now and 2030 than any other energy source and no nuclear (except extension of the design life of Koeberg) up to the 2030 horizon. In the longer term (beyond 2030), the coal power stations will need to be replaced with low carbon options, which will likely continue to include renewables, but also nuclear (as baseload), gas and diesel. Eskom recognises that "it is crucial that the private sector plays a role in addressing the future electricity needs of the country. This will reduce the funding burden on Government, relieve the borrowing requirements of Eskom and introduce generation technologies that Eskom may not consider part of its core function" (Eskom, Guide to Independent Power Producer (IPP) processes, 2019).

For these reasons South Africa has turned to renewable energy over conventional fossil fuel-based energy generation. Nuclear and renewable energy, including wind, solar, hydro and biogas, provide a lower impact alternative to the conventional coal-based electricity generation methods, as far as the global warming crisis is concerned, and can also contribute to a range of socioeconomic benefits which contribute to the country's economic development imperatives.

The government began exploring feed-in tariffs (FITs) for renewable energy in 2009 but according to the PPIAF and World Bank Group Report on 'South Africa's Renewable Energy IPP Procurement Program' (PPIAF, 2014), these were later rejected in favour of competitive tenders for commercial scale projects. The resulting program, now known as the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), has successfully channelled substantial private sector expertise and investment into grid-connected renewable energy in South Africa at competitive prices. Thus far the REIPPPP, in line with the Integrated Resource Plan

[1] Associated with the burning of lower grade coals and outmoded technologies.

(IRP2010) have procured 6,422MW of new renewable power from 112 Independent Power Producers (IPPs) and installed just over 3,776 MW of it (SAWEA, 2019). The REIPPPP's contribution to South Africa's climate change objectives so far is a reduction of 33.2 million tonnes or CO^2 (by 31 December 2018) (SAWEA, 2019) and these reductions will continue to grow as the programme rolls out. The renewable energy sector is estimated to be more employment-intensive than traditional thermal powerplants and has attracted R 209.4 billion in private sector investment (SAWEA, 2019). Additionally, renewable energy facilities (wind and solar) have been getting cheaper as the global market develops and is now cheaper in R/kWh than conventional power supplies (Coal and nuclear), as shown in research undertaken by the CSIR back in 2016 (wind and solar has become even cheaper since then) and presented in the following graph (Refer Figure 1-1).

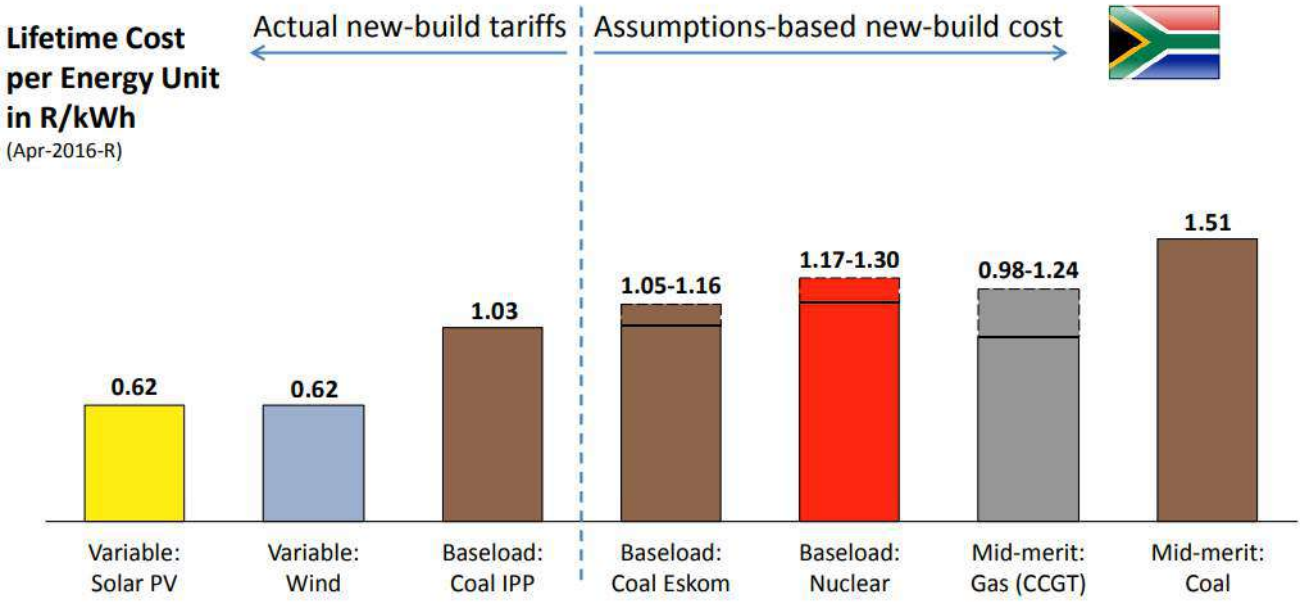


Figure 1-1: Power cost per kWh for the main generation types under consideration by South Africa (CSIR, 2016)

The drawback is that solar and wind energy are not consistent baseload power producers because the sun does not always shine (night times, cloud cover or even seasonal change) and the wind does not always blow consistently or predictably. These facilities therefore produce intermittent and variable power and often not at the times when its most needed, i.e. the daily electrical demand peaks around sun-up and sundown. These problems can be somewhat mitigated, firstly through storage (either in chemical batteries, thermal reservoirs, pump storage schemes, or other mechanisms) to level variations or bridge short periods and secondly by spreading out the renewable facilities across the country to ensure some facilities are always located somewhere where energy can be produced (i.e. the wind is blowing and/ or the sun is shining). Wind energy is better placed than solar to provide electricity during the daily 6-8a.m and 6-9p.m peaks in energy demand and this is the main reason that in the 2019 Integrated Resource place (2019) (IRP2019) there is far more new wind energy planned till 2030 than solar. Lastly one must make up the difference with peaking facilities (i.e. quick response gas and diesel turbines that can fill the demand/supply gaps). Despite all this, the country may still need additional baseload capacity in the form of new coal or nuclear beyond 2030 and 2040.

The 2010 Intergraded Resource Plan (IRP2010) for electricity set a target to source 17.8 Gigawatts (GW) of the country's electricity supply from renewable energy sources, over a 20-year period from 2010 to 2030 (Independent Power Producers Office, n.d.). The 2019 Integrated Resource place (2019) (IRP2019) was released on 18 October 2019 and includes the following capacity allocation:

- 1 500MW of new coal power (noting that there will be decommissioning of coal capacity over the period)
- 2 500MW of hydro power
- 6 000MW solar

- 14 400MW wind
- 2 000MW of storage
- 3 000MW from gas

The following chart (Refer Figure 1-2) provides a view for South Africa's energy mix between now and 2030. The Department of Energy (DoE) indicated that new nuclear capacity may come online after 2030 to replace decommissioned coal baseload and shows the central role that wind energy will play in this transformation. Wind is by far the largest planned source of new energy capacity over the next 10 years which shows that there is a strategic imperative by government for wind power and need to develop wind farms at diverse locations across the country.

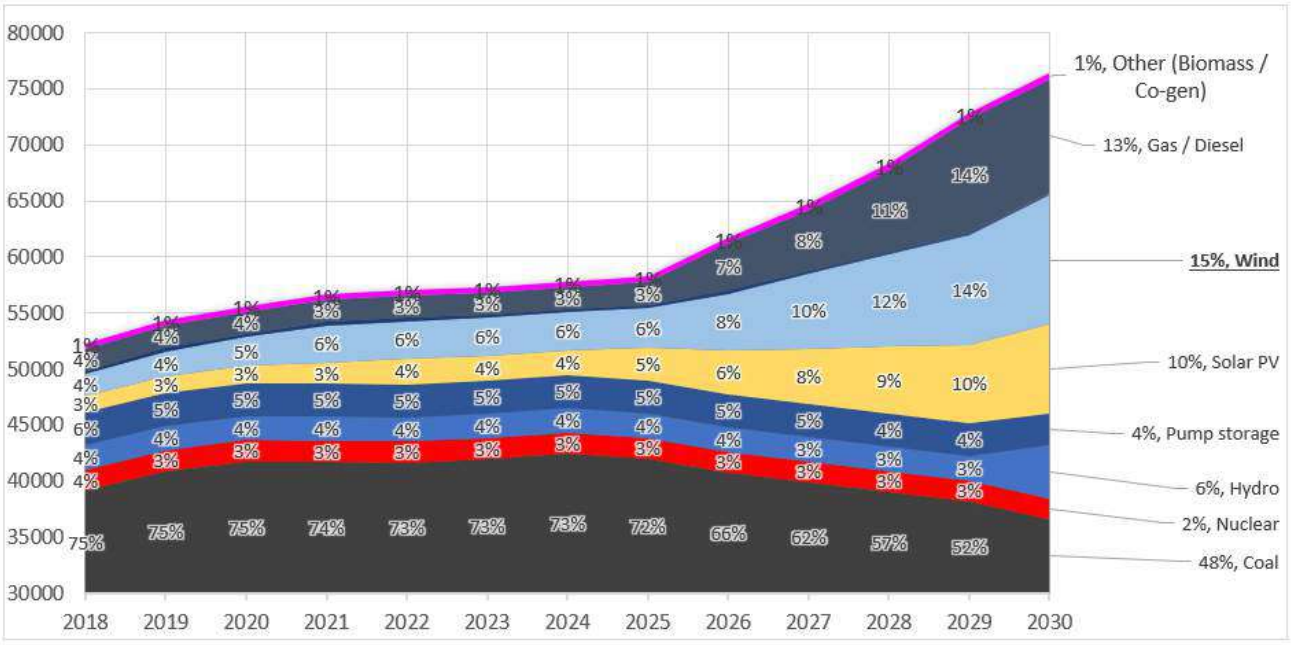


Figure 1-2: South Africa's energy mix from 2018 to 2030 based on IRP2019 figures (Integrated Resource Plan 2019, 2019)

The proposed revised Kokerboom 3 Wind Farm would, if authorised and selected as a preferred bidder, form part of the REIPPPP and contribute to the IRP 2019 targets for wind energy and much needed low carbon energy to the national grid to assist South Africa with its development objectives, a transition to a low carbon economy and its commitments to combat climate change.

Wind energy is therefore of critical and strategic importance to South Africa's in terms of its future energy mix (particularly in the short term), economic development objectives, but also in the challenge to manage emissions and global warming related climate change and the variety of potentially catastrophic global impacts associated with this.

1.2 Introducing the Project

The Proponent, *Business Venture Investments No. 2105 (Pty) Ltd (BVI)*, proposes to construct a 300MW Wind Energy Facility (WEF), known as the **Kokerboom 3 WEF**, and associated infrastructure on adjacent farms near Loeriesfontein in the Northern Cape. This Scoping Report specifically relates to the **Kokerboom 3 application.** The proposed Kokerboom 3 WEF would have a maximum generation capacity of up to 300 MW. This WEF will

be located adjacent to the authorised Kokerboom 1 ([2]DEA ref. no.: 14/12/16/3/3/2/985) and Kokerboom 2 (DEA ref.no.:14/12/16/3/3/2/986) Wind Farms.

1.3 Background

The proponent obtained environmental authorisation for the construction of the Kokerboom 3 Wind Energy Facility on 2 February 2018 (Ref: 14/12/16/3/3/2/1009), on the subject properties. The project is located approximately 50 km north of Loeriesfontein in the Northern Cape Province, directly north and west of the operational Khobab & Loeriesfontein Wind Farms respectively. Subsequently, it has been determined that the wake effects between Kokerboom 3 and the operational Khobab Wind Farm and Loeriesfontein Wind Farm will be more impactful than previously predicted during the original Kokerboom 3 EIA (when the Khobab & Loeriesfontein WEFs were not yet operational). As a result, the owner of the Kokerboom 3 project wishes to revise the wind farm layout to relocate turbines further northwards away from the operational wind farms, and at the same time split the wind farm project into two separate wind farms, namely the **Kokerboom 3** and Kokerboom 4 Wind Farms. Because it is proposed to relocate turbines outside of the area assessed in the original Kokerboom 3 EIA, the proponent was advised by the Department during a pre-application meeting on 14 July 2020 that a new Scoping & EIR process should be undertaken for the "new" Kokerboom 3 and Kokerboom 4 projects.

This application pertains to the application for the revised **Kokerboom 3** wind energy facility. A separate application will be undertaken for the proposed Kokerboom 4 WEF.

Note that the environmental authorisation for the revised Kokerboom 3 WEF (if granted), will supersede and replace the existing environmental authorisation for Kokerboom 3 (i.e. the end result will be a single authorisation for a single "Kokerboom 3" WEF on the properties)

1.4 Project description

Zutari (Pty) Ltd (formerly Aurecon South Africa (Pty) Ltd)) has been appointed to undertake the requisite environmental impact assessment (EIA) process for the "new/revised" Kokerboom 3, as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, on behalf of the Proponent.

The proposed site of the Kokerboom 3 Wind Farm is located approximately 60 kilometres (km) north of Loeriesfontein, 85 km west of Brandvlei and 160 km southeast of Springbok in the Northern Cape.

Access to the site is off the public Granaatsboskolk Road, which traverses the north-east section of the site. Three access points are proposed (one or all may be developed, given the extent of the site). For the Kokerboom 3 Wind Farm, up to 60 turbine locations are proposed to achieve the targeted generation capacity of a maximum of up to 300 MW. A facility substation, Operations & Maintenance building and a battery energy storage system (BESS) are proposed to be included as part of the Kokerboom 3 Wind Farm (Refer Figure 1-3). The Kokerboom 3 Wind Farm footprint is approximately 2,563 hectares (ha) and will be located on the farms listed in Table 1-1 below, and as illustrated in Figure 1-3.

Table 1-1 : Farm details for Kokerboom 3 Wind Farm

Name of landowner	Erf number	21-digit SG code	Name of farm	Farm Size (ha)
Gert Johannes Lombard	1/214	C01500000000021400001	Karree Doorn Pan	5,094.23
TR2 Immobilien GmbH	2/214	C01500000000021400002	Karree Doorn Pan	5,094.24

[2] DEA has had a name change to DFFE effective 1 April 2021.

Gert Johannes Lombard	RE/213	C01500000000021300000	Remainder of Aan de Karree Doorn Pan No 213	2,580 ha

The wind energy facility will be connecting to the Helios Main Transmission Substation by means of a 132 kV line (DEFF Ref. No.:14/12/16/3/3/1/1818, granted EA on 01 February 2018). This would feed into the existing national electricity grid at the Eskom Helios Main Transmission Substation located south-east of the site.

Additional ancillary infrastructure would include underground cabling between project components, onsite substation/s, foundations to support turbine towers, hardstands to support cranes at each turbine, and permanent operations/maintenance buildings, office and workshop areas. Service and access roads will be constructed in addition to upgrading existing roads, with the relevant stormwater infrastructure and gates constructed as required. The property of the proposed WEF may be enclosed with suitable fencing erected along the perimeter, if required. One or more formal laydown areas for the construction period, containing temporary site offices, storage & workshop areas, batching plant along with a guard cabin, will be established. These have been further explained in Chapter 4.

The National Department of Forestry, Fisheries and the Environment (DFFE) has indicated that each of the two proposed Kokerboom WEFs (Kokerboom 3 and 4) must be subject to its own EIA process and that separate EIA reports must be submitted to the competent authority for consideration. This report relates specifically to the Kokerboom 3 WEF.

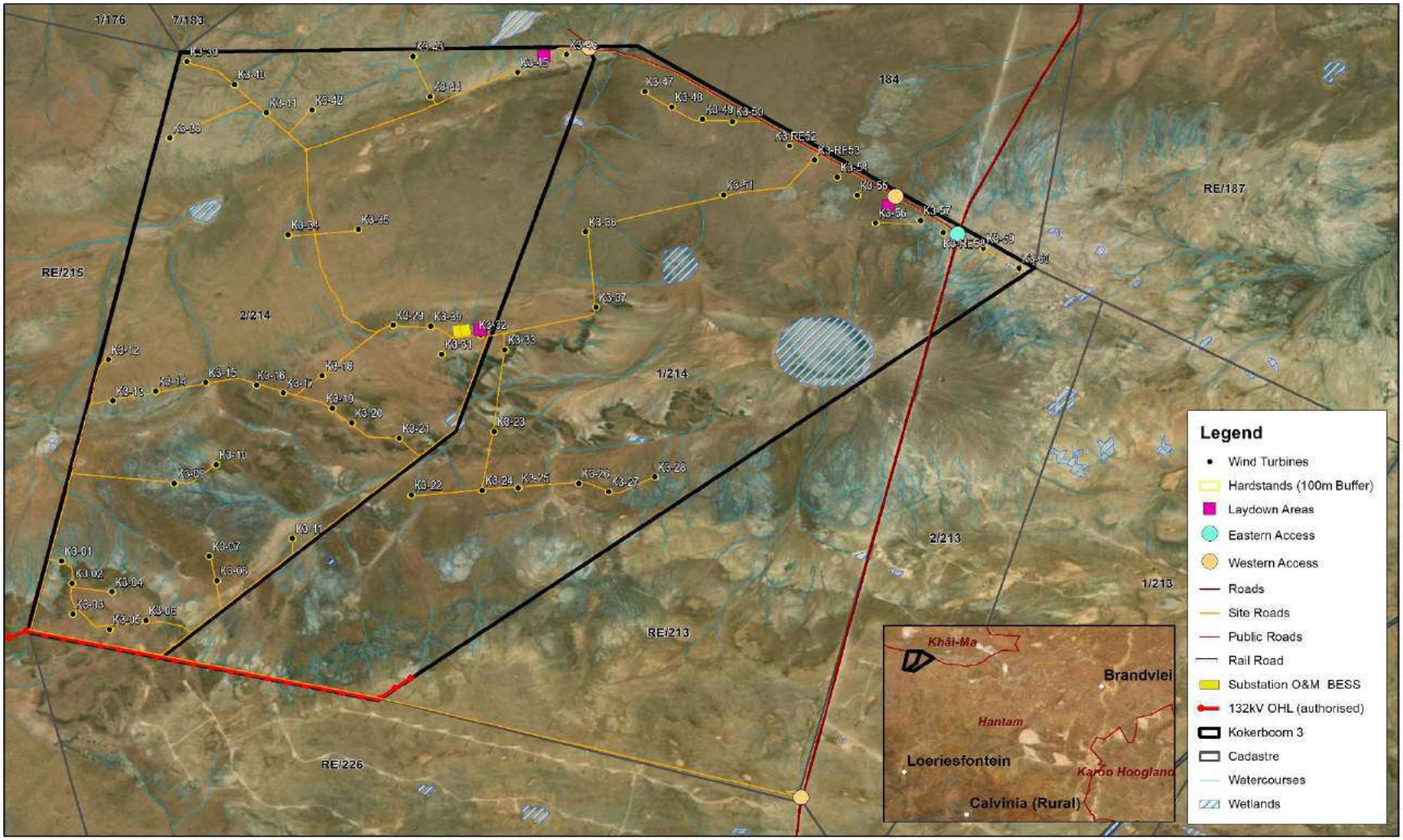


Figure 1-3: | Location of the farm portions for the proposed Kokerboom 3 Wind Farm near Loeriesfontein in the Northern Cape

In terms of the NEMA, the proposed project triggers a suite of listed activities which require authorisation from the competent environmental authority via an EIA process before they can be undertaken. Since the project is for the generation of energy, and energy projects are dealt with by the national authority, the competent authority is thus the national DFFE. DFFE's decision will be based on the outcome of this EIA process. The EIA process entails a number of phases which are further detailed below in Section 3.1.

The purpose of this Scoping Report[3] is to provide the background and outline the Plan of Study (Annexure F) proposed to be undertaken in the EIA phase. Accordingly, the Scoping Report includes the following chapters:

- Chapter 1 introduces the Kokerboom 3 WEF project in the context of the renewable energy industry in South Africa and introduces the EIA project team.
- Chapter 2 outlines an analysis of the legal framework relevant to the project.
- Chapter 3 focuses on the EIA methodology, detailing the phases of the EIA as well as the public participation process.
- Chapter 4 introduces a project description specific to the Kokerboom 3 Wind Energy Facility.
- Chapter 5 provides the alternatives that have been considered.
- Chapter 6 describes the baseline environment, i.e. current state of the environment, on site and surrounds, and highlights the potential impacts that may be caused by the project.
- Chapter 7 provides a summary of the key issues and a way forward.

A number of annexures accompany this report and include the following:

- Annexure A provides details on the Environmental Assessment Practitioners (EAP) who compiled this report.
- Annexure B provides correspondence with DEFF to date.
- Annexure C contains a Public Participation Plan which entails a comprehensive description of the public participation process and has been approved by DEFF on 29 October 2020.
- Annexure D includes specialist input, where this was submitted in a report format.
- Annexure E provides the peer review report for the reports that have been produced by Zutari.
- Annexure F stands alone as the Plan of Study for the EIR which will be used as a term of reference for each specialist during the detailed impact assessment phase of the EIA, to follow.

1.5 EIA Project Team

Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners in order to execute this project in a professional and unbiased manner. Please refer to Table 1-2 : EIA Project TeamTable 1-2 for a list of the team. Full CVs of the EIA and Project Management team are available in Annexure A. Should a CV of a Specialist be required that is not included in the relevant specialist report in Annexure D, this will be provided upon request from the Zutari Project Leader.

Table 1-2 : EIA Project Team

Role	Consultant	Company
EIA and Project Management		
Project Director	Stephan van den Berg	Zutari
Project Leader / Manager	Charles Norman	Zutari
Project Staff & Senior EAP	Corlie Steyn	Zutari
Sub-consulting Specialists		
Avifauna (birds)	Chris van Rooyen	Chris van Rooyen consulting CC
Bats	Stephanie Dippenaar	Stephanie Dippenaar Consulting

[3] Appendix 2 of amended EIA Regulations (GN R982) of NEMA lists the content required in a Scoping Report. This has been listed for cross checking purposes on the page preceding the table of contents.

Role	Consultant	Company
Terrestrial Ecology	Brian Colloty	Scherman Colloty & Associates
Aquatic ecology	Brian Colloty	Scherman Colloty & Associates
Socio-economic	Tony Barbour	Private Consultant
Agricultural potential	Johann Lanz	Private Consultant
Noise	Morné de Jager	Enviro Acoustic Resources (EAR)
Heritage (incl. archaeology)	Jayson Orton	ASHA Consulting (Pty) Ltd
Palaeontology	John Almond	Natura Viva
Visual and Flicker	Stephen Stead	Visual Resources Management (VRM) Africa
Traffic management plan	Hermanus Steyn	Aurecon South Africa (Pty) Ltd
EMI/RFI Assessment	Callie Fouche	ITC Services
Independent transport specialist peer review	Athol Schwarz	Private Consultant
Butterfly specialist	David Alan Edge	Private consultant

1.5.1 Independence

The amended 2014 EIA Regulations pursuant to NEMA, provide general requirements for EAPs and specialists with the intention of reducing the potential for bias in the environmental process. The first requirement is that the EAP should be independent (Regulation 13(1)(a) of GN R982, as amended).

Neither Zutari nor any of its sub-consultants are subsidiaries of *BVI*, nor is *BVI* a subsidiary to Zutari.

Zutari and its sub-consultants do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

1.6 Assumptions, Limitations and Gaps in Knowledge

In undertaking this investigation and compiling the Scoping Report, the following has been assumed:

- The information provided by the client is accurate and unbiased, and no information that could change the outcome of the EIA process has been withheld.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed Kokerboom 3 Wind Farm. The environmental impacts of Kokerboom 1 and Kokerboom 2 WEFs have already been investigated and authorised in separate EIA processes. However, all four of the Kokerboom WEFs (Kokerboom 1,2, 3 and the proposed Kokerboom 4) will be considered as part of the cumulative impact assessment. A separate Basic Assessment process has been be undertaken to assess the environmental impacts associated with the proposed connection to the grid (line (DEFF Ref. No.:14/12/16/3/3/1/1818).
- The EIA process is based on Best Practice Guidelines which were available at the time of writing this Report.

This Scoping Report has identified the potential environmental impacts associated with the proposed activities. However, the scope of impacts presented in this report could change, should new information become available during public participation on this Scoping Report and/or during the Environmental Impact Report (EIR) Phase. The purpose of this section is therefore to highlight gaps in knowledge that were evident during the Scoping Phase. The gaps include:

- Lack of confirmation of services capacity from the municipality.
- Lack of exact source of water, although it is anticipated that water will be sourced from one or more on-site boreholes.
- No indication of commencement date of construction phase, as this is dependent on REIPPPP.

- Lack of specific plan for decommissioning of the wind energy facility.

The planning for the proposed project is at a feasibility level and its design is conceptual – but near final, subject to the findings of the EIR phase. This Scoping and EIR process forms a part of a suite of feasibility studies, and as these studies progress, more information will become available to inform the process. The DEFF, and other authorities, will be requested to issue their comments to allow for the type of refinements that typically occur during project design. Undertaking the EIA process in parallel with the feasibility studies does have a number of benefits, which include integrating environmental aspects into the layout and design and therefore ultimately encouraging a more environmentally responsive and sustainable project.

2 LEGAL AND PLANNING CONTEXT

There are a host of legal and policy documents and guidelines to consider when undertaking such a project. These have been detailed in the sections that follow.

2.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 2-1.

Table 2-1 : Legislation considered in preparation of the scoping report

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
National Environmental Management Act, Act No. 107 of 1998 (NEMA), as amended	Department of Forestry, Fisheries, and the Environment (DFFE)	Several listed activities in terms of NEMA GN No R982, R983, R984 and R985 in the Government Gazette of 4 December 2014 (as amended on 7 April 2017), have been triggered and need to be authorised for the proposed wind energy facility (also see Table 2-2). Based on the listed activities triggered, the application for environmental authorisation will follow the scoping and EIR process as set out in Regulations 21-24 of GN R982.
National Environmental Management: Biodiversity Act, Act No. 10 of 2004	Department of Forestry, Fisheries, and the Environment (DFFE)	The act calls for the management of all biodiversity within South Africa. No Red Data listed species were observed according to the Ecological Assessment 2021, but all indigenous fauna is protected under the NCNCA (refer further below in this table)
Environmental Conservation Act, Act No. 73 of 1989 (ECA)	Department of Forestry, Fisheries, and the Environment (DFFE)	WEFs and related infrastructure will increase noise levels during construction as well as possible operational noises. Noise emitted by WEFs include aerodynamic sources due to the passage of air over the wind turbine blades and mechanical sources which are associated with components of the power train within the turbine, such as the gearbox and generator and control equipment for yaw, blade pitch, etc. In terms of section 25 of the ECA, the national Noise Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCR) was promulgated. The NCRs were revised under Government Notice Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Currently, no provincial or local regulations exist in the Northern Cape and no approval is required. Mitigation measures, recommended by the noise specialist, will be included in the EIR and EMPr.
National Water Act, Act No. 36 of 1998 (NWA)	Department of Water Affairs and Sanitation (DWS)	Section 21 of the NWA recognises water uses that require authorisation by DWS before they commence. Construction of infrastructure within drainage lines will likely be required for the associated roads and underground cables and authorisation is therefore required in terms of Section 21 (c) and (i) in the form of either a General Authorisation or Water Use License Application (WULA). The information required by the DWS for this application has been included in the aquatic ecology assessment in Annexure D. However, this application will only be submitted if the project is awarded preferred bidder

		status in terms of the REIPPPP. No water use may begin without the appropriate authorisation.
National Heritage Resources Act, Act No. 25 of 1999 (NHRA)	South African Heritage Resources Agency (SAHRA), and Northern Cape Provincial Heritage Resources Authority Ngwao Boswa Kapa Bokone (NBKB)	The proposed Kokerboom 3 Wind Energy Facility will change the character of the sites and will exceed 5,000 m^2 in extent. The proposed roads will exceed 300 m in length. Section 38 of the NHRA is thus applicable. As such, it is proposed that a Heritage Impact Assessment and Palaeontological Assessment be undertaken as required by the NHRA. Comment on the project will be obtained from NBKB and SAHRA and any appropriate mitigation measures required will be included in the EIR and EMPr.
Aviation Act, Act No 74 of 1962	Civil Aviation Authority (CAA)	Wind turbine generators may potentially interfere with radio navigation equipment. Turbines are also considered to be potential physical obstacles and may need to be fitted with aviation warning lights if required by the CAA. No aerodromes are in close proximity to the site. Once the proposed layout of the turbines has been provided by the design engineers, based on the environmental sensitivities identified through the Scoping Phase, an application for approval will be submitted to the CAA. This will be done in terms of the proponent's REIPPPP bid as required by the Act.
Conservation of Agricultural Resources Act, Act No. 43 of 1983 (CARA)	Northern Cape Department of Agriculture and Rural Development	The purpose of this Act is to ensure that natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the EIA process, recommendations will be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. The Proponent together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the regulation that may pose a problem as a result of the proposed project.
National Road Traffic Act, Act No. 93 of 1996 (NRTA)	Department of Transport, Northern Cape	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. Due to the large size of many of the facility's components (e.g. tower and blades) they will need to be transported via "abnormal loads". As such, the Northern Cape Department of Transport will be provided with an opportunity to review and comment on this EIA process.
The National Energy Act, Act No. 34 of 2008	Department of Energy (DoE)	The REIPPPP is guided by the National Energy Act, one of the purposes of which is to promote sustainable development of renewable energy infrastructure.
Northern Cape Nature Conservation Act Act No. 9 of 2009 (NCNCA)	Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform	Numerous sections (specifically sections 50-51) under NCNCA deal with indigenous and protected plants. The protected status of various species that may be located on the site requires a permit under NCNCA in order for the plants to be removed or destroyed i.e. a permit is required before development may commence.

Astronomy Geographic Advantage Act, Act No. 21 of 2007 (AGA), and associated Regulations	Department of Science and Innovation (DSI)	In terms of Schedule D of the Regulations on the Protection of the Karoo Central Astronomy Advantage Areas (GN 1411 of 15 December 2017), wind turbines located more than 50km away from the SKA Infrastructure Territory are exempt from requiring a permit from the DSI unless the operational turbines are found to cause interference with the SKA. The Kokerboom 3 WEF is more than 50km away from the SKA Infrastructure Territory and is thus exempt from the AGA permitting requirements. Regardless, it is proposed that an Electro-magnetic interference (EMI) assessment be undertaken during the EIR phase to determine the potential impact on the SKA radio telescope. A comment on the project will also be obtained from SKA, for its inclusion in the EIA process. It is noted that any transmitters that are to be established, or have been established, at the site for the purposes of voice and data communication will be required to comply with the relevant AGA regulations concerning the restriction of use of the radio frequency spectrum that applies in the area concerned.

2.2 Listed Activities in terms of NEMA

NEMA is the primary legislation tasked with the management of environmental resources and, accordingly, identifies activities that require authorisation prior to commencement. Such activities listed in the amended 2014 EIA Regulations (GN R982, as amended) are detailed in Table 2-2

Table 2-2: | Listed activities triggered by the proposed Kokerboom 3 Wind Farm

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
GN R983 Activity 11	"The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts".	An on-site collector substation, including a BESS, would be required for the Kokerboom 3 Wind Farm which would step up power from 33 kV to 132 kV. Turbines would be linked to each other and the on-site substation via overhead and/or subterranean medium voltage cables (~33 kV).
GN R983 Activity 12	The development of – (ii) infrastructure or structures with a physical footprint of 100 m^2 or more; Where such development occurs – (a) within a watercourse; (c) if no development setback exists, within 32 m of a water course, measured from the edge of a watercourse;	Drainage lines scattered across the proposed site. The proposed roads, powerlines and/ or other infrastructure are likely to cross these drainage lines or be within 32 m thereof.
GN R 983	The development and related operation of facilities or infrastructure, for the storage, or for the storage and	The approximate area of 2 ha has been designated for battery storage within the

Activity 14	handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500cubic metres.	substation and O&M Complex. The BESS would have a capacity of up to 150 MWh and would utilise either lithium-ion or redox flow technology.
GN R983 Activity 19	The infilling or depositing of any material of more than 10 m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m^3 from a watercourse;	The infilling or depositing of any material of more than 10 m^3 into a watercourse may be triggered with the construction of internal service roads or cables across drainage lines.
GN R983 Activity 24	The development of a road - (ii) with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres;	Permanent roads of sufficient width (~8 m with a buffer/road reserve of 12 m i.e. 20m wide) for crawler cranes may be required for the proposed Wind Energy Facility (WEF).
GN R983 Activity 28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 1 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 ha.	The proposed farm portions on which the project is proposed are being used for livestock grazing (mostly sheep).
GN R983 Activity 56	The widening of a road by more than 6 m, or lengthening of a road by more than 1 km – (ii) where no reserve exists, where the existing road is wider than 8 m.	Access roads of approximately 8 m in width, with a 12 m buffer/ road reserve would be required to develop the proposed WEF and in combination would exceed 1 km. Existing roads would be used as far as practically possible and feasible, but would likely require widening by more than 6 m.
Activity No(s):	Provide the relevant **Scoping and EIA Activity(ies**) as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
GN R984 **Activity 1**	"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."	The wind farm would have a maximum generation capacity of up to 300 MW.
GN R984 **Activity 15**	"The clearance of an area of 20 hectares or more of indigenous vegetation… "	Physical alteration of undeveloped land for the WEF would take place and would require clearing of indigenous vegetation. The total area to be disturbed is expected to be approximately 160 ha temporary and 166.2ha permanent.
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
GN R985 **Activity 18**	The widening of a road by more than 4 m, or the lengthening of a road by more than 1 km. (g) Northern Cape (ii) Outside urban areas: (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	Access roads of approximately 8 m in width, with an approximate 12 m wide buffer/ road reserve would be required to develop the proposed wind farm and in combination would exceed 1 km. Existing roads would be used as far as practically possible and feasible, but would likely require widening by more than 4 m. Some of these roads may traverse drainage lines or fall within 100 m from the edge of a watercourse or wetland.

Activities 4, 10 and 12 of GN R324 (7 April 2017) were considered during this Scoping Phase, as the proposed development will required the development of a road wider than 4m, with a reserve less than 13.5m (Activity 4), as well as the clearance of an area of 300m^2 of indigenous vegetation (Activity 12) and the storage of dangerous good (activity 10). However, the listed activities were not triggered due to size and the project area does not trigger conditions associated with spatial environmental sensitivity.

The CBAs mapped and included in the Namakwa Bioregional Plan were based on mapping that was undertaken in 2008, none of which occur within proximity of the proposed Kokerboom 3 Wind Farm site. The ecologist identified that the mapping was updated by Oosthuysen and Hollness in 2016, which includes CBAs and Ecosystem Support Areas (ESAs) located within the footprint of the greater Kokerboom study area. However, these mapped areas have not been included in a Bioregional Plan to date.

2.2.1 DFFE Screening Tool

Government Notice 960, gazetted on 05 July 2019, in accordance with the NEMA EIA Regulations 2014 (as amended) requires that a National web based environmental screening tool is used to produce a report that should be submitted with an EA application to the DEA[4] from 05 October 2019 and onwards (i.e. 90 days following the date of publication of this notice). The downloaded report is appended in Annexure G. This report shows, on a high level, the site's sensitivity to wind farm development based on different environmental themes (including, inter alia, terrestrial ecology, avifauna, heritage) and identifies assessment protocols that must be undertaken depending on the environmental theme's sensitivity rating within the development site.

Assessment protocols that set out the "*procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of the national environmental management act, 1998, when applying for environmental authorisation*" were Gazetted on 20 March 2020. However, the specialists engaged for this study were appointed before the notice was gazetted, specifically on 19 February 2020. The DFEE confirmed in an email (Annexure B.4) dated 7 April 2021 that the onus is on the applicant to prove that the specialist studies for Kokerboom 3 were commissioned prior to the publication of GN 320 of 20 March 2020. Proof of the date of appointment has been provided in Annexure H.

2.3 Relevant Policies

South Africa's Constitution (1997), together with the three policies indicated in Figure 2-1 below, have been key in developing South Africa's renewable energy industry.

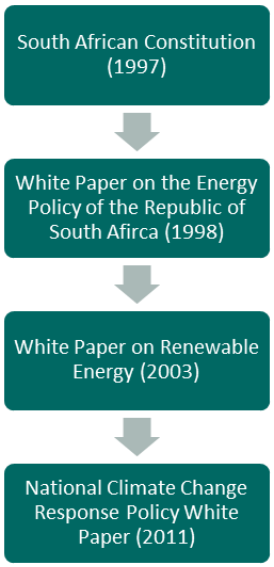


Figure 2-1: Key policies for initiating renewable energy in South Africa

[4] DEA is now referred to as DFFE effective 1 April 2021.

2.4 Relevant Guidelines

This EIA process is informed by the series of national Environmental Guidelines where applicable and relevant:

- EIA Guideline for Renewable Energy Projects (DEA, 2015).
- Integrated Environmental Information Management (IEIM), Information Series 5: Companion to the NEMA EIA Regulations of 2010 (DEA, 2010).
- IEIM, Information Series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT), 2002).
- IEIM, Information Series 3: Stakeholder Engagement (DEAT, 2002).
- IEIM, Information Series 4: Specialist Studies (DEAT, 2002).
- IEIM, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004).
- IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004).
- IEM Guideline Series 7: Public Participation in the Environmental Impact Assessment Process (DEA, 2012)
- Birds and Wind-Energy Best-Practice Guidelines: Third Edition (BirdLife SA and EWT, 2015).
- Environmental, Health, and Safety Guidelines for Wind Energy (World Bank Group, 2015).
- Good Practice Guidelines for Surveying Bats and Wind Energy Facility Developments – Pre-construction 4th edition (Sowler et al. 2016).

The following guidelines from the Department of Environmental Affairs and Development Planning (Western Cape) (DEA&DP) were also taken into consideration as best-practice, even though the project is situated in the Northern Cape:

- Guideline for involving biodiversity specialists in EIA process (Brownlie. 2005).
- Guideline for involving heritage specialists in the Environmental Impact Report process (June Winter & Baumann, 2005).
- Guideline for involving visual and aesthetic specialists in the Environmental Impact Report process (Oberholzer.2005).
- Guideline for Environmental Management Plans (Lochner, 2005).
- Guideline for determining the scope of specialist involvement in EIA Processes (2005).
- Guideline for the review of specialist input into the EIA Process (June 2005).
- Guideline on Alternatives, EIA Guideline and Information Document Series. (DEA&DP, 2011).
- Guideline on Need and Desirability, EIA Guideline and Information Document Series. (DEA, 2012).
- Guideline on Public Participation, EIA Guideline and Information Document Series. (DEA&DP, 2011)

3 EIA METHODOLOGY

As outlined in Figure 3-1, there are three distinct phases in the EIA process namely the Pre-Application Phase, the Scoping Phase, and the EIR Phase. A description of the activities which have been, and will be, undertaken during each phase is provided in the following sections. Note that this report covers the second phase, *viz.* the Scoping Report Phase.

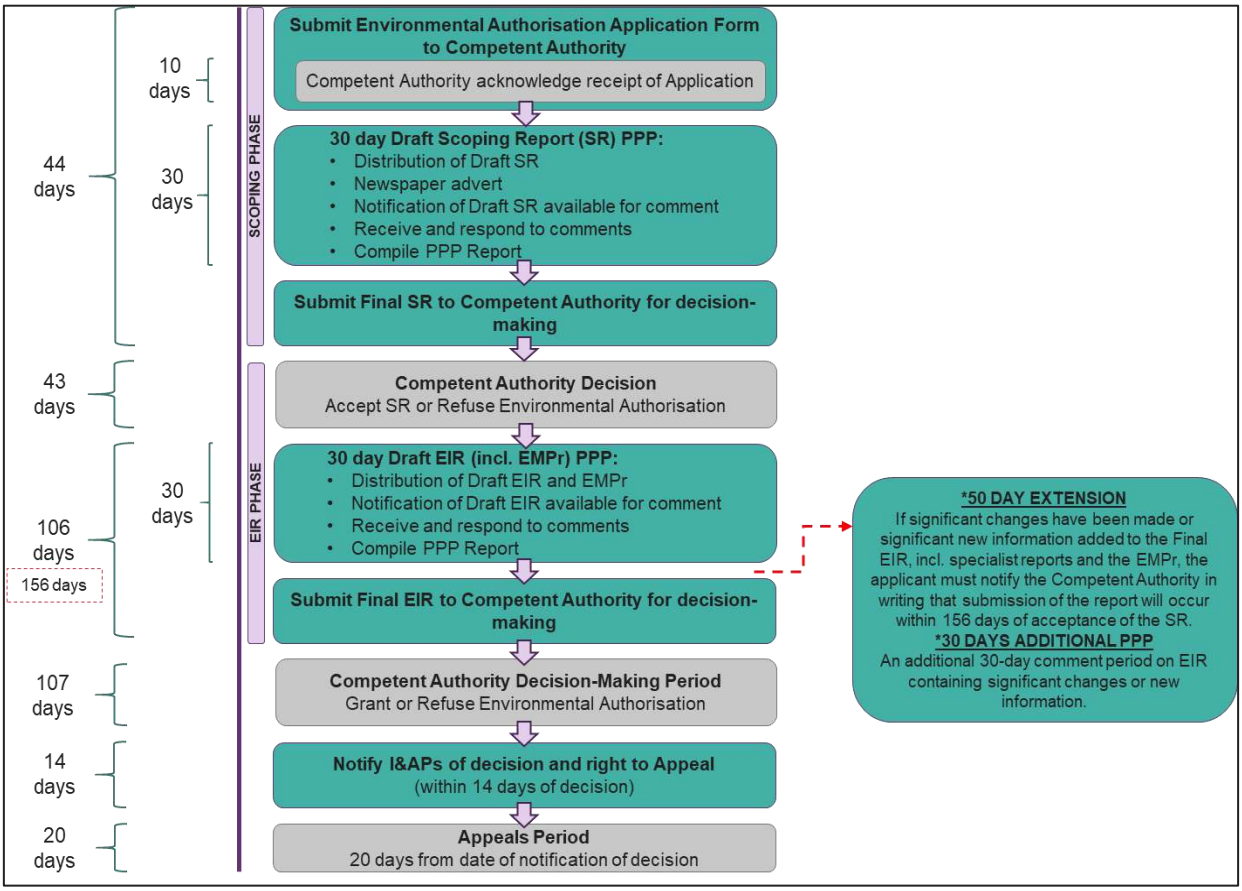


Figure 3-1 : The EIA process in terms of NEMA

As illustrated in Figure 3-1 three stages of public participation are included in the EIA process, at the Pre-Application, Scoping and EIR phase respectively. More information on the Public Participation Process (PPP) is included in Section 3.2.

3.1.1 The Pre-Application Phase

The Pre-Application Phase consists of site visits, pre-application meeting with DFFE and a PP Plan as accepted by DFFE on 29 October 2020.

A site visit was undertaken to familiarise the EAP and the specialists with the site and to allow for a rapid site survey, identifying potential areas of concern or opportunity.

A full 12-month bird and bat monitoring study was undertaken over all land parcels that encompass the Kokerboom 3 WEF area. Bat monitoring commenced on 16 August 2019, when static recorders were installed, and monitoring was completed on 5 June 2020. Bird monitoring started in June 2019 (winter) until the end of March 2020 (autumn). The other specialists (listed above in Table 1-2) visited the site in March 2020. Initial feedback from specialists has been included in this Scoping Report (included in Annexure D where appropriate). Detailed specialist impact assessments will be submitted with the EIR.

An application form for the project must be submitted to DFFE in order to register the project on the Department's databases. A reference number will be allocated to the project which will be used on all correspondence once it has been received. Following the receipt of the application form, the Final Scoping Report will need to be submitted to the DFFE within 44 days.

The EIA process, in terms of the 2014 EIA regulations (amended on 7 April 2017 under regulation number 326), follows stringent timeframes between each phase. At a pre-application meeting with DEFF, held on 14 July 2020, it was agreed that the application form could be submitted together with the draft Scoping Report to ensure that the timeframes for completing the EIA process do not lapse. The minutes of this meeting have been included in Annexure B. A subsequent email from DEFF on 24 March 2021 confirmed that no other pre-application meeting was required. This email is also included in Annexure B.

The Approved PP Plan will be followed (Annexure B).

The COVID-19 Disaster Management Regulations, Directions Annexure 3: Services to be provided or obtained by proponent, applicants, environmental assessment practitioners (EAPs), specialists, professionals undertaking actions as part of the environmental authorisation process and organs of state as commenting authorities required in terms of the National Environmental Management Act, the National Environmental Management: Waste Act, and the Environmental Impact Assessment Regulations, (EIA Regulations) (Annexure 3) have been and will be followed (Annexure F).

The Pre-Application Phase therefore includes the compilation of the application form for environmental authorisation, placing of site notices as well as drafting the Scoping Report.

3.1.2 The Scoping Phase

The EIA application form will be submitted to the DEFF with the Draft Scoping Report. DEFF will then send out an acknowledgement of receipt within 10 days of receiving the application form. The Final Scoping Report will be submitted to DEFF after a 30-day public comment period and after any comments raised by I&APs have been suitably addressed.

Scoping in the EIA process is the procedure used for determining the extent of, and approach to, the EIA phase and involves the following key tasks as required in Appendix 2(2)(1)(g) of the amended 2014 EIA Regulations.

- Identification and involvement of relevant authorities and I&APs in order to elicit their interest in the project;
- Description of the baseline environment and environmental attributes of the proposed site;
- Details of the public participation process undertaken in terms of Regulation 41 of the amended 2014 EIA Regulations (GN R982 of 4 December 2014);
- Provision of a summary of any issues raised by I&APs to date and how they were incorporated into the Final Scoping Report, if required;
- Identification and selection of feasible alternatives to be taken through to the EIA Phase;
- Identification of significant issues/impacts associated with each feasible alternative to be examined in the EIA, and mitigation measures that could be applied;
- Determination of methodology for assessment used in quantifying and ranking the nature, significance, consequences, extent, duration and probability of the potential impacts; and
- Determination of specific ToRs for any specialist studies required in the EIA.

Various methods and sources were utilised to identify the potential social and environmental aspects associated with the proposed project and to develop the ToRs for the specialist studies. The sources of information for the preparation of this report include, *inter alia*, the following:

- Collection of information specific to the project, as provided by the Proponent:
    - Project description;
    - Methodology for construction of the various project components;
    - Methodology during operations and decommissioning;

- Expected timeframe for project development;
- Maps and figures, outlining the proposed facilities; and
- Technical information relating to design.

- Other relevant EIRs prepared for EIAs undertaken in the area;
- Environmental baseline literature and desktop spatial surveys for this site and surrounding areas;
- Environmental baseline surveys for this site and surrounding areas from site visits by specialists;
- Consultation with the project team (including specialists); and
- Consultation with I&APs, including authorities.

(a) Once the Scoping Report has been drafted, it will be circulated for a 30-day public comment period. Any comments received will be recorded and responded to in a Comments and Response chapter within the Public Participation Process Report (Annexure C) and the Scoping Report will be updated in order to address I&AP comments, as/where appropriate. The Draft and Final Scoping Reports will be submitted to DFFE for review. Thereafter DFFE must, within 43 days of receipt of the Final Scoping Report, consider it, and in writing – Accept the report and advise the EAP to proceed with the tasks contemplated in the Plan of Study for EIA; or

(b) Refuse Environmental Authorisation if

(i) The proposed activity is prohibited in terms of a prohibition contained in legislation; or

(ii) If the Scoping Report does not substantially comply with the objectives and content requirements for scoping reports in terms of the amended 2014 EIA Regulations and the applicant cannot ensure compliance with these regulations within the prescribed timeframe.

3.1.3 The EIR Phase

The Scoping Phase will be followed by the Environmental Impact Report (EIR) Phase, which will be informed by the specialist investigations. The development proposal may be refined and adjusted based on the findings of the specialist assessments. This phase will culminate in a comprehensive EIR that documents the outcome of the impact assessments. Details of this phase are further addressed in Annexure F. The DFFE has a 107-day decision-making period once the Final EIR (inclusive of the EMPr) is submitted. Should the DFFE accept the application and issue an EA, the EAP would have to notify all registered I&APs of the decision and their right to appeal. In this regard, registered I&APs must be notified within 14 days from the date of the decision where after I&APs have a 20-day period from the date of notification to submit an appeal.

3.2 Public Participation

Stakeholder engagement has been described by the International Finance Corporation (IFC) of the World Bank Group as a broad, inclusive and continuous process of communication between a Proponent of a project, and those potentially affected by the activities of the proposed development. This can include a wide range of activities that are relevant to the entire life of a project. The aim of stakeholder engagement differs at different stages of the project lifecycle. During the EIA process, the aim is to provide an opportunity for stakeholders to be informed of projects occurring in their area and that may affect them directly or indirectly. It also aims to provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances and to ensure that these are used to guide the new development, and ongoing operations, in a responsible manner that complements the local socio-economic environment and enhances the benefit of a given project.

South African legislation and guidelines (refer to Chapter 2) have formalised stakeholder engagement in the EIA process and refer to it as the Public Participation Process (PPP). PPP therefore forms an integral component of this investigation and enables interested and affected parties (I&APs) to identify their issues, concerns, and suggestions during the EIA process. This PPP has been structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents/ reports, and to voice any issues of concern at various stages throughout the EIA process. These stages are described below.

A Public Participation Report has been included in Annexure C and provides detail on the process that has been followed to date. This document will be updated as the project progresses.

3.2.1 Stages of the Public Participation Process

PPP for this project are illustrated in Figure 3-2 below.

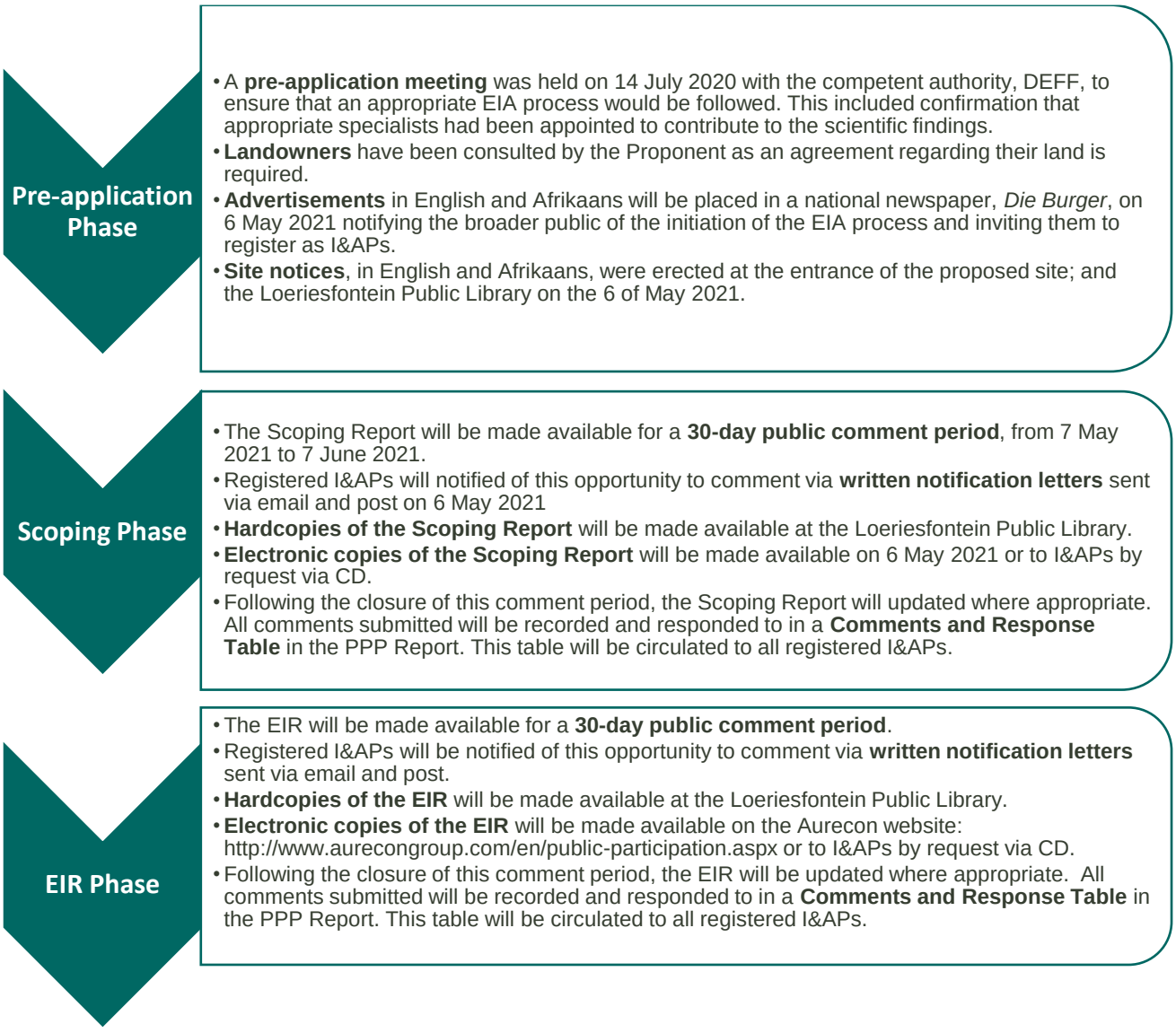


Figure 3-2: Public participation in the EIA process

3.2.2 Identification of Stakeholders

A database of I&APs has been developed for the proposed revised Kokerboom 3 Wind Energy Facility, with cumulative stakeholders identified during the PPP for the Kokerboom 1 and 2 Wind Energy Facilities, as well as the original Kokerboom 3 EIA. This database was initiated by including the details of the following affected parties:

- Landowners and adjacent landowners;
- Relevant district and local municipal officials and ward councillor/s;
- Relevant national and provincial government officials;
- Neighbouring renewable energy projects, and
- Organisations in the area.

This database will be augmented via chain referral during the EIA process, and will be continually updated as new I&APs are identified throughout the project lifecycle. The list of I&APs is included in Annexure C.

3.3 Authority involvement

In terms of Section 24O (2) and (3) of the NEMA, the following state departments and/or parastatal bodies will be sent a copy of the Scoping Report and EIR for comment.

- Provincial and local authorities, and parastatal organisations:
    - Namakwa District Municipality (DM);
    - Hantam Local Municipality (LM);
    - Khai-Ma LM;
    - Northern Cape Provincial Heritage: Boswa ya Kapa Bokone;
    - Eskom;
    - Northern Cape Department of Agriculture, Land Reform & Rural Development;
    - Northern Cape Department of Environmental Affairs and Nature Conservation;
    - Northern Cape Department of Roads and Transport; and
    - Northern Cape Tourism Authority.
- National departments and organisations:
    - Council for Geoscience
    - Department of Water and Sanitation;
    - Department of Agriculture, Land Reform and Rural Development.
    - Department of Health;
    - Department of Transport;
    - Department of Mineral Resources & Energy;
    - Department of Environmental Affairs: Integrated Environmental Management
    - Department of Environmental Affairs: Biodiversity Conservation
    - South African National Roads Agency Limited;
    - South African Heritage Resources Agency;
    - National Energy Regulator of South Africa
    - Civil Aviation Authority;
    - BirdLife South Africa;
    - South African Bat Assessment Association (SABAA);
    - Square Kilometre Array (SKA);
    - South African Astronomical Observation (SAAO)
    - WeatherSA; and
    - Conservation agencies: WESSA, EWT and WWF SA.
- Other national/ provincial departments where deemed necessary

Where the need arises, focus group meetings will be arranged with representatives from the relevant national and provincial departments and local authorities. The purpose of these meetings will be to ensure that the authorities have a thorough understanding of the need for the project and that Zutari has a clear understanding of the authority requirements. It is anticipated that beyond providing key inputs into the EIA, this authority scoping process will ultimately expedite the process by ensuring that the final documentation satisfies the

authority requirements and that the authorities are fully informed with respect to the nature and scope of the proposed Kokerboom 3 Wind Farm.

3.4 Summary of Comments and Responses

All comments will be added to the Comments and Response Report and will be added to the Final Scoping Report.

4 DESCRIPTION OF PROPOSED PROJECT

4.1 Site Location and Extent

The proposed site for the Kokerboom 3 Wind Farm is located approximately 60 km north of Loeriesfontein, 85 km west of Brandvlei and 160 km southeast of Springbok in the Northern Cape. The site can be reached via the unsurfaced Granaatboskolk (Nuwepos) Road that branches off the main road, R357 (see Figure 4-1 below). Kokerboom 3 Wind Farm is proposed on two neighbouring farm as detailed below in Table 4-1, while the southern access road will traverse a third property.

Table 4-1: Farm details for Kokerboom 3 Wind Farm

Kokerboom 3				
Name of landowner	**Erf number**	**21-digit SG code**	**Name of farm**	**Farm Size (ha)**
Gert Johannes Lombard	1/214	C01500000000021400001	Karree Doorn Pan	5,094.23
TR2 Immobilien GmbH	2/214	C01500000000021400002	Karree Doorn Pan	5,094.24
Gert Johannes Lombard	RE/213	C01500000000021300000	Remainder of Aan de Karree Doorn Pan No 213	2,580 ha

Whilst the facility spans a vast area, the results of the facility layout determination indicate the disturbance footprint will be up to 160ha (temporary) and 166.2ha (permanent) that will be directly affected by the footprint of the proposed project.

Furthermore, after the construction phase rehabilitation has been completed, the remaining permanent footprint[5], of approximately 166.2 ha, will consist of the concrete turbine foundations, crane hardstands, access routes, operations and maintenance facilities (site office, storage area, workshop, etc.), substation and BESS Figure 4-1 portrays the location of Kokerboom 3 in relation to Kokerboom 1 and 2 and the proposed Kokerboom 4.

[5] The bases of the grid connection transmission lines may also cross this footprint but have been not been considered in this application as they have been applied for and authorised in a separate application for environmental authorisation via a basic assessment process.

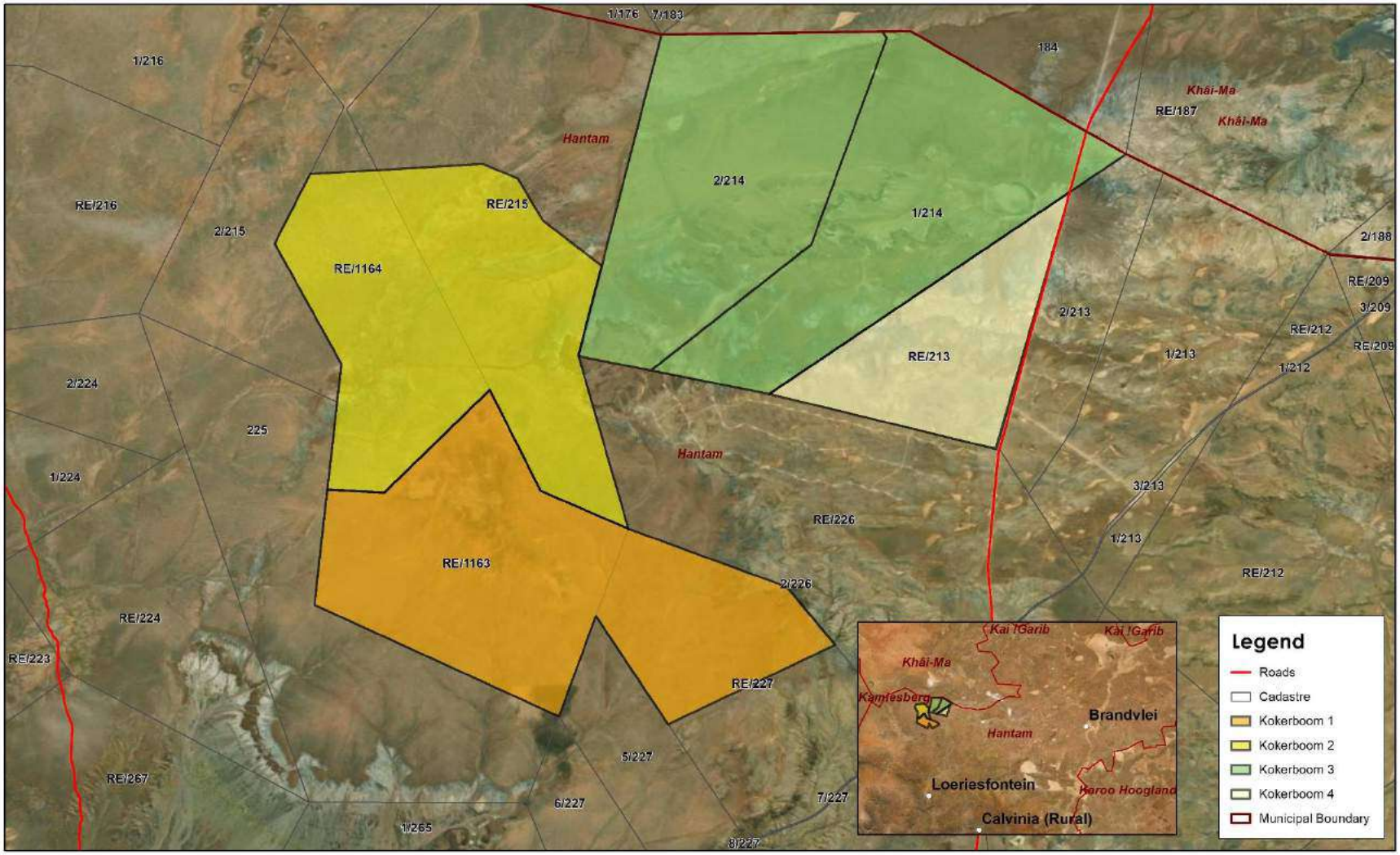


Figure 4-1: Kokerboom 3 Wind Farm on Farms 2/214 and1/214 , in relation to the study area for the Kokerboom 1 & 2 WEFs.

4.2 Technical Description of a Wind Energy Facility (WEF)

A wind farm, (or Wind Energy Facility (WEF)), requires a number of key components to generate electricity at a large scale. As illustrated in Figure 4-2, this includes wind turbines (blue), powerlines and substation facilities to collect the generated electricity and distribute it to other users and the associated connecting infrastructure to ensure efficiency, such as roads, transformers and cabling, etc.

Figure 4-2: Aerial image of a wind farm in Texas[6], which provides an indication of typical wind farm infrastructure.

Technical specifications of the Kokerboom 3 Wind Farm will be detailed in the EIR, but the table below provides preliminary technical details of the proposed components. These specifications may be refined or updated during the EIR phase, based on the outcome of the Scoping Phase and specialist investigations.

Table 4-2: Provisional Technical specifications for Kokerboom 3 WEF

Component	Description
Turbines	Up to 60 turbines of up to 6.5 MW each is planned, depending on technology available. Turbines will have a hub height of up to 150 m, and rotor diameter up to 180 m.
	Construction of turbines will require foundations of approximately 26 m in diameter with a construction (disturbance) footprint of approximately 32 m x 32 m.
	Hardstand areas for a crane (up to 150m X 100m) will be required for each turbine and will remain for the lifespan of the WEF for construction and maintenance purposes. In addition, temporary laydown/ assembly areas of up to 150m X 15m will be required at each turbine during the construction phase.

[6] © Herb Lingl/aerialarchives.com 2016.Filename: aerial-Texas-wind-turbines-AHLB3126.jpg (Online). Available for download: http://aerialarchives.photoshelter.com/image/I0000O7hCVjCoF6U [Downloaded 8 November 2020].

	The turbine hardstands and laydown areas will be located within a 100m radius of the turbine base. The exact position and orientation of the hardstands and laydowns will be determined during the detailed design.
	Road sidings will be constructed at each turbine and will be rehabilitated after construction.
Access roads & Site roads	Three potential access points are proposed off the public road. One or all of the access points may be utilised, given the extent of the site. The access road/s to the WEF will remain indefinitely. A 20m wide road reserve is required for the access roads and internal site roads. This accounts for a 6m road surface width, 1m for side drains either side, and a further 6m either side of the road surface for MV cable trenches and associated disturbance. After construction the roads will be rehabilitated down to 8m wide (6m wide road surface + 1m drain either side). Where possible, existing tracks will be utilised and upgraded.
	Turning circles will be required to allow heavy and abnormal vehicles to turn safely without disturbing beyond the footprint. Where possible, existing tracks will be upgraded.
Facility Substation and O&M Complex	A 5ha area has been identified for the Substation and Operations & Maintenance (O&M) Complex. The following will be located within this 5-ha area: • Facility substation (approx. 1ha) • O&M building (approx. 0.5 ha) • Oil storage area (approx. 0.1 ha) • Battery Energy Storage Facility (approx. 2 ha) • Associated facilities including parking area
Battery Energy Storage System	A ~2ha battery energy storage system will be located within the Substation and O&M Complex. The BESS will have a capacity of up to 150MWh and will utilise either lithium-ion or redox flow technology.
On-site substation	An on-site substation (up to 132kV) with a footprint of approximately 1 ha will be constructed within the Substation and O&M Complex.
Operations and maintenance building	A permanent Operational and Maintenance (O&M) building, which will include a site office, workshop, and storeroom and ablution facilities will be developed (approx 0.5ha).
MV Collector cables	Each turbine will be connected to the on-site substation via Medium Voltage (MV) cables, up to 33kV. The MV cable collectors will run underground parallel to the roads within the road reserve. No overhead MV lines will run from the turbines to the on-site substation.
Construction Laydown area & Site Camp	Three Construction Laydown Areas of up to 15 ha each are proposed. Two near to the entrances of the site, and a third other near the substation. One or all of the laydown areas may be utilized. The laydown areas will include temporary site offices, stores, workshops, turbine storage areas, fuel storage, worker mess and ablution facilities etc. These areas will be rehabilitated after construction.
Batching plant and stockpile area	A centralised concrete batch plant will be erected for the concrete works required during construction. An area of approx. 100m x 100m is required for the batch plant. The batch plant area will include aggregate stockpile areas, cement silos, truck parking areas and the batch plant itself. Where possible, the batch plant will be located within one of the construction laydown areas.

The following subsections provide additional information on wind turbine technology (Section 4.2.1), transmission and distribution (Section 4.2.2) and other associated infrastructure (Section 4.2.3).

4.2.1 Wind Turbine Technology

A wind turbine is a rotary device that extracts energy from the wind. The mechanical energy generated is converted to electricity.

Wind turbines can either rotate around a horizontal or a vertical axis. Turbines used in wind farms for commercial production of electricity typically have horizontal axes, are three-bladed and directed into the wind by computer-controlled motors, as is proposed for this project. These have high tip speeds of over 320 km/hour, high efficiency, and low torque ripple, which contribute to good reliability. Figure 4-3 and Figure 4-4 provide illustrations of the external and internal components that make up a typical wind turbine.

The main components of a wind turbine are listed and illustrated below:

- Rotor and blades
- Nacelle
- Generator
- Tower

Rotor and Blades

- The rotor has three blades that typically rotate at 5 – 25 revolutions per minute (rpm) depending on the make and set-up of the turbine, as well as the wind speed on site. The blades are usually coloured white or light grey, and in the case of this proposed project, would be up to a maximum of 90 m long with a rotor diameter of up to 180 m.

Nacelle

- Larger wind turbines are typically actively controlled to face the wind direction, which is measured by a wind vane situated on the back of the nacelle. By reducing the misalignment between wind and turbine pointing direction (yaw angle), the power output is maximised, and non-symmetrical loads minimised. The nacelle turns the turbine to face into the wind (‘yaw control'). The nacelle also contains the generator, control equipment, gearbox and wind speed instrument (anemometer) in order to monitor the wind speed and direction.

  The turbine controls the angle of the blades (‘pitch control') to make optimal use of the available wind and avoid damage at high wind speeds. By turning the blades sideways into the wind, i.e. away from the direction of the wind (‘furling’), the turbine ceases its rotation, accompanied by both electromagnetic and mechanical brakes. This would typically occur at very high wind speeds, typically over 72 km/h (20 m/s), depending on the characteristics of the specific turbine. The wind speed at which shut down occurs is called the cut-out speed. The cut-out speed is a safety feature which protects the wind turbine from damage. Normal wind turbine operation usually resumes when the wind drops back to a safe level.

Generator

- The generator converts the turning motion of the blades into electricity. A gear box is commonly used for stepping up the speed of the generator. Inside the generator, wire coils rotate in a magnetic field to produce electricity. Each turbine has a transformer that steps up the voltage to match the transmission line frequency and voltage for electricity evacuation/distribution. The transformer may be located inside the turbine tower, or within a small housing at the base of the tower.

Figure 4-3: External components of a wind turbine tower

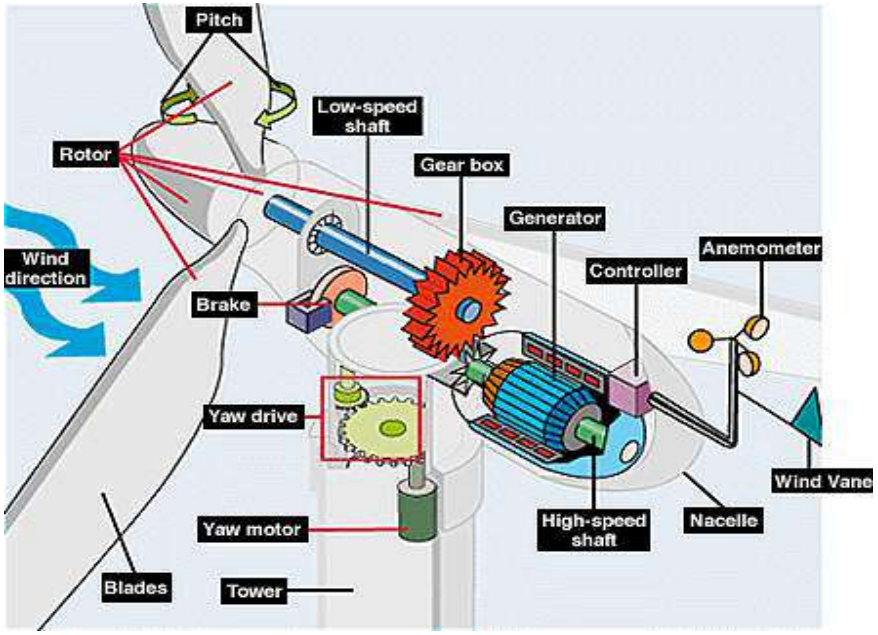


Figure 4-4: Internal components of a typical wind turbine

Tower

- The tower is constructed from tubular steel or concrete and supports the rotor and nacelle. For the proposed project the tower would be up to a maximum of 150 m tall, depending on the selected turbine. This height is referred to as “hub height.” Wind has greater velocity at higher altitudes, therefore increasing the height of a turbine increases the expected wind speeds and electricity output.

Foundation

- Foundations are designed to factor in both weight (vertical load) and lateral wind pressure (horizontal load). Considerable attention is given when designing the footings to ensure that the turbines are adequately grounded to operate safely and efficiently. The final foundation design of the proposed turbines is dependent on a geotechnical investigation. However, it is likely that the proposed turbine foundations would be constructed from reinforced concrete and/or piled foundations. The foundations would be approximately 26 m in diameter and up to ~3 m deep. During construction, a disturbance area of approximately 32 m x 32 m will be required for each turbine tower. The foundation would be cast *in situ* and could be covered with topsoil to allow vegetation growth around the steel tower.

4.2.2 Transmission and Distribution

In order for the electricity generated by the wind turbine to be used, it needs to be collected, transformed and then distributed through the national grid. The step-up process that occurs within the footprint of the Kokerboom 3 Wind Farm will be included in this EIA process. The wind energy facility will be connecting to the Helios Main Transmission Substation by means of a 132 kV line, which has been assessed and authorised via a separate application (DEFF Ref. No.:14/12/16/3/3/1/1818).

On-site Substation and Transformer

A 5 ha area has been identified for the substation and Operational and Management (O&M) complex. The following infrastructure would be located within 5 ha area:

- Facility substation
- O&M building
- Oil storage area
- Battery Energy Storage Facility
- Associated facilities including the parking area

The area will be levelled and compacted. If required, imported material will be sourced, or excess material from the turbine foundations will be used as fill. This may serve as a fire protection measure and prevent erosion and dust production. The control room will be fitted with a remote monitoring system to monitor both unauthorised access and technical aspects associated with the operation of the WEF.

The substation will contain a transformer to increase ("step-up") the voltage of the electricity from 33kV to 132kV for transmission into the Helios Main Transmission Substation (MTS) and national grid.

Cabling

Each turbine will be connected to the substation via medium voltage cables (~33kV lines).These cables will be laid underground in trenches, generally running alongside internal roads. For subterranean cabling, should the on-site excavated material be unsuitable to be used as cable bedding within the trenches, imported bedding material may be needed which will be sourced off-site. This will be obtained from a registered, commercial source.

Substations

Eskom's Helios Main Transmission Substation (MTS) is located approximately 12 km away from the Kokerboom 3 Wind Farm and has been identified as suitable to connect the facility to the national grid. This substation is also the connection point for the Loeriesfontein Wind Farm and Khobab Wind Farm (currently operational), each of which provide 140 MW to the national grid.

Figure 4-5: Helios MTS

4.2.3 Access & Site Roads

Access, Service Roads and Sidings

Access to the site is off the public Granaatsboskolk (Nuwepos) Road, which traverses the north-east section of the site. Three access points are proposed (one or all may be developed, given the extent of the site).

Existing farm tracks would be utilized and upgraded where possible, however new roads would also be developed.

A 20 m wide road reserve is required; this accounts for a 6 m road surface width, 1 m for side drains either side, and a further 6 m either side of the road surface for MV cable trenches and associated disturbance.

After construction the road would be rehabilitated down to 8 m wide (6 m wide road surface + 1 m drain either side).

Roads would be provided with a gravel wearing course. The wind farm terrain is relatively flat therefore cut to fill activities are expected to be limited.

Where necessary, road deviations may be required in the final layout to ensure that the corners are opened, and gradients are reduced to accommodate the delivery of abnormal loads to the site.

Water and Electricity

A preliminary approximation of the water requirements for the construction phase of the proposed WEF are as follows:

- During the construction period (18 - 24 months) the water requirement varies from 5 to 30 kℓ per day. This water will largely be used for the following: road construction; hardstand compaction; concrete foundations; cleaning equipment after concrete pours and dust suppression on roads.
- During the operational phase (approximately 20 years) the water requirement would be an estimated 7kℓ per month for 11 months of the year, increasing to approximately 300kℓ per month for 1 month of the year for annual road maintenance. Water is required during road maintenance for the grading and re-compacting of the roads, which uses approximately 32kℓ/km of road.

Several water header tanks will be used to provide potable water. Potable water will be sourced from the property, or from the municipality or neighbouring farmers (under agreement) and trucked to site as required during the construction and operational phases. Further investigations are currently underway, and recommendations will be included in the EIA Phase.

Basic sanitation will be provided on site during the construction and operational phases in the form of portable toilets and conservancy tanks. Wastewater will be collected at regular intervals and transported to the Municipal Wastewater Treatment Works.

Electricity for construction could be obtained from temporary diesel generators and possibly small scale mobile photovoltaic units.

4.3 Project Phases

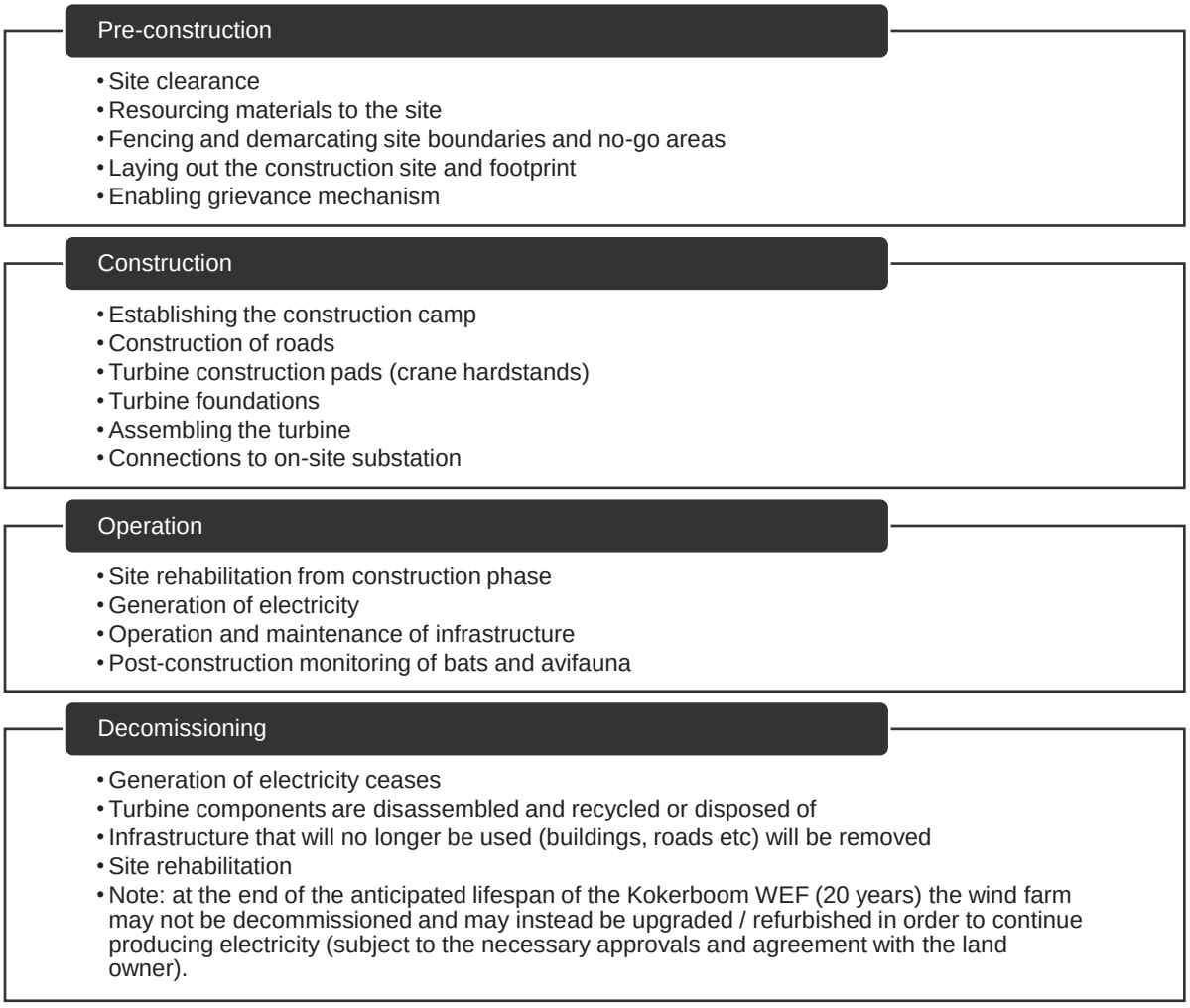


Figure 4-6: Summary of activities associated with project phases

4.3.1 Pre-Construction

Pre-construction activities involve tasks that establish the site, both in terms of the construction activities, as well as the social and environmental management systems. During this time, all effort should be made to ensure that the planning of the project is completed effectively to ensure that there are no delays to the project and that no unnecessary environmental degradation occurs.

During this period, the site layout will be confirmed on site through a micro-siting process. The footprint boundaries will be demarcated, and no-go areas will be identified. Site clearance will occur for the formal laydown areas, turbine footprints, access routes, construction camps, on-site substation and operations & maintenance (O&M) complex. Storage areas for materials and spoil and topsoil piles should be identified.

Within the formal laydown area/s, a maintenance and storage building along with a guard cabin will be established for the duration of the construction period. Smaller manageable components of the turbines will be placed on the laydown area, whereas larger more cumbersome structures, such as the blades, will likely be taken directly to the assembly point.

A significant percentage of the wind turbine components are likely to be imported into South Africa. Thus, the origin of the transportation routes to site would start at one of the ports in Southern Africa (most likely Saldanha or Coega).

It is also important to ensure that social risk is addressed during the construction period by ensuring that an appropriate grievance mechanism is put in place. Furthermore, all of the Contractors' staff must undergo training to ensure they understand the environmental sensitivities of the site. This will be further elaborated upon in the Environmental Management Programme (EMPr) that will accompany the submission of the EIR.

4.3.2 Construction Phase Activities

The construction period for the Kokerboom 3 Wind Farm is anticipated to last 18 – 24 months. During this phase, environmental degradation will be limited to the certain necessary areas. A construction camp will be fenced off and will include a site office, storage areas as well as areas for the management of dangerous and hazardous substances such as fuel.

At the start of the construction period, access roads to the site and between the turbines will need to be established. Where possible, existing farm roads will be used and upgraded. The roads will be up to 8 m wide and will be surfaced with imported gravel wearing course material or other suitable material. Some internal access roads may need to be widened up to 20 m wide during the construction phase, to accommodate the transport of turbine components and large machinery to the turbine sites. These internal haulage roads will be rehabilitated down to 8 m after construction is complete or rehabilitated completely if the haulage road is no longer required as an access road during the operational phase.

At each turbine site, an approximate area of ~32m X 32m will need to be cleared to allow for the foundation of the turbine to be constructed. Furthermore, a hardstand area (approximately 150m x 100m) will be required at each turbine for cranes to be used in the wind turbine assembly process, as well as a laydown/assembly area of approximately 150m X 15m at each turbine. The hardstand and assembly areas will enable the turning of large construction vehicles that will be bringing the turbine components to the site. . The turbine hardstand areas and assembly areas will be positioned within a 100m radius of each turbine. The turbines will then be assembled in sections as illustrated in Figure 4-7. The crane hardstand will remain in place for the duration of the operational phase, to facilitate maintenance of the turbine.

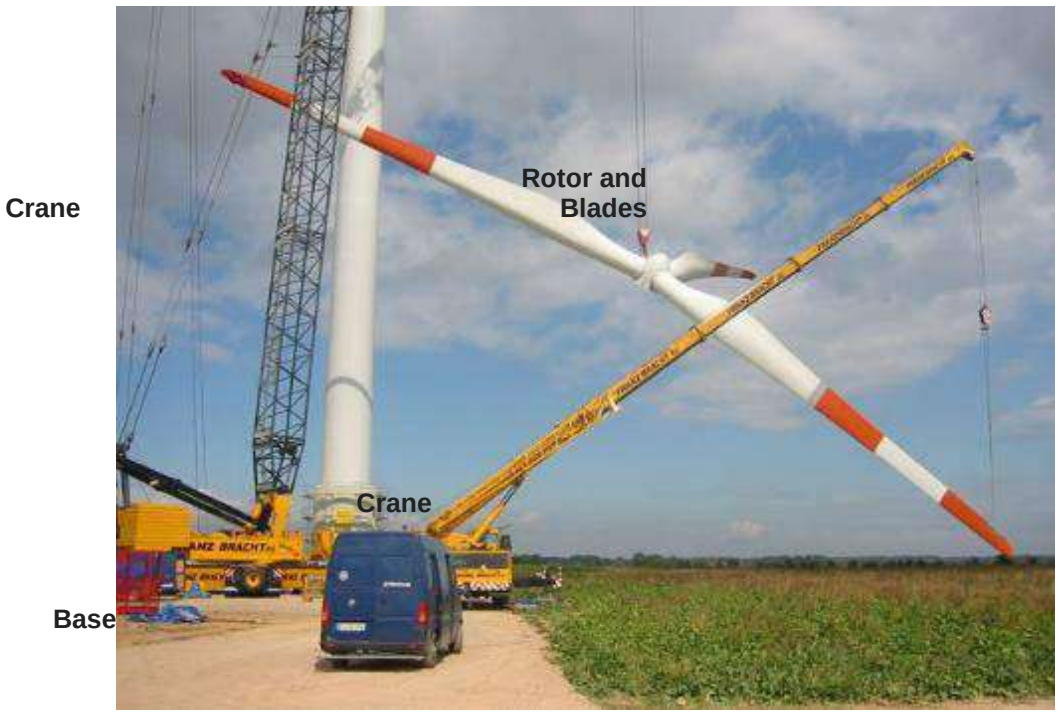


Figure 4-7: Wind turbine in the process of being assembled

Potential waste streams during construction will include general site waste and spoil (some of which can be reused). Bins will be placed at suitable locations within the construction camp and a waste management hierarchy (reduce, reuse, recycle) will be required as a condition of the EMPr. Approximately 280,000 m^3 of spoil will be generated for Kokerboom 3 Wind Farm, of which approximately 200,000 m^3 can be reused as part of the construction activities. The remaining 80,000 m^3 will be removed from site and re-used elsewhere (as appropriate) or delivered to a registered municipal landfill facility. Waste mitigation measures will be included in detail in the EMPr as part of the EIA Phase.

Rehabilitation during the construction phase will be undertaken in a phased approach and will continue into the operational phase.

the construction phase period will provide employment opportunities to the local community, mostly in the low and semi skilled level. The majority of these employment opportunities are likely to be accrued by the historically disadvantaged. Approx 25% of the operational employment opportunities would be for low- or semi-skilled people. The remainder of the positions are likely to be highly skilled, and its unlikely that these skills will be available in the local community (i.e. only a portion (up to 25%) of all positions will be available for local HDIsThe anticipated wage bill for the project is in the region of R50 million, which will be spread throughout the 18 month construction phase and will be distributed between the low level, semi-skilled and professional employees. A certain percentage will be reserved for local businesses (i.e. the construction period will result in the growth of the hospitality industry, which will benefit from the provision of accommodation and meals for professionals).

The majority of the low and semi-skilled employment opportunities will be available to local residents in the area, specifically residents from Loeriesfontein and potentially Niewoudtville, Calvinia and other nearby settlements. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. In order to maximise the potential benefits, the developer should commit to employing local community members to fill the low and medium skilled jobs, as far as possible.

4.3.3 Operational Phase Activities

Turbines are designed to operate continuously, unattended and with low maintenance for more than 20 years, or greater than 120,000 hours of operation. Once operating, the proposed wind turbines will be monitored and controlled remotely, with a mobile team brought to site for maintenance, when required. Approximately 35 permanent jobs, 25 highly skilled, five semi-skilled and five unskilled job opportunities would be available during the operational phase. There would be basic operation and maintenance buildings, including a storage facility, site office and workshop area. The central laydown area/s and construction site camp will however be decommissioned and form part of the rehabilitation of the area.

The WEF will be monitored and controlled remotely using telemetric systems. This will enable the operator of the facility to remotely monitor activity on site, including the performance of the turbines, and be able to make adjustments to ensure optimum performance of the facility. Should there be a security threat, or if there is an equipment malfunction, personnel will be deployed to attend to the situation on an ad hoc basis.

During the operational phase, the site will remain available to the farmers as rangeland or retained as wilderness area. The areas disturbed during the construction phase will be rehabilitated in a phased approach during this operational phase.

A post construction monitoring programme for birds and bats will also continue into the operational phase, in accordance with the best-practise applicable at the time.

The proponent intends to apply for an Independent Power Producer (IPP) contract in an upcoming bid round of the Department of Energy's (DoE) *Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)*. Construction of the WEF is expected to commence within 4-6 months of being selected as a preferred bidder.

4.3.4 Decommissioning Phase Activities

The proposed project has an intended project lifespan of at least 20 years, based on the mechanical characteristics of the turbines, and the fact that a maximum of a 20-year power purchase agreement can be signed with Eskom under the REIPPPP programme. At the end of the 20-year operational phase, the lifespan of the Kokerboom 3 Wind Farm may be extended (subject to the necessary authorisations and agreements with the landowners, Eskom and the DoE), in which case the turbines may be refurbished / upgraded, or replaced with the latest turbine technology at that time. Alternatively, should the lifespan of the Kokerboom 3 Wind Farm not be extended beyond the 20-year operational phase, the facility will be decommissioned.

The decommissioning is expected to take between 12 to 18 months. After disconnecting the WEF infrastructure from the electricity network, the components of the facility would be disassembled, removed and reused or recycled as far as possible. All underground cables would be excavated and removed or left *in situ* if appropriate. The buildings and associated infrastructure would be demolished and removed by an authorised company.

The rehabilitation of the disturbed areas would form part of the decommissioning phase. The aim would be to restore the land to its original substratum characteristics (or as near as possible). The prescribed restoration activities will be described in the EMPr.

The decommissioning phase will comply with the applicable legislation in effect at the time.

4.4 Project Need and Desirability

As introduced in Section 1.1 and supported by the numerous policies and legislation described in Chapter 2, the need for renewable energy is well documented. Wind energy is desirable as it:

- Creates a more sustainable economy by promoting South Africa's energy policy towards energy diversification;
- Reduces the demand on scarce resources such as water by promoting energy generating facilities which are less resource intensive;
- Assists in meeting nationally appropriate carbon emission targets in line with global climate change commitments by reducing reliance on coal as an energy source;
- Reduces and, where possible, eliminates pollution by using cleaner energy generating mechanisms and reducing the demand on carbon-based fuels;
- Promotes local economic development by creating jobs and promoting skills development; and
- Enhances energy security by diversifying generation to reduce reliance on coal, which is non-renewable, as a primary energy source and promoting renewable energy generation.

Table 4-3 below provides project specific answers to questions included in the Needs and Desirability Guideline[7].

Table 4-3: Need and Desirability of the Proposed Kokerboom 3 Wind Farm

Need and Desirability	
Need (Timing)	
Question	Response
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the	Renewable Energy projects have been prioritised in strategies at various municipal scales in the area. The Northern Cape Province aims to provide a "home" for Renewable Energy[8]. The Namakwa District Municipality (DM) aims to "enable development around the construction

[7] DEA&DP. 2011. Needs and Desirability Guideline.
[8] Northern Cape Department of Economic Development and Tourism. 2012. Northern Cape Province Economic Potential and Investment Profile.

relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?	of the 100 MW wind energy facility[9]". This would suggest that the site for Kokerboom 3 Wind Farm would be supported by the DM. The Hantam Local Municipality (LM) specifically includes the importance of renewable energy in the 2015 to 2020 development plan indicated in the 2020/2021 IDP. Apart from providing the business plans for attracting renewable energy projects to the area, the IDP also includes strategies relating to PPP and raising public awareness on green energy and energy saving, as well as climate change awareness programmes. The area proposed is currently zoned as Agricultural land. The respective landowners have signed an option for a long-term lease agreement with the Proponent. The leased land has very low agricultural potential and grazing could continue below the turbines and as such it would not negatively affect the economic viability of the farm. The additional income would safeguard the economic sustainability of the farms.
2. Should development or, if applicable, expansion, of the town/ area concerned in terms of this land use (associated with the activity being applied for) occur at this point in time?	Yes. The Hantam LM has identified renewable energy projects as one of its strategies going forward.
3. Does the community/ area need the activity and the associated land use concerned (is it a societal priority)?	Yes. The Hantam LM has identified the need to speed up economic growth and transform the economy in a sustainable manner and to provide a programme to build economic and social infrastructure. According to the 2020-2021 Integrated Development Plan (IDP) the LM aims to raise public awareness on green energy and energy saving. The proposed Kokerboom 3 WEF near Loeriesfontein would also benefit the local community directly. Firstly, it would be a source of income to the landowners and would improve the economic viability of the landowner's current farming operations. Secondly, it would also create job opportunities for the local community. Secondary economic benefits may include an increase in service amenities through an increase in contractors and associated demand for accommodation and other services.
4. Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	The necessary services are appropriate. The proposed Kokerboom WEF would connect to the national Eskom grid through the Helios MTS. Furthermore, the construction of the Khobab and Loeriesfontein WEFs resulted in infrastructure in the area (such as roads) being improved.
5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services)?	Yes. Although the project is not specifically mentioned in the municipal planning reports, reference is made of wind energy projects and the need to upgrade infrastructure to accommodate renewable energy developments. The Hantam LM IDP (specifically ward 5 (Loeriesfontein)) identifies the need for the paving of roads, identification of new water sources, promotion of renewable energy, awareness on biodiversity and improved engagement through PPP. The EIA process of this project can assist with the above needs through an increase of scientific assessment in the area. Water, sanitation and electrical services required for the construction and operation of the WEF will be provided by the appointed contractor, and additional municipal services are not expected to be required for the proposed development (e.g. potable water will be trucked to site, waste

[9] It is assumed that this refers to the 140 MW Loeriesfontein Wind Farm and/or the 140MW Khobab Wind farm, as these projects were awarded preferred bidder status in bidding window three of the REIPPPP. Construction of Loeriesfontein Wind Farm began in May 2015, as did the construction of Khobab Wind Farm.

	water will be collected in conservancy tanks and transported to an appropriate wastewater treatment site, on-site generators will be utilised etc.).
6. Is this project part of a national programme to address an issue of national concern or importance?	Yes. The establishment of the proposed facilities would would contribute towards meeting the national energy targets as set by the DoE, of a share of all new power generation being derived from IPPs. The 2010 Industrial Policy Action Plan (IPAP) recommends a sector focussed approach identifying key sectors with potential to be developed. The sectors identified in the IPAP2 document include **green energy saving industries especially wind.** The proposed WEF thus further facilitates the realisation of this development objective. The 2010 Integrated Resource Plan (IRP) developed by the DoE for the 2010 to 2030 period aims to achieve a "*balance between an affordable electricity price to support a globally competitive economy, a more sustainable and efficient economy, the creation of local jobs, the demand on scarce resources such as water and the need to meet nationally appropriate emission targets in line with global commitments*". The final IRP provides for an additional 14 400MW wind energy in the electricity mix in South Africa by 2030

5 CONSIDERATION OF ALTERNATIVES

The NEMA requires that alternatives are considered during the EIA process. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

The DEA&DP Guideline on Alternatives (2013)[10] states that: "*every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist.*"

The 2014 EIA Regulations (GN R982) (as amended) provide the following definition: "*Alternatives*", in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to the -

(a) property on which or location where the activity is proposed to be undertaken;
(b) type of activity to be undertaken;
(c) design or layout of the activity;
(d) technology to be used in the activity;
(e) operational aspects of the activity; and
(f) includes the option of not implementing the activity ("No-Go" alternative).

In addition to the list above, the 2013 DEA&DP Guidelines on Alternatives also considers the following as alternatives:

(a) **Demand alternative:** Arises when a demand for a certain product or service can be met by some alternative means (e.g. the demand for electricity could be met by supplying more energy or using energy more efficiently by managing demand).
(b) **Input alternative:** Input alternatives are applicable to applications that may use different raw materials or energy sources in their process (e.g. Industry may consider using either high sulphur coal or natural gas as a fuel source).
(c) **Routing alternative:** Consideration of alternative routes generally applies to linear developments such as power line servitudes, transportation and pipeline routes.
(d) **Scheduling and timing alternative:** Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.
(e) **Scale and Magnitude alternative:** Activities that can be broken down into smaller units and can be undertaken on different scales (e.g. for a housing development there could be the option of 10, 15 or 20 housing units. Each of these alternatives may have different impacts).

An important function of the Scoping Phase is to screen alternatives to derive a list of feasible alternatives that need to be assessed in further detail in the EIA Phase. The following types of alternatives are the most pertinent to the proposed project and are detailed further below:

- Location alternatives;
- Layout alternatives;
- Technology alternatives; and
- The "no-go" alternative.

[10] This guideline has been used as a best practice tool since it is the most recent guideline on alternatives.

5.1 Location Alternatives

The location for the Kokerboom 3 WEF was selected based on the following parameters:

- Good wind resource;
- Proximity to an Eskom substation which has sufficient capacity (or planned capacity) to support the proposed WEF project;
- Close proximity to Eskom Helios substation (i.e. shorter grid connection required, which minimises costs, energy losses and environmental impacts);
- Proximity of authorised transmission line for the original Kokerboom 3 WEF application (DEFF Ref. No.:14/12/16/3/3/1/1818).
- Relatively flat site, which makes construction easier and less expensive than on an undulating site;
- Relatively remote site (anticipated lower visual, noise and dust impacts);
- Existing landowner agreements and landowner support;
- Other WEFs have been constructed in the area (e.g. Loeriesfontein and Khobab Wind Farms), and existing haulage routes can be utilised. Also provides an opportunity to align the powerlines for the proposed WEFs with those of other WEFs in the area, thus limiting the disturbance corridors in the landscape;
- The land has a low agricultural potential and can only be used for low intensity livestock grazing;
- Knowledge gained from the original Kokerboom 3 EIA application and recent site visits completed by specialists, indicates that the site is feasible from an environmental sensitivity point of view; and
- The current application entails the revision of the existing authorised Kokerboom 3 project on the subject properties, and hence alternate sites outside of the subject properties could not be considered.

Based on these considerations, the Kokerboom 3 WEF site has been selected as the preferred alternative due to the favourable factors listed above.

5.2 Design and Layout Alternatives

A single site layout will be compiled and presented in the EIR, based on *inter alia* the following criteria:

- Technical constraints:
    - Spatial orientation requirements of turbines and associated infrastructure (e.g. roads); and
    - Layout relative to other existing infrastructure (e.g. powerlines), and operational WEFs.
- Environmental constraints:
    - Wind resource profile (this has significant technical constraints as well);
    - Topographical constraints, including surface and groundwater;
    - Biophysical constraints (presence of sensitive or protected plant or faunal communities or other environmentally sensitive features);
    - Required setbacks from property boundaries and other infrastructure (roads, powerlines etc.); and
    - Socio-economic constraints (such as visual, sensitive heritage areas, sensitive noise receptors, landowner requirements).

The site layout is anticipated to change during the EIA Phase in response to the environmental, social and technical sensitivities identified during the EIA process specialist assessments, and via engagement with the public and other stakeholders. The proposed WEF layout will therefore be developed and refined during the EIA process and will be presented in the EIR which will be made available for public comment. The layout will be designed taking all environmental sensitivities and constraints into consideration upfront, and the resultant design will be the optimal layout that meets all technical specifications while avoiding environmental sensitivities. Accordingly, a single layout will be assessed in the EIR phase.

For the purposes of this Scoping Phase assessment, the full extent of the study area on the subject properties has been considered. It is known that the layout of the Kokerboom 3 Wind Farm will be restricted to the extent of the property boundaries, with the ultimate positioning of turbines and associated infrastructure to be guided by the findings of the EIA process.

5.3 Technology Alternatives

The most important factors that are considered when selecting a turbine for any site are the annual average wind speed, reference wind speed, the return period for extreme wind conditions and wind direction (i.e. wind resource profile). other determining factors when selecting the preferred turbine are efficiency, full load hours and the capacity factor. The pricing of relevant technology at the time of construction is also a key factor, as well as the exchange rate for imported components. Turbine technology is also continually improving, with newer and more efficient turbine models being released on an ongoing basis. Based on these characteristics, a turbine which is best suited to the site will be selected closer to the time of construction and cannot be confirmed during the EIA process.

In order to derive the desired capacity for the WEF (up to 300MW), the Proponent is proposing to employ up to 60 turbines of up to 6.5 MW each. The turbines would have a hub height of up to 150 m and blades of up to 90 m in length (i.e. up to 180 m in rotor diameter).

The turbine selection will seek to maximise energy production, while taking financial feasibility and environmental constraints into account. Final turbine selection will only be made closer to the bid stage based on the turbines available in the market and exchange rates at the time etc. Turbine alternatives will not be considered as part of the EIA.

5.4 Routing Alternative for Linear Activities

5.4.1 Transmission Lines

As discussed in Section 4.2.2, a 132 kV overhead transmission line received environmental authorisation (DEFF Ref. No.:14/12/16/3/3/1/1818) independently to the authorised and proposed Kokerboom 3 WEF. This overhead transmission line will be used to evacuate the power from the proposed WEF into the national grid at the Eskom Helios substation.

Medium voltage (MV) cables, up to 33 kV, will be used to connect the turbines with the proposed onsite substation and will be placed underground within the road reserve.

5.4.2 Roads

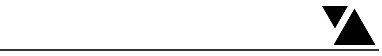
Route alternatives include different access and service route alternatives. Service route alternatives will depend on the micro-siting of the turbines and will thus only be finalised in the EIA phase.

Road routings will be designed to make use of existing farm tracks as far as possible, while minimising total road length and avoiding environmental sensitivities as far as possible.

The layout of the roads will therefore be influenced by the environmental constraints identified by the findings of this scoping phase and will therefore be included in the EIA phase.

5.5 No-Go Alternative

The assessment of alternatives must at all times include the “no-go” option as a baseline against which all other alternatives must be measured. The option of not implementing the activity must always be assessed and to the same level of detail as the other feasible and reasonable alternatives. The no-go will see the *status quo* farming activities persist, with the construction of the authorised Kokerboom 3 WEF, but without the proposed redesigned WEF (as described in this application). The “no-go” option is taken to be the existing rights on the



property, and this includes all the duty of care and other legal responsibilities that apply to the owner of the property and the holder of the EA for the Kokerboom 3 as authorised on 12/02/2018.

6 BASELINE ENVIRONMENT AND POTENTIAL IMPACTS

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the site and surrounding area and discussions with various role-players. The high-level identification of potential impacts which may occur as a result of the proposed activities described in Section 4.3 above is broad and covers the four phases of the project (i.e. pre-construction, construction, operation and decommissioning).

Construction of the adjacent Loeriesfontein Wind Farm and Khobab Wind Farm began in 2015. Potential impacts of the proposed revised Kokerboom 3 and 4 Wind Farms (proposed), as well as the authorised Kokerboom 1 and 2 Wind Energy Facilities, will be increased cumulatively by the other renewable energy projects in the area. These cumulative impacts will be assessed per environmental aspect accordingly.

Impacts of lesser importance have also been screened out, with reasons provided, to ensure that the EIA is focused on the potentially significant impacts only. The following environmental aspects are further discussed in this chapter below:

- Climate
- Topography, geology and soils
- Terrestrial ecology (excluding birds and bats)
- Bats
- Avifauna
- Aquatic ecology
- Heritage, archaeology and palaeontology
- Socio-economic aspects
- Agricultural production and potential
- Visual landscape
- Noise
- Traffic
- Electromagnetic Interference (EMI) & Radio Frequency Interference (RFI)

6.1 Climate

Description of Climate

According to the Köppen-Geiger climate classification[11], the Kokerboom 3 Wind Farm falls over three climatic units. These are described as cold and arid desert (BWk), hot and arid desert (BWh) and hot and arid steppe (BSk).

The following graphs describe the climatic parameters based on 30 years of hourly weather model simulations from a central point in Loeriesfontein[12]. Figure 6-1 illustrates the average temperatures and precipitation levels over a calendar year. The solid red and blue lines indicate the mean daily maximum and minimum respectively per month. The dashed red and blue lines show the average hottest day and coldest night of each month for the last 30 years. Precipitation falls throughout the year, with most falling in the winter months.

[11] Koppen climate classification. *Encyclopaedia Britannica.* (Online). https://global.britannica.com/science/Koppen-climate-classification [Accessed 15 October 2020].
[12] Meteoblue. 2020. Climate Loeriesfontein (30.95°S 19.44°E 902m). (Online). https://www.meteoblue.com/en/weather/forecast/modelclimate/loeriesfontein_south-africa_3364501 [Accessed 15 October 2020].

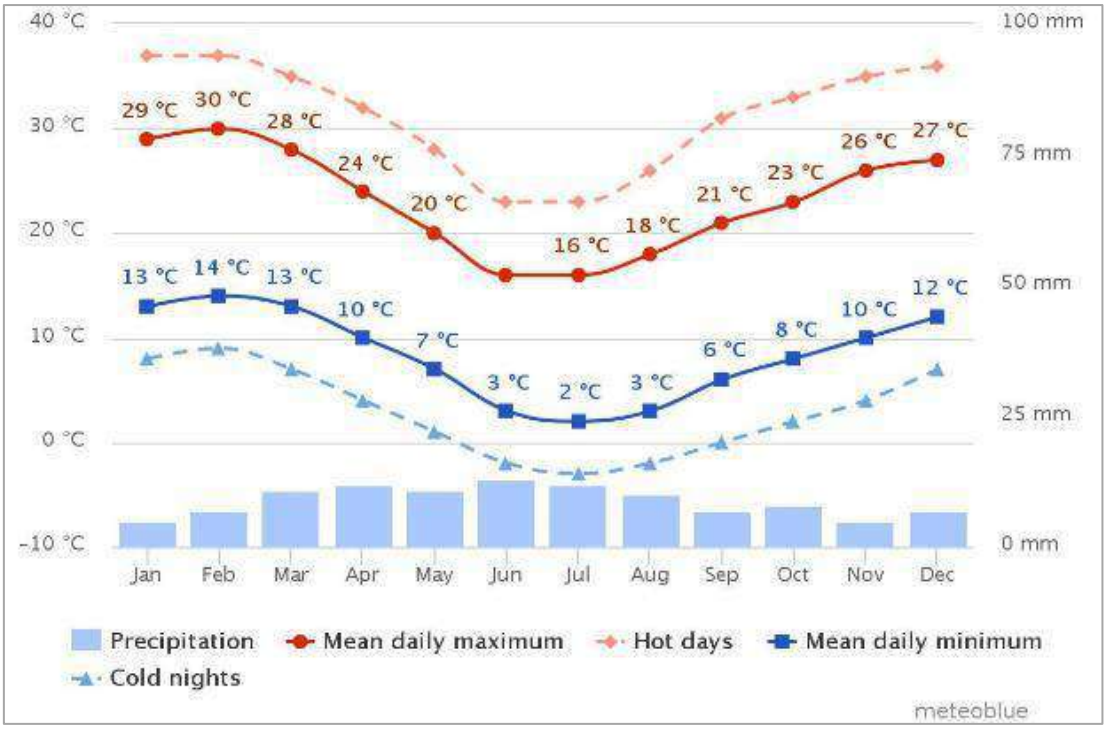


Figure 6-1: Average temperature and rainfall for Loeriesfontein

Although the average maximum temperature for February is 30°C (as an example), the temperature can go beyond 35°C for approximately six to seven days in the same month. This monthly distribution is illustrated below in Figure 6-2.

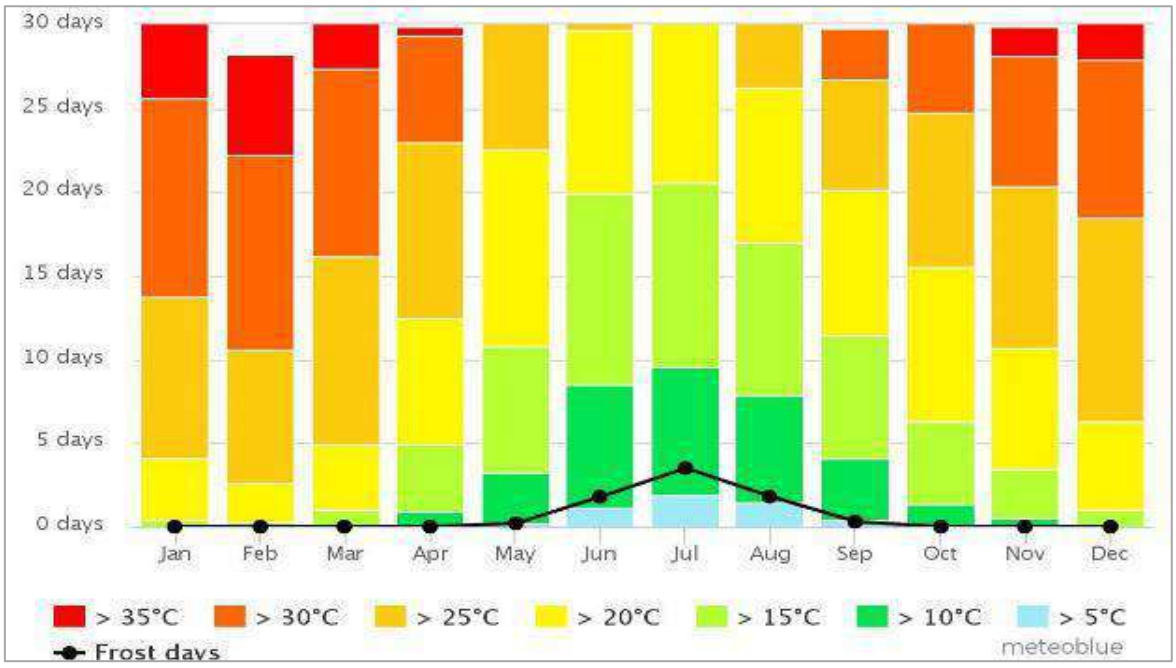


Figure 6-2: Monthly maximum temperature

Wind in the area is highest in summer reaching average speeds of 28 to 38 km/h. Figure 6-3 illustrates how these wind speeds are spread per month over a calendar year. In the graph, June to September have included days of exceptionally high wind speeds of higher than 38 km/h. **Figure 6-4** illustrates that the dominant wind direction is from the southwest. The wind rose shows how many hours per year the wind blows in a particular direction. Meteorological masts on the proposed site for the Kokerboom 3 WEF will assist in refining the climate data for the technical design of the WEF.

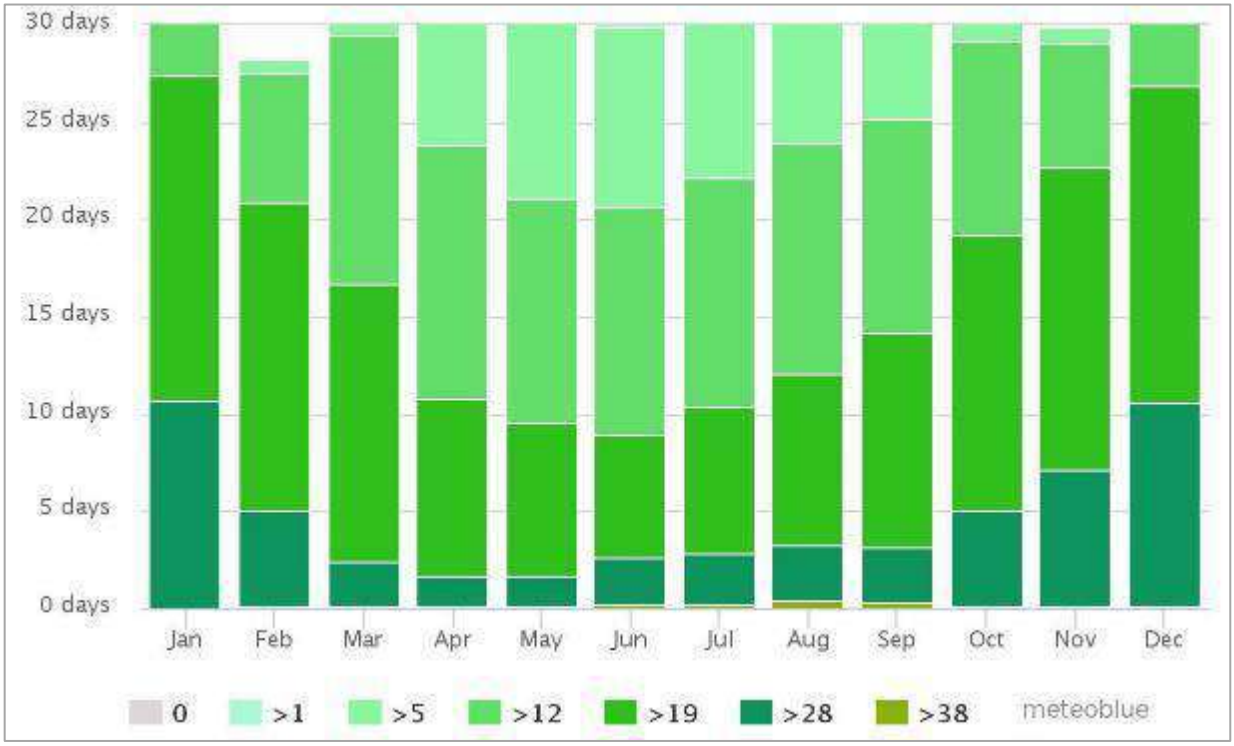


Figure 6-3: Monthly average wind speeds.

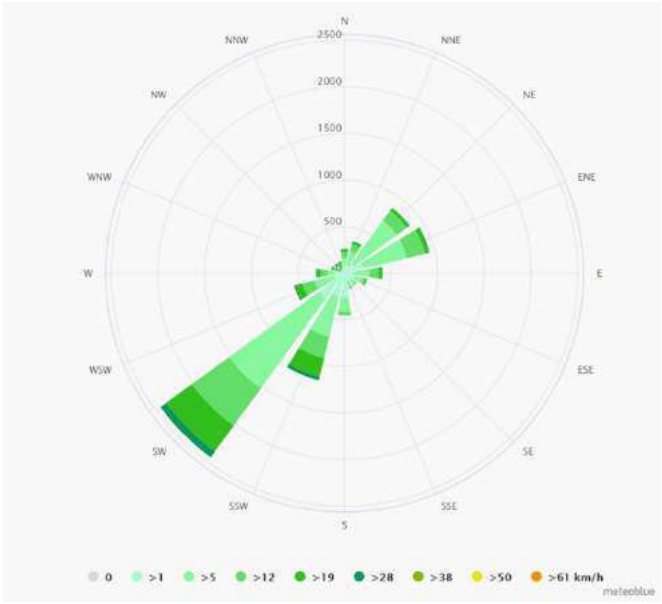


Figure 6-4: Wind rose for Loeriesfontein

6.2 Topography, Geology and Soils (Lanz, 2016 and Lanz, 2020)

This section provides a short summary of the topography, geology and soils. A full Agriculture and Soils Assessment was conducted during 2016 as part of the EIA process for the Kokerboom 3 WEF that was authorised in 2018 and located towards the south western parts of the properties. A further Site Sensitivity Verification and Compliance Statement was compiled during 2020 as part of the new EIA application process for Kokerboom 3 which is situated across the full extent of the properties. The Site Sensitivity Verification and Compliance Statement compiled by Lanz (2020) is available in Annexure D1.

Description of Topography, Geology and Soils

Kokerboom 3 Wind Farm is located on a relatively flat terrain with only slight undulations in the landscape tending down towards the north east. The altitude across the study area for Kokerboom 3 Wind Farm varies between approximately 915 m and 995 m above sea-level.

The underlying geology of the area is shale of the Ecca and Dwyka Groups of the Karoo Supergroup with dolerite intrusions of the Early Jurassic Karoo Dolerite Suite. The Ecca Group rocks (Prince Albert, Whitehill and Tierberg Formations) are very poorly exposed and deeply weathered near surface. The Karoo dolerites that crop out over the majority of the study area are also poorly exposed and deeply weathered. Soils in the study area are characterised by predominantly shallow, sandy soils on underlying rock or hard-pan carbonate. The predominant soil forms are Coega, Mispah, Glenrosa and Askham. Soils in the area are characteristic of having a high salt content. The natural surface erosion, typical of sparsely vegetated arid environments, is active, but there is no evidence of excessive, accelerated erosion, or other land degradation. The land is classified as having a low to moderate water erosion hazard, but it is classified as susceptible to wind erosion because sands, as a soil textural class, are dominant.

Potential Impacts

Topography will directly affect a number of impacts discussed further below. Erosion will be greater on slopes, and if there are any drainage lines in close proximity, this will increase the impact of sedimentation on the drainage system These impacts will be felt in both the construction and to a lesser degree during the operational phases of the project. The significance of these potential impacts will be assessed in the EIR, and mitigation measures will be included in the EMPr and stormwater management plan.

The geology and soils of the site are generally uniform across the site and are unlikely to be impacted upon by the WEF. The sandiness of the soils, together with the dry climatic winds (Section 1.1) may create dust on site, especially during the construction phase. This will be increased by the use of vehicles on site and site preparation activities.

Conclusions and Recommendations

As the topography of the area will play a role in the potential impacts associated with the proposed development, it is imperative that all of the features which make up the uniqueness of the land are assessed. As such, a comprehensive number of specialist studies have been undertaken which will directly inform the design and layout of the final proposal, thereby providing mitigation for as many potential impacts as possible.

The impact of dust will be further assessed in the EIR, and mitigation measures for dealing with dust pollution will be included in the EMPr. It would be necessary to consider the viability of dust suppression measures such as watering of roads in such a dry and remote location. Other mitigation alternatives may therefore need to be investigated.

Erosion will also be further assessed in the EIA Phase, and potential mitigation measures will be included in the EMPr. Topography, geology and soils on the site will also have significant technical considerations to the site layout, access routes and construction approach. As such, a geotechnical investigation will be undertaken outside of this EIA process.

6.3 Terrestrial Ecology (excluding birds and bats but inclusive of a butterfly sensitivity study) (Colloty, 2020 and Edge 2020)

Terrestrial ecology includes the floral and faunal components of the environment. Bats (Section □) and birds (avifauna) (Section 6.5) have been excluded from this section and are dealt with separately due to the direct impacts experienced by WEFs. Aquatic ecology has also been considered separately in Section 0.

An ecological specialist considered the terrestrial ecology of the area on a site visit in March 2020 provided a full scoping report which has been included in Annexure D2.

Description of Terrestrial Ecology

The site is located within the low rainfall region of South Africa, with a Mean Annual Precipitation (MAP) of between 100 -200 per annum usually in the summer months. The site is underlain with a rocky to sandy substrate derived from Mudstones and Shales from the Ecca Group and Dwyka Tillites. The area is thus characterised by very shallow soils, mostly with limestone/calcrete present. Dolerite outcrops varying in size are also present (Figure 6-5).

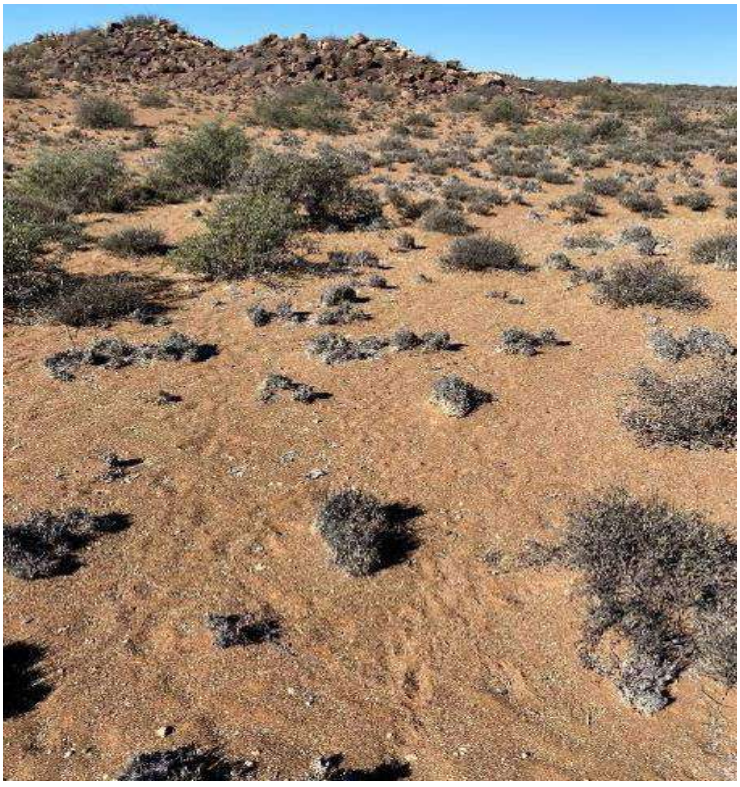


Figure 6-5: A view of one of the larger dolerite outcrops, with spoor evidence of animal use (tracks) between outcrops

Vegetation

The site is predominately located within Bushmanland Basin Shrubland (NKb 6) as defined by the National Vegetation Type Map (Mucina & Rutherford, 2007, updated in 2017/2018 (Refer Figure 6-6). This vegetation unit is dominated by dwarf shrubs, mostly succulents, interspersed in areas with grasses. No natural trees were observed within the site, with the exception of alien Prosopis trees. A secondary vegetation unit, associated with the large pans was also found within the site, namely Bushmanland Vloere (Azi 5) (Figure 6-7). This vegetation unit is described in more detail in the aquatic environment section of this report. The Bushmanland Basin Shrubland and Bushmanland Vloere vegetation types are not listed as a Threatened

Ecosystem as per the National Environmental Management Biodiversity Act, this due the vast area this vegetation units occupy, with little in terms of human / agricultural use.

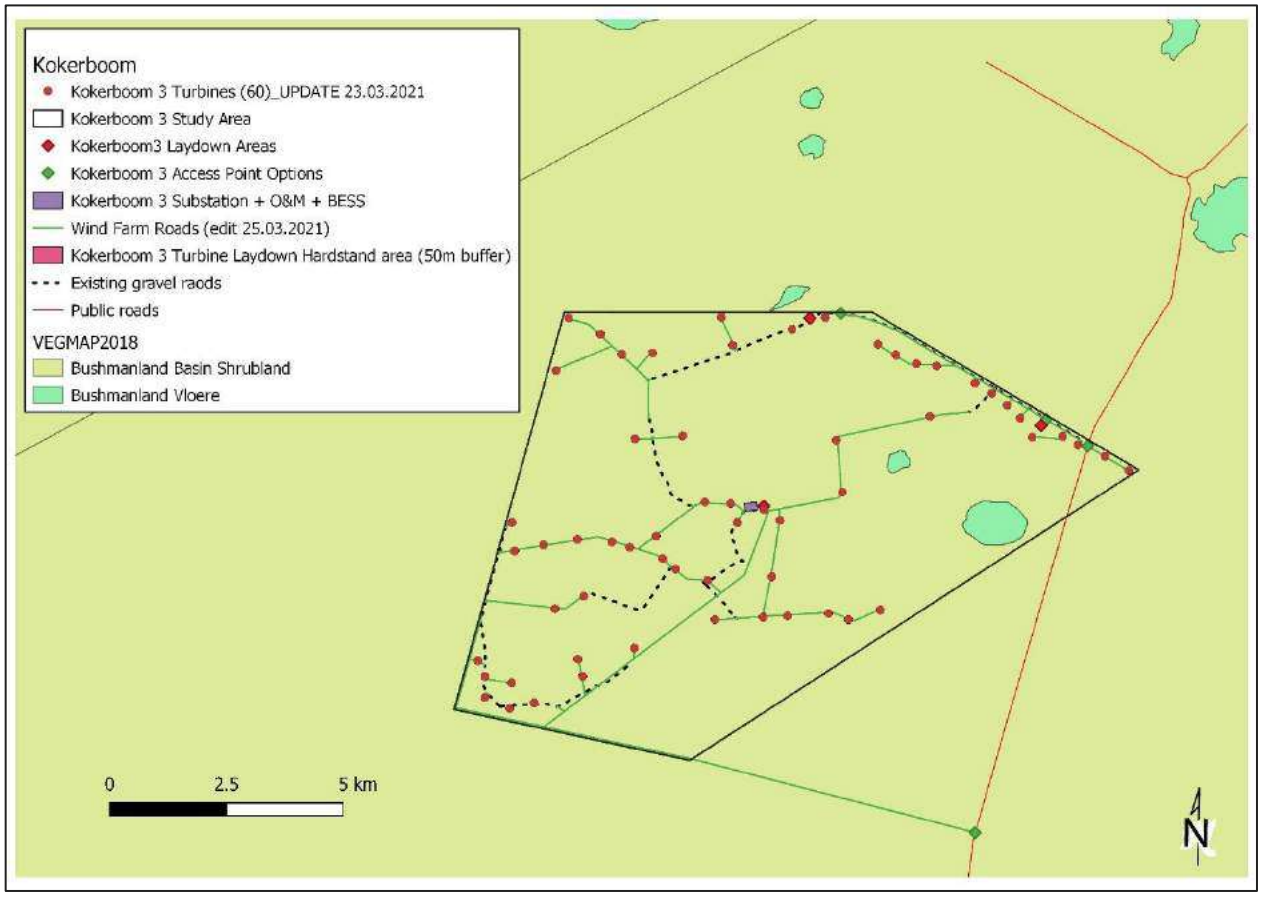


Figure 6-6: Project locality map indicating regional vegetation types as per the National Vegetation Type map updated 2017/2018

Figure 6-7: Bushmanland Vloere vegetation unit associated with the floor of the large Pan located within the site

The DFFE Screening Tool lists Plant Species 44, which was actively searched for, but suitable habitat and or the presence / absence of this species was not confirmed.

Based on the number, density and type of species observed within the site, it was clear that four sperate habitat units were observed. These included the following:

- Shale / calcrete dominated plains with succulent plant species such as Brownanthus ciliatus, Euphorbia decussata, Prenia tetragonia, Ruschia robusta, Zygophyllum retrofractum, Lycium pumilum, Aridaria noctiflora, Sceletium tortuosum, Phyllobolus nitidus, Cephalophyllum rigidum Drosanthemum lique, Octompoma quadrisepalum, Ruschia abbreviata, Galenia fruticosa, Exomis microphylla, Tetragonia fruticosa, Tripteris sinuate.
- Low lying drainage lines and alluvial watercourses, that were dominated by sandy alluvial with or without distinct channels that contained larger and more abundant herbaceous shrubs and grasses than the flat stony / shale plains. Plant species included, Phaeoptilum spinosum, Zygophyllum retrofractum, Salsola tuberculata, Rhigozum trichotomum, Stipagrostis namaquensis, Osteospermum armatum, Lycium pumilum, Lycium oxycarpum, Stipagrostis obtuse, Galenia sarcophylla, Salsola aphylla and Sesamum capensis. These areas also act as faunal corridors between the pans and Dolerite outcrops, with these three habitats containing higher numbers of animals (observed & spoor)
- Dolerite outcrops were mostly located in the northern central portion of the site, and ranged from small groups of boulders to large areas of weathered outcrop of exposed rock. Plant species assemblages varied within these areas, and species assemblages reflected the adjoining habitats. It is also proposed that this the only habitat in close proximity to any of the wind farm infrastructure be buffered by 20m.
- Pans and depressions (Bushmanland Vloere vegetation unit) ranged from bare sandy areas to vegetated pans, although containing evidence that these were close to saline, i.e. dried salt crusts or saline tolerant species such as Salsola aphylla and Salsola tuberculata

Terrestrial fauna

A detailed review of past literature as well as spatial species databases / atlases was also conducted to produce a species checklist prior to the field work being conducted (Appendix 1 of the Ecological Assesment). The animal species observed were limited to invertebrates, birds and reptiles shown in Table 6-1.

Faunal diversity observed due to the state and size of the site was thus low, when compared to the anticipated species known to occur in the region. It is also anticipated that the invertebrate and reptile species numbers could be higher but limited by the dry conditions prior to the survey period.

No species observed on site are listed as IUCN Red Data species, but all indigenous fauna is protected under the NCNCA, i.e. provincially protected.

Reference is also made to the Butterfly assessment attached (Appendix 4 of the Scoping Ecological Assessment) where it is anticipated that the Trimen's Opal, Chrysoritis trimeni (identified as potentially present in the DFFE screening tool), listed as Vulnerable, is not likely to occur within the site.

Anticipated mammal diversity was also low within the site, with approximately 40 species likely to occur within the region. Species observed were mostly small mammals, found on the higher lying ridges or rocky outcrop area within the site as shown in Table 6-1. No Red Data listed species were observed but do receive protection under the provincial NCNCA.

Table 6-1: Faunal species observed within the site

Taxon	Common Name	Conservation status and habitat	Site observation
Invertebrates			
Locusta pardalina	Brown locust	Least Concern	Several observed within the site
Belenois aurota	Brown veined white	Least Concern (SABCA 2013)	
Junonia hierta cebrene	Yellow pansy	Least Concern (SABCA 2013)	
Reptiles			
Dispholidus typus	Boomslang	Least Concern (ARRSA, 2014) Widespread	Observed in dense tree cover near old farmstead
Pedioplanis namaquensis	Namaqua Sand Lizard	Least Concern (ARRSA, 2014)	Rocky outcrops
Meroles suborbitalis	Spotted Desert Lizard	Least Concern (ARRSA, 2014)	Exposed shales
Nucras tessellata	*Western Sandveld Lizard*	Least Concern (ARRSA, 2014)	Rocky outcrops
Agama atra	Southern Rock Agama	Least Concern (ARRSA, 2014)	Rocky outcrops
Agama aculeata subsp. aculeata	Ground Agama	Least Concern (ARRSA, 2014)	Exposed shales
Psammobates tentorius tentorius	Karoo Tent Tortoise	Least Concern (ARRSA, 2014)	9 observed throughout the site, three suffering from severe dehydration (Plate 6)
Mammals			
Hystrix africaeaustralis	Cape Porcupine	Least Concern (RDB, 2016)	Spoor or quills evident
Orycteropus afer	Aardvark	Least Concern (RDB, 2016)	Burrows and spoor
Cynictis penicillata	Yellow Mongoose	Least Concern (RDB, 2016)	Near roads
Otocyon megalotis	Bat-eared Fox	Least Concern (RDB, 2016)	Roadkill on public road
Lepus capensis	Cape Hare	Least Concern (RDB, 2016)	Spoor
Vulpes chama	Cape Fox	Least Concern (RDB, 2016)	Spoor and observed late evening

Butterflies

Chrysoritis trimeni (VU)

The DFFE online Screening Tool identified this butterfly species – listed as Vulnerable – as potentially occurring on the site. This butterfly has only been recorded on the northern Namaqualand coast in the Northern Cape from Noep in the south to Port Nolloth (MacDougall's Bay) in the north. It has been recorded in vegetation types SKs1 (Richtersveld Coastal Duneveld), SKs4 Richtersveld Sandy Coastal Scorpionstailveld, SKs7 (Namaqualand Strandveld) and SKs8 (Namaqualand Coastal Duneveld). It only occurs on coastal dunes in the Succulent Karoo biome.

Its recorded larval host plants at these localities are:

Thesium (species unknown) (Santalaceae)

Roepera (= Zygophyllum) flexuosa (Eckl. & Zeyh.) Beier & Thulin (Zygophyllaceae)

Roepera (=Zygophyllum) morgsana (L.) Beier & Thulin (Zygophyllaceae)

Osteospermum oppositifolium (Aiton) B. Nord. (Asteraceae)

Colloty (2020) reported that three Thesium species and Zygophyllum flexuosum occurred at the Kokerboom site. No records of butterfly species have been recorded by the Virtual Museum from the Kokerboom project site (Edge,2020).

The specialist investigation concludes that this butterfly could not possibly occur on the Kokerboom site, because its closest known occurrence is 250 km to the west, where it occurs in a different biome (Succulent Karoo), on coastal dunes.

Potential impacts

Impacts by the proposed wind energy facility on the ecology of the study area will largely relate to the loss of biodiversity and habitat as vegetation will need to be cleared within designated footprints. In addition, alien plant seeds could be introduced with construction material such as sand or other materials. Disturbed areas would be particularly vulnerable.

However, the significance of the loss of biodiversity should not be high. This is due to the vegetation type considered as least threatened, as well as the limited geographic extent of the proposed wind energy facility. The transformation of the landscape to a wind farm would not result in a large-scale disturbance and fragmentation of vegetation.

The negative impact of habitat loss on vegetation and fauna would be applicable to the pre-construction and construction phases. No significant impact should be felt during the operational phase. In the decommissioning phase, the rehabilitation of the area could contribute to a positive impact, resulting in an increase in biodiversity if mitigation measures are adhered to.

Slower moving fauna are at risk of being killed during the construction phase and, as such, this phase must be properly managed through the implementation of an EMPr which would include mitigation measures such as a search and rescue amongst other measures, which would reduce the potential impact.

As highlighted above the following impacts on the ecological environment have been identified:

Construction and to a degree the Operational and Decommissioning Phases were relevant

- Direct loss of vegetation and or important habitat (Construction & Decommissioning)
- Direct loss of any faunal species (Construction & Operational)
- Direct loss of any species of special concern (Fauna & Floral) (Construction)
- Increase risk of alien plant invasion (Project lifespan)

Construction and operational phase only

- Cumulative impacts on the terrestrial resources of the area
- Cumulative impacts on the aquatic resources of the area
- No-go option

Conclusion and recommendation

Several Very High Sensitivity Habitats were observed and mapped, and these were then considered No-Go for any new infrastructure, while Moderate and Low sensitivity areas could be considered for development. The only exception being road crossings and transmission lines would be considered within No-Go area if these areas are spanned and or located within existing disturbance footprints (e.g. roads within existing farm tracks).

Based on the findings of this study and the preliminary impact assessment, the specialist finds no reason to withhold to an authorisation of any of the proposed activities, assuming that key mitigations measures are implemented. This is based on the consideration that with the exception of several minor drainage line crossings, the remaining Very High & Moderate Sensitivity areas have been avoided.

During the EIA phase of this report, the following plans will be developed for inclusion in the EMPr:

- Draft Plant and Animal Search and Rescue Plan
- Draft Alien plant management plan

- Draft Rehabilitation Plan

The proposed Kokerboom development area was rated by the Screening Tool as being of “Medium” sensitivity for animals because of the possibility of the occurrence of a butterfly species of conservation concern Chrysoritis trimeni. This investigation has revealed that this butterfly could not possibly occur on the Kokerboom site, because its closest known occurrence is 250 km to the west, where it occurs in a different biome (Succulent Karoo), on coastal dunes. No other butterfly species of conservation concern have been recorded at, or in the vicinity of the Kokerboom 3 site.

6.4 Bats (Dippenaar, 2020)

This section provides a summary of the bat specialist report, the full Bat Impact Assessment compiled by Dippenaar (2020) is available in Annexure D3.

Bat impact assessments, which in South Africa are guided by 12 months of pre-construction bat monitoring, are a key specialist component of the EIA process for a wind farm.

A full 12-month monitoring study was previously done over all land parcels that encompassed the original Kokerboom 3 WEF area, as part of the original Kokerboom 3 EIA. This study was conducted during 2015 and 2016, by Animalia Consultants (Animalia Consultants, 2017(a)). Stephanie Dippenaar Consulting was subsequently appointed by Business Venture Investments No. 2105 (Pty) Ltd to undertake a bat monitoring study to assess the impacts of the revised proposed Kokerboom 3 Wind Farm. The winter season was omitted as a substantial section of the site was already investigated and the previous monitoring study found bat activity to be very low during the winter months. Bat monitoring commenced on 16 August 2019, when static recorders were installed, and monitoring was completed on 5 June 2020.

Baseline Description of Bat Environment

The presence of bats in an environment are largely connected to areas providing roosting and foraging habitats. A few roosting resources are available on site; however, they are in relatively low abundance. Vegetation types, and the presence of houses and buildings, are therefore suitable indicators for potential roosting sites. The presence of watercourses and certain vegetation types providing insect habitat would be indicators of potential foraging sites. Bats that are expected to be present on site are listed in Table 6-2.

Table 6-2: Potential bat species occurring on the Kokerboom 3 Wind Farm

Highlighted yellow cells indicate confirmed presence at the development site. Likelihood of fatality risk as indicated by the pre-construction guidelines (MacEwan et al., 2020).

Family	Species	Common Name	SA conservation status	Global conservation status (IUCN)	Roosting habitat	Foraging functional group	Migratory behaviour	Likelihood of fatality risk	Bats confirmed on site	
									2015-2016	2019-2020
MINIOPTERIDAE	*Miniopterus natalensis*	Natal long-fingered bat	Near Threatened	Near Threatened	Caves	Clutter-edge, insectivorous	Seasonal, up to 150 km	Medium-High	✓	✓
NYCTERIDAE	*Nycteris thebaica*	Egyptian slit-faced bat	Least Concern	Least Concern	Cave, Aardvark burrows, road culverts, hollow trees.	Clutter, insectivorous, avoids open grassland, but might be found in drainage lines	Not known	Low		
MOLISSIDAE	*Tadarida aegyptiaca*	Egyptian free-tailed bat	Least Concern	Least Concern	Roofs of houses, caves, rock crevices, under exfoliating rocks, hollow trees	Open-air, insectivorous	Not known	High	✓	✓
	Sauromys petrophilus	Robert's Flat-faced bat	Least Concern	Least Concern	Narrow cracks, under exfoliating rocks and in crevices.	Open-air, insectivorous	Not known	High		
RHINOLOPHIDAE	*Rhinolophus clivosus*	Geoffroy's horseshoe bat	Near Threatened	Least Concern	Caves, old mines.	Clutter, insectivorous		Low		
VESPERTILIONIDAE	*Neoromicia capensis*	Cape serotine bat	Least Concern	Least Concern	Roofs of houses, under tree bark, at base of aloes	Clutter-edge, insectivorous	Not known	Medium-High	✓	✓
	Eptesicus hottentotus	Long-tailed serotine (endemic)	Least Concern	Least Concern	Caves, rock crevices, rocky outcrops	Clutter-edge, insectivorous	Not known	Medium	✓	
	Cistugo seabrae	Angolan wing-gland bat (endemic)	Vulnerable	Near Threatened	Possibly buildings, but no further information is available	Clutter-edge, insectivorous	Not known	Low		

Potential Impacts

Although most bats are highly capable of advanced navigation through the use of echolocation and excellent sight, they are at risk of physical impact with the blades of wind turbines. The incidence of bat fatalities for migrating species has been found to be directly related to turbine height, increasing exponentially with altitude, as this disrupts the migratory flight paths. Historically, it was understood that most bat mortalities around wind farms were found to be caused by barotrauma[13], however more recent studies[14] have argued that the majority of bat fatalities are caused by direct collision with the blades.

To avoid significant negative impacts to bats during the operational phase, an effective mitigation measure is avoidance via appropriate siting of turbines. During the pre-construction monitoring period, the bat specialists undertake an exercise to map the sensitivities of the area, as it relates to bats. This is based on features identified to be important for foraging and roosting (based on literature) that are likely to be present on the site. Each monitoring period refined this map based on site findings. The outcome of the sensitivity map will assist in identifying sensitive environments to avoid in the placement of turbines. The final sensitivity map will be included in the EIR. Table 6-3 below describes the categories that will be used in the sensitivity map.

Table 6-3: Description of sensitivity categories utilised in the sensitivity map

Sensitivity	Description
Moderate Sensitivity	Areas of foraging habitat or roosting sites considered to have significant roles for bat ecology. Turbines within or close to these areas must acquire priority (not excluding all other turbines) during pre/post-construction studies and mitigation measures, if any is needed.
High Sensitivity	Areas that are deemed critical for resident bat populations, capable of elevated levels of bat activity and support greater bat diversity than the rest of the site. These areas are 'no-go' areas for turbines and turbines must not be placed in these areas.

Once the operational period commences, a bat specialists will be required to conduct a period of operational monitoring in accordance to conditions included in the environmental authorisation and/or in accordance with the best-practise guidelines in effect at the time. During this time, if bat fatalities exceed the applicable thresholds then measures to mitigate and minimise the impact should be implemented.

Conclusion and Recommendations

The site is located within an arid region that experiences a winter rainfall regime. The land is currently chiefly used for extensive grazing for mainly sheep livestock. It is a dry, open landscape of large livestock farms located within the Nama-Karoo biome and occupies the Bushmanland Basin Shrubland and Bushmanland Vloere vegetation units. A few roosting resources are available for bats on site; however, they are in relatively low abundance. The vegetation across majority of the site will host foraging and commuting activities of bats. High bat activity is anticipated within and around the pans on site once they receive precipitation.

The proposed wind farm falls within the distribution ranges of five families and approximately eight species. Calls of three species, Miniopterus natalensis (Natal long-fingered bat), Neoromicia capensis (Cape serotine bat) and Tadarida aegyptiaca (Egyptian free-tailed bat), were recorded by the detectors over the monitoring program. However, four species have been confirmed on site as the previous bat monitoring study conducted over 2015 – 2016 detected an additional species namely *Eptesicus hottentotus* (Long-tailed serotine bat). Tadarida aegyptiaca was the most abundant species on site and was the only species to be recorded at 100 m height. This is a high, fast flying species that forages in open spaces high above the ground and is at high risk of fatality from wind farms. Met Mast B, located in the northern reaches of the site, recorded the highest

[13] Barotrauma occurs where low air pressure found around the moving blades of wind turbines, causes the lungs of a bat to collapse, resulting in internal haemorrhaging which is fatal (Kunz et al. 2007).
[14] Rollins, K.E., Meyerholz, D. K. and Johnson, G.D. 2012. A Forensic Investigation into the Etiology of Bat Motrality at a Wind Farm: Barotrauma or Traumatic Injury? *Veterinary Pathology*, 41, 362-371).

number of calls. Overall low bat activity has been recorded over August 2019 to January 2020. Lower relative bat activity is likely due to the prolonged dry veld conditions and drought. Currently, it appears that the veld cannot sustain substantial insect populations and thus will not host high bat abundance either, but during a rainy spell it is expected that bat activity will increase. Substantial increases in activity levels were then recorded from February 2020 to June 2020.

The construction, operational, and cumulative impacts of the proposed Kokerboom 3 WEF will be assessed. Relative bat activity levels and weather conditions were used in tandem to compile a mitigation scheme of curtailment detailed in section 7 of the specialist report. The curtailment schedule must be applied to the eight turbines located within medium sensitivity areas of the site immediately after turbine installation. The turbine numbers are KOK3V1-01, KOK3V1-02, KOK3V1-11, KOK3V1-15, KOK3V1-28, KOK3V1-45, KOK3V1-46, and KOK3V1-47. A further mitigation measure to be applied to all turbines from installation throughout the operational lifespan of the WEF, is to limit free-wheeling of blades from dusk to dawn below the cut-in speed of the turbines by feathering the blades below cut-in. Lastly, a summary of a construction and operational bat monitoring plan will be included in the EMPR. The curtailment schedule should be updated based on the bat specialist findings during the operational monitoring program.

A minimum of two years post-construction monitoring should commence when the turbine blades start to turn. This, together with all mitigation measures, should be included in the EMPR of the environmental impact assessment. If results show high fatality rates, above the thresholds for Nama-Karoo, more stringent mitigation measures should be implemented immediately.

6.5 Avifauna (Van Rooyen 2020)

This section provides a summary of the avifaunal specialist report, the full Avifauna Impact Assessment compiled by Van Rooyen (2020) is available in Annexure D4.

The proposed Kokerboom 3 Wind Farm study area comprises habitat which may sustain several bird species which may be impacted by the proposed facility. The pre-construction monitoring protocol was designed in accordance with the *"Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa"* (Jenkins *et al.* 2011) which was published by the Endangered Wildlife Trust (EWT) and BirdLife South Africa (BLSA) in March 2011, and subsequently revised in 2011, 2012 and 2015. In accordance with these guidelines monitoring was implemented during 2-8 July 2019 (Winter), 11-14 November 2019 (Spring), 4-10 January 2020 (Summer) and 15-22 March 2020 (Autumn). The monitoring period consisted of four site visits, roughly every three months, to represent the four seasons. The objective of pre-construction monitoring is to obtain baseline data on the abundance and diversity of birds at the site with a suitable control site to measure the potential displacement effect of the WEF. Furthermore, it is to also identify the flight patterns of priority species at the site to measure the potential collision risk with the turbines.

Baseline description of Avifaunal Environment

As discussed above in Section 6.3, the vegetation of the Kokerboom 3 Wind Farm is mapped as Bushmanland Basin Shrubland. This vegetation type consists of a mixture of small-leaved shrubs and shrubby succulents with drought resistant grasses. The Karoo avifauna characteristically comprises ground-dwelling species of open habitats, with several species' characteristic of arid woodland in the tree-lined watercourses. Due to the dry climatic conditions, however, there are limited perennial waterbodies in the area. The nearest important bird area is located approximately 55 km to the north of the proposed Kokerboom 3 Wind Farm.

The proposed WEF is located on a vast flat plain with a mixture of gravel and sandy areas. The vegetation consists of Bushmanland Basin Shrubland. Bushmanland Basin Shrubland consists of dwarf shrubland dominated by a mixture of low, sturdy and spiny (and sometimes also succulent) shrubs (*Rhigozum, Salsola, Pentzia, Eriocephalus*), 'white' grasses (*Stipagrostis*) and in years of high rainfall also abundant annual flowering plants such as species of *Gazania* and *Leysera* (Mucina & Rutherford 2006). A number of ephemeral drainage lines flow though the study area, but they only hold water for brief periods after exceptional rainfall events, which are rare events.

It is estimated that a total of 225 bird species could potentially occur in the broader area.

Between July 2019 and March 2020, four site visits were undertaken by the avifaunal specialist. It is estimated that a total of 225 bird species could potentially occur in the broader area and of these, 32 species are classified as priority species.During the monitoring periods 48 bird species were recorded, of which 7 are considered priority species. These Red List species are listed below in Table 6-4. The list of species identified to date have been included in Annexure D and will be updated in the EIA Phase.

Table 6-4: Priority species identified on site and listed as Threatened on the IUCN Red

Scientific name	Common name	Conservation status[15]
Falco rupicoloides	Greater Kestrel	LC - Least concern
Eupodotis vigorsii	Karoo Korhaan	LC - Least concern
Neotis ludwigii	Ludwig's Bustard	EN - Endangered
Afrotis afraoides	Northern Black Korhaan	LC - Least concern
Melierax canorus	Pale Chanting Goshawk	LC - Least concern
Calendulauda burra	Red Lark	VU - Vulnerable
Bubo africanus	Spotted Eagle-Owl	LC - Least concern

[15] IUCN. 2016. The IUCN Red List of Threatened Species. Version 2016-1. Online. www.iucnredlist.org [Accessed on 20 November 2020].

Red Larks (*Calendulauda burra*) (illustrated in Figure 6-8), which are marked as a priority species, have been noted to be present on site. Whilst the numbers have been recorded in moderate numbers, the provisional spatial analysis of Red Lark records indicates that the species is found all over the site. This is to be expected as the habitat is very uniform. Red Larks conduct display flights when breeding, which is opportunistic and can happen at any time following rains. Most breeding activity takes place between August and May[16].

The priority species which could occur with some regularity at the proposed Kokerboom 3 WEF can be classified as either terrestrial species, soaring species or occasional long-distance fliers. Terrestrial species spend most of the time foraging on the ground. They do not fly often and when they do, they generally fly for short distances at low to medium altitude. At the application site, Northern Black Korhaan, Ludwig Bustard, and Karoo Korhaan and Kori Bustard are included in this category. Occasional long-distance fliers generally behave as terrestrial species but can and do undertake long distance flights on occasion. Species in this category are Ludwig's Bustard, Greater Flamingo and Lesser Flamingo, although the latter two species are not expected to occur regularly. Soaring species spend a significant time on the wing in a variety of flight modes including soaring, kiting, hovering and gliding at medium to high altitudes. At the application site, these include all the raptors which could regularly occur i.e. Black-shouldered Kite, Lanner Falcon, Booted Eagle, Martial Eagle, Greater Kestrel and Southern Pale Chanting Goshawk. Based on the time spent potentially flying at rotor height, soaring species are likely to be at greater risk of collision.

Specific behaviour of some species might put them at risk of collision, e.g. display flights of Northern Black Korhaan and Red Lark may place them within the rotor swept zone, potentially resulting in mortalities (Ralston-Paton & Camagu 2019). However, both the number and altitude of display flights of Red Larks decrease significantly at wind speeds of above 2.5m/second (R. Colyn pers. comm). The typical cut-in speed for the turbines at the WEF will be 3m/second (measured at hub-height), which significantly decreases the risk of collisions. It is notable that there are no published records of Red Lark fatalities thus far at operational wind farms in South Africa (Ralston-Paton & Camagu 2019). The collision risk for Red Larks are limited to periods of active display flights at the onset of and during breeding events. Active display flights, and therefore breeding events, are triggered by rainfall events which takes place in an unpredictable manner on a temporal and spatial scale. The display activity gets triggered by rainfall events of 15mm or higher, and the activity lasts up to four weeks after the event (R. Colyn pers. comm). The rainfall events can be either single large or multiple smaller events over a week which would be a potential trigger for breeding events. The level of display flight activity and altitude is largely governed by the wind strength. All flight activity and altitude are significantly reduced at wind speeds above 2.5m/s (measured at ground level).

Figure 6-8: Red Lark, *Calendulauda burra*. (Source: www.avianleisure.com**)**

16 Hockey, P.A.R, Dean, W.R.J and Ryan, P. 2005. Robert's birds of southern Africa (Vii) edition. The John Voelcker Bird Book Fund, Johannesburg.

Potential Impacts

The key issue as far as Red Larks are concerned, is the lower tip height of the turbine. The impact in terms of ranging tip heights will therefore be considered further in the EIR Phase.
Potential negative impacts caused by the proposed Kokerboom 3 Wind Farm on avifauna in general include:

- Collision mortality on the wind turbines
- Displacement due to disturbance
- Displacement due to habitat transformation.

Conclusions and Recommendations

- Collision mortality on the wind turbines
    - In general, very little flight activity of priority species was recorded during the vantage point (VP) watches, with an overall passage rate for priority species over the VP observation area (all flight heights) of 0.1 birds/hour. This is in the same range to what was recorded at the neighbouring Khobab, Loeriesfontein 2, Kokerboom 1 and 2, Leeuwberg and Dwarsrug sites during pre-construction monitoring (all of these sites received environmental authorisation).
    - Southern Pale Chanting Goshawk emerged as the species with the highest potential collision risk score i.e. with a risk rating 2.7 times higher than the average risk rating for priority species.
    - Red Lark emerged with the second highest collision rating, although it was still below the average risk rating for priority species. The greatest risk of collisions is associated with display flights, which can at times result in the birds entering the lower reaches of the turbine swept area. However, both the number and altitude of display flights of Red Larks decrease significantly at wind speeds of above 2.5m/second (R. Colyn pers. comm), which greatly reduces the risk of collision mortality. No Red Lark mortality has so far been recorded at the neighbouring Loeriesfontein 2 and Khobab wind farms.
    - Karoo Korhaan emerged with the third highest collision rating, although still below the average for priority species. There are currently no published records of this species being killed through turbine collisions (Raltson-Patton & Camagu 2019).
    - No flight activity was recorded for priority species other than Southern Pale Chanting Goshawk, Red Lark and Karoo Korhaan.
    - The potential for collisions with the wind turbines due to presence of lights is not envisaged to be a major contributing factor at the Kokerboom 3 site, primarily because the phenomenon of mass nocturnal passerine migrations is not a feature of the study area. It may however heighten the risk of collisions for Spotted Eagle-Owl, if insects are attracted to the lights which in turn attract the birds.
    - It should be possible, through the application of appropriate mitigation measures, to restrict the impact of collision mortality on priority species through collisions with the turbines to a low level of significance.
- Displacement through disturbance during the construction phase
    - Appropriate buffer zones need to be implemented to prevent potential disturbance of breeding priority species. Only Southern Pale Chanting Goshawk were recorded at a potentially active nest at Kokerboom 3 which will require a buffer zone.
    - It is inevitable that a measure of displacement will take place for all priority species during the construction phase, due to the disturbance factor associated with the construction activities.

This is likely to affect ground nesting species the most, as this could temporarily disrupt their reproductive cycle. Regularly occurring species which fall in this category are Red Lark, Ludwig's Bustard, Northern Black Korhaan, Karoo Korhaan and Spotted Eagle-Owl and some which may occur but less regularly such as Sclater's Lark and Kori Bustard. Some species might be able to recolonise the area after the completion of the construction phase, but for some species this might only be partially the case, resulting in lower densities than before once the WEF is operational, due to the disturbance factor of the operational turbines.

- Through the application of appropriate mitigation measures, the impact of displacement due to disturbance on priority species can be kept at a low level of significance.

- Displacement through habitat transformation during the construction phase

  - Micro-habitat modelling has shown that the site contains areas of good to very good habitat for the endemic and range restricted Red Lark, with an expected density of 0.015 birds per/hectare averaged over all habitat types (Spatiallytics 2020). These areas are mostly sandy areas with grasses and shrubs as opposed to gravel plains with shrub. This translates into a population of approximately 684 birds for the 10 265 hectares which comprise the total surface area covered by the Kokerboom 3 WEF land parcels. If a 90m buffer is drawn around all 60 turbines, based on the expected displacement distance once the wind farm is operational (R. Colyn pers. comm) it will result in the loss of approximately 150 hectares of habitat, which translates into the displacement of about 2 birds, which comprises <1% of the population potentially present on the WEF land parcels. The current global population of Red Larks is estimated to exceed 10 000 mature individuals (Taylor et al. 2015), therefore the displacement of 2 birds should not be biologically significant as far as the national population is concerned i.e. having a statistically significant effect that has a noteworthy impact on survival.
  - The network of roads is likely to result in significant habitat fragmentation, and it will most likely have an effect on the density of several species, particularly larger terrestrial species such as Ludwig's Bustard, Kori Bustard and Northern Black Korhaan, and possibly also on smaller passerines such as the Red Listed Sclater's Lark or Red Lark. Given the current proposed density of the proposed turbine lay-out and associated road infra-structure, it is not expected that any priority species will be permanently displaced from the development area. It should be noted that the overall abundance of birds at the adjacent Loeriesfontein 2 and Khobab wind farms have decreased significantly, compared to pre-construction levels. While this can be partially explained by the drought conditions which were prevalent during the operational monitoring, the same levels of decrease have not been observed at the control site.
  - Through the application of appropriate mitigation measures, the impact of displacement due to habitat transformation on priority species can be kept at a medium level of significance.

- Cumulative impacts

The total number of wind turbines planned for the 30km radius around the application site is 448. Of these, a total of 122 have been constructed. However, each of the planned projects must still be subject to a competitive bidding process where only the most competitive projects will win a power purchase agreement required for the project to proceed to construction. It is therefore unlikely that a total of 448 turbines will actually be constructed, but due to the possibility that it could happen, one needs to apply the precautionary principle and assume that it will be the case. The Kokerboom 3 WEF will consist of 60 turbines, which constitute 13% of the total planned number of turbines. As such, its cumulative contribution to the total number of turbines, and by implication the impacts associated with the turbines, is fairly low.

Micro-siting of turbines and other infrastructure within the proposed site remains the foremost means of mitigating the impact on birds. Additional analysis will be undertaken on the results from the pre-construction monitoring in the Avifaunal Impact Assessment. This will be fully considered in the EIA Phase.

6.6 Aquatic Ecology (Colloty, 2020)

This section provides a summary of the aquatic specialist report, the full Aquatic Impact Assessment compiled by Colloty (2020) is available in Annexure D5.

Baseline description of Aquatic Ecology

The study area is dominated by four main aquatic features associated with catchments and watercourses and associated vegetation types as described in this report and are as follows:

- Riverine Alluvial watercourses, with no distinct riparian zone
- Riverine Minor drainage lines
- Pan (wetland) Endorheic Pan/Depressions
- Artificial Dams and reservoirs

Notably most of the aquatic features within the study area are located within the riverine valleys and alluvial floodplains, with no direct linkage to any mainstem rivers associated with the D35F quaternary catchment (Refer Figure 6-9) all within the Nama Karoo Ecoregion located in the Lower Orange Water Management Area (DWS Upington Office). Furthermore, the study area is not located within any Strategic Water Resource areas or wetland clusters.

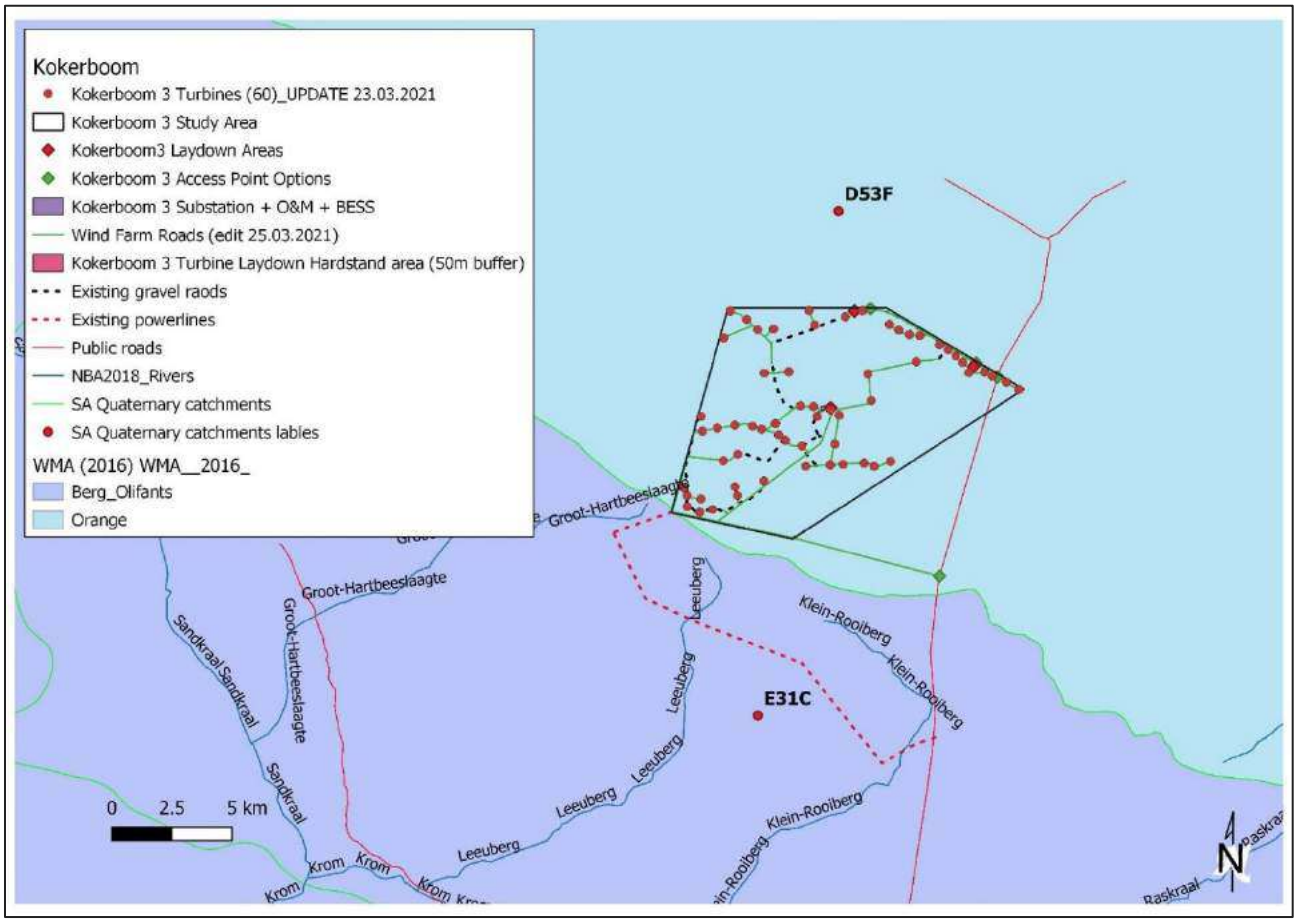


Figure 6-9: Project locality map indicating the various quaternary catchments and mainstem rivers (Source DWS and NGI) within the wind farm boundary

The groundtruthed delineations were then compared to current wetland inventories (van Deventer *et al*., 2020), 1: 50 000 topocadastral surveys mapping (Figure 6-10 and Figure 6-11) only differ with regard to the delineation of the alluvial watercourses and the depressions observed. A baseline map was then developed and refined using the May 2020 survey data, noting that due to the complex nature topography and geology, the systems were digitised at a scale of 1:2000 (Figure 6-11).

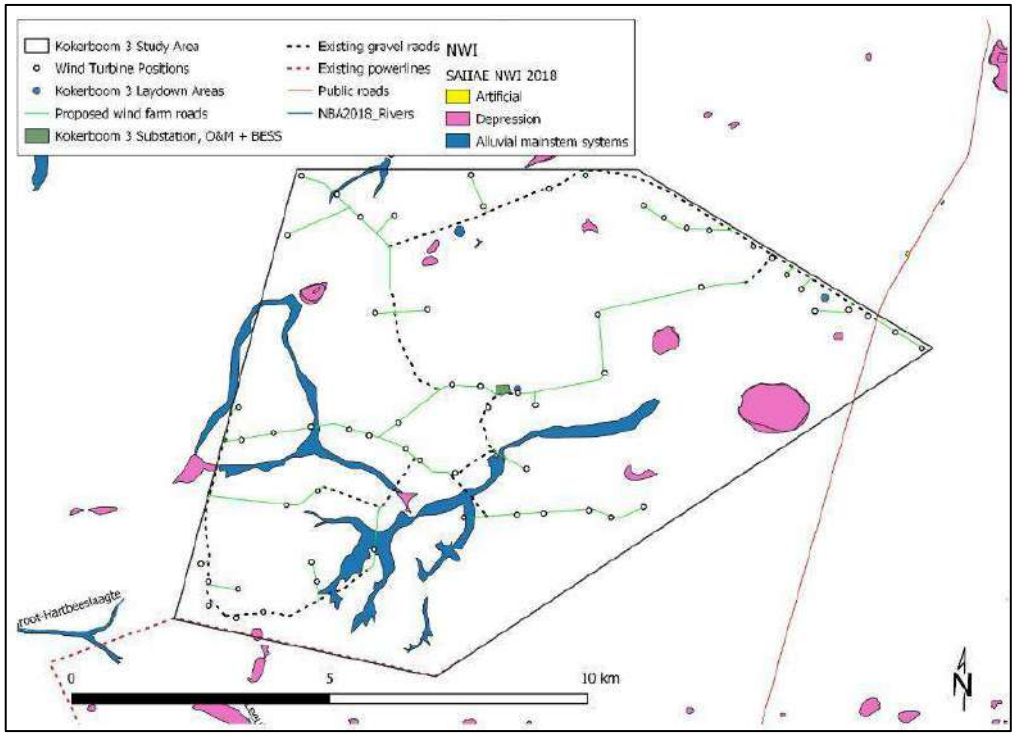


Figure 6-10: National Wetland Inventory wetlands and waterbodies (van Deventer *et al*., 2018) for the wind farm

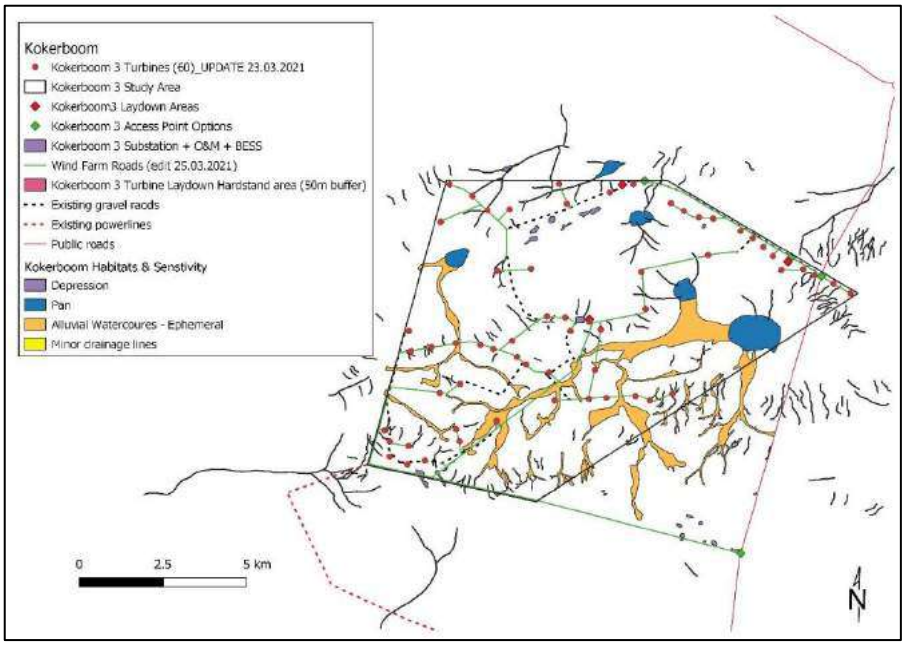


Figure 6-11: The delineations of the systems based on the proposed windfarm (Courtesy, Colloty 2020)

The affected catchments are included in both the National Freshwater Priority Atlas and the provincial Biodiversity Spatial Plan Critical Biodiversity Area spatial layers (Figure 6-12and Figure 6-13).

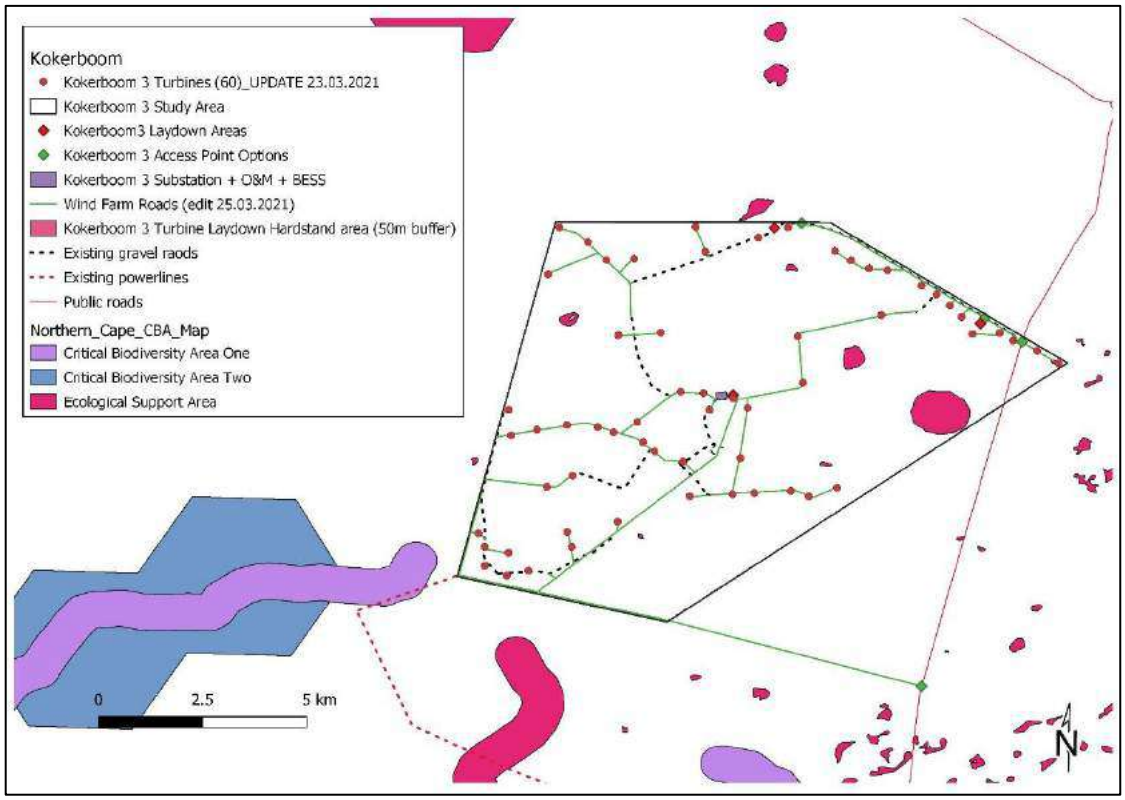


Figure 6-12: The Critical Biodiversity Areas as per the Northern Cape Biodiversity Spatial Plan (Oosthuysen & Holness 2016) in relation to the Wind Farm study area

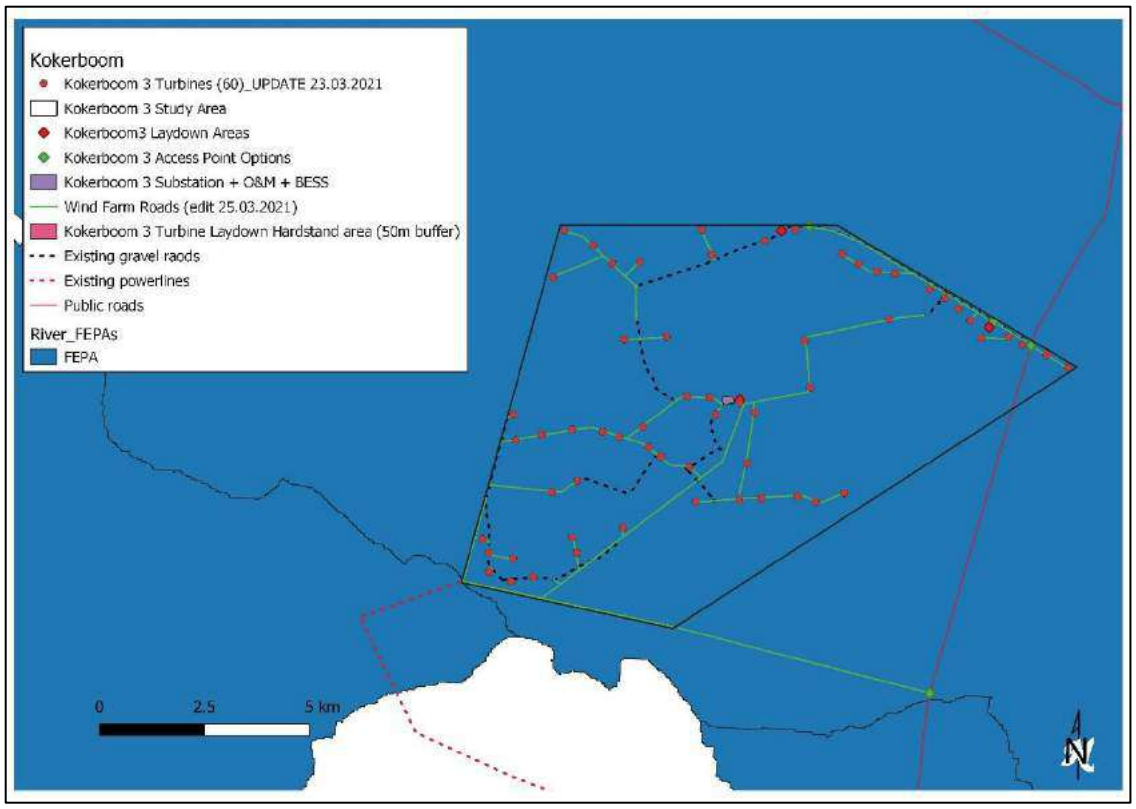


Figure 6-13: The respective subquaternary catchments rated in terms of Freshwater Ecosystem Priority Areas (FEPAs) (Nel *et al*., 2011)

Potential Impacts

Potential impacts of a wind farm on freshwater ecology could include:

- Damage or loss of riverine systems, wetlands and water courses through the placement of new crossings or infrastructure.
- Potential impacts on localised water quality, although unlikely due to the ephemeral nature of the systems but would occur during when rainfall does occur.
- Impact on aquatic systems through possible increase in surface water runoff within the wind farm site.

Conclusion and Recommendations

Several Very High Sensitivity Habitats were observed and mapped, and these were then considered No-Go for any new infrastructure, while Moderate and Low sensitivity areas could be considered for development. The only exception being road crossings and transmission lines would be considered within No-Go area, if these areas are spanned and or located within existing disturbance footprints (e.g. roads within existing farm tracks).

Based on the findings of this study and the preliminary impact assessment, the specialist finds no reason to withhold to an authorisation of any of the proposed activities, assuming that key mitigations measures are implemented. This is based on the consideration that with the exception of several minor drainage line crossings, the remaining Very High & Moderate Sensitivity areas have been avoided.

During the EIA phase of this report, the following plans will be developed for inclusion in the EMPr:

1. Draft Plant and Animal Search and Rescue Plan
2. Draft Alien plant management plan
3. Draft Rehabilitation Plan

6.7 Heritage, Archaeology and Palaeontology

This section provides a short summary of the heritage report, the full Heritage Impact Assessment Report compiled by Orton (2020) is available in Annexure D6.

Baseline description

Heritage resources include archaeological material (e.g. rock paintings, stone tools), paleontological material (e.g. fossilised materials) and cultural heritage material (e.g. old graveyards, fences, ruins of buildings, or sense of place). Since some potential heritage material is buried, it is often only found during the construction phase of a project. A heritage specialist was appointed to undertake an assessment of the cultural heritage, archaeology and palaeontology of the study area in February 2017 and a follow up assessment was undertaken in February 2020.

The assessment describes the site as generally flat, but, broadly, the southern part is somewhat higher lying than the north. A number of ephemeral pans were evident in the south-eastern part of the study area, generally associated with calcrete gravel (Figure 6-14). The flatter ground tends to be sandy and grassed, while on the higher ground erosion has resulted in the surfaces being gravelled (Figure 6-15).

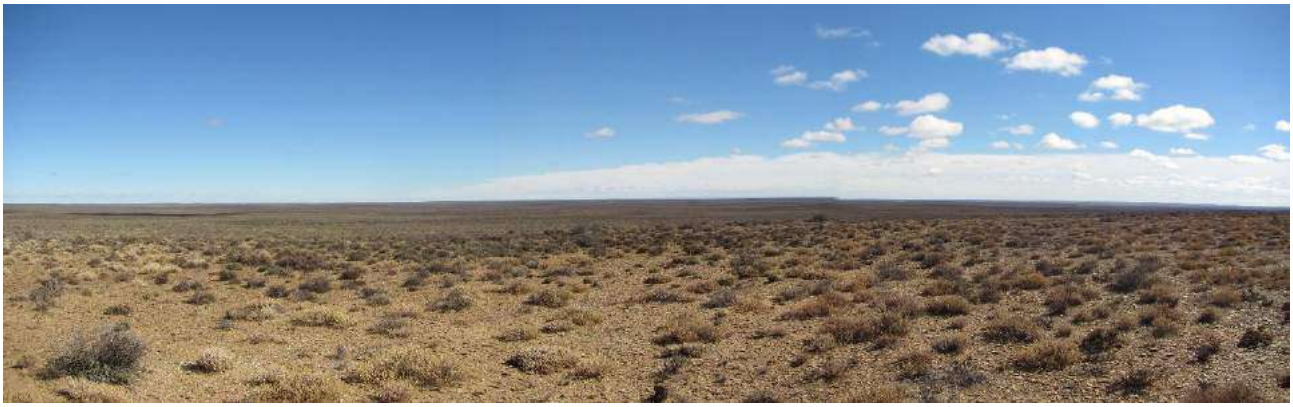


Figure 6-14: View across the northern part of the study area showing the endless grassy plain that forms about a quarter of the study area to the north of the large drainage line

Figure 6-15: View towards of the southeast showing dolerite outcrops overlooking a pan in the northern part of the study area