Scoping and Environmental Impact Assessment for the Proposed Development of the 279 MW Wind Energy Facility and associated Infrastructure (i.e. Kwagga WEF 1), near Beaufort West, Western Cape

PART C

ENVIRONMENTAL MANAGEMENT PROGRAMME

Scoping and Environmental Impact Assessment for the Proposed Development of the 279 MW Wind Energy Facility and associated Infrastructure (i.e. Kwagga WEF 1), near Beaufort West, Western Cape

PART C.1

Environmental Management Programme (EMPr) for the Kwagga WEF 1

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1. INTRODUCTION

The Project Developer, ABO Wind renewable energies (Pty) Ltd (hereafter "ABO Wind") is proposing the construction of three Wind Energy Facilities (WEFs), namely Kwagga WEF 1, Kwagga WEF 2, and Kwagga WEF 3, and its supporting electrical infrastructure, in the Central Karoo District Municipality, situated approximately 57 km south from the town of Beaufort West in the Western Cape Province (see Figure 1.1). The proposed Kwagga WEF 1 will be located in the Beaufort West Local Municipality, with the new access road to be constructed linking the proposed Kwagga WEF 1 project site with the R308 Rietbron bound public access road to the south of the site will be located in the Prince Albert Local Municipality, whereas the proposed Kwagga WEF 2 will be entirely located in the Prince Albert Local Municipality, and the Kwagga WEF 3 will be located in both these local municipalities. The project details are provided in Table A below. It must be noted that this Environmental Management Programme (EMPr) only covers the proposed Kwagga Wind Energy Facility 1 ('Kwagga WEF 1'), as detailed below. Separate EMPr's are provided for the remaining WEF projects.

Table C.1-1. Project Names, Applicants and the main Affected Farm Portions

Project Name	Project Applicant	Capacity	Affected Farm Portions
Kwagga WEF 1 (facility)	Kwagga Wind Energy Facility 1 (Pty) Ltd	279 MW	• Tyger Poort 376 / 3 • Dwaalfontein Wes 377 / RE • Dwaalfontein Wes 377 / 1 • Dwaalfontein 379 / RE
Kwagga WEF 1 (access road)			• Wolve Kraal 17 / RE • Wolve Kraal 17 / 7, 8, 10, 11 and 12
Kwagga WEF 2	Kwagga Wind Energy Facility 2 (Pty) Ltd	341 MW	• Wolve Kraal 17 / RE • Wolve Kraal 17 / 1, 3, 6, 7, 8, 9, 10, 11, and 12 • Annex Wolve Kraal 18 / RE • Annex Welbedacht 19 / RE
Kwagga WEF 3	Kwagga Wind Energy Facility 3 (Pty) Ltd	204.6 MW	• Arthurs Kraal 386 / 1, 2, 3 • Annex Taaibos 21 / RE • Cyferfontein 115 / 4, 5, 6, 8 • Muis Kraal 373 / 5, 7

The proposed Kwagga WEF 1 will comprise of up to 45 Wind Turbine Generators (WTGs), each with a generation capacity of at least 6.2 MW. Note however that should wind turbines with a larger generation capacity of up to 10 MW be available at the time of construction (post EA, should this WEF project be granted EA), a fewer number of turbines with an increased generation capacity will be selected for constructed. The proposed project will also include one temporary compound and laydown are and one on-site substation hub incorporating the facility substation, switchyard, BESS, collector infrastructure and associated O&M buildings. Each substation location will have a maximum development footprint of 9 ha and built infrastructure will not exceed 10 m in height. Four site alternatives for the on-site and three site alternatives for the temporary construction compound and laydown area were identified for assessment during the EIA Phase (Figure 1). The Kwagga WEF site is approximately 5 136 ha, of which the infrastructure for the wind farm will cover approximately 250 ha, excluding access roads.

It is proposed that a 132 kV overhead transmission line, which will be constructed for the proposed Kwagga WEF 1 at a later stage, will extend between the proposed on-site collector substation at the Kwagga WEF 1 and the existing Droërivier–Proteus 400 kV line that runs parallel to the N12 in a north-south direction and connects Beaufort West with the George/Mossel Bay area further south. Eskom's Droërivier Substation is located approximately 55 km north of the proposed Kwagga WEF 1, within the Northern Central Corridor of the Strategic Transmission Corridors (as gazetted on 16 February 2018, GN R113).

Note that the Project Developer is still investigating options for possible grid connection, from the proposed Kwagga WEF 1 to a proposed on-site collector substation, and/or a third-party major transmission station (MTS) to be constructed nearby, and therefore a separate Environmental Assessment Process will be undertaken at a later stage once the grid connection and the power line routing has been confirmed.

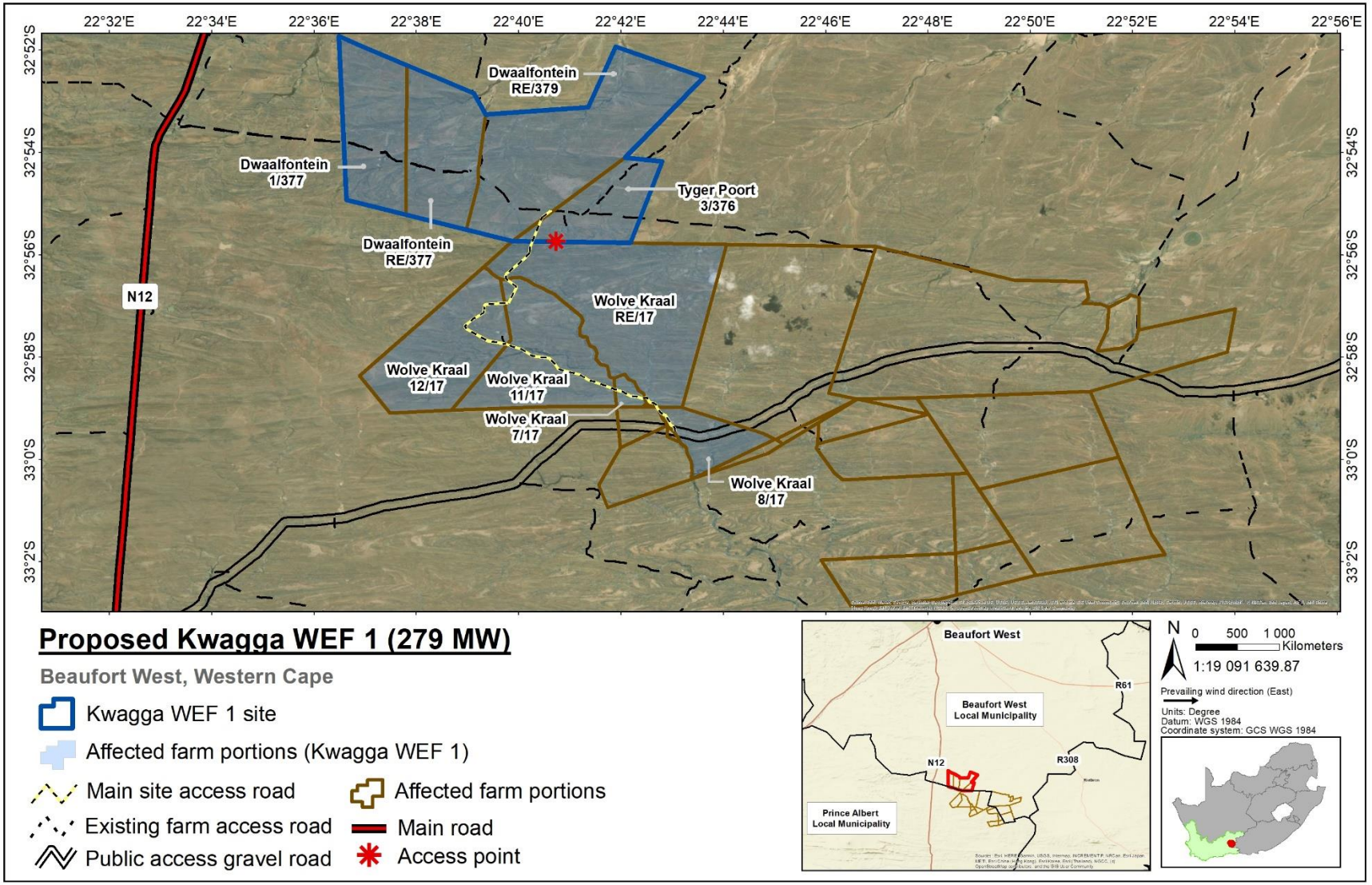

Figure C.1-1. Locality of the proposed Kwagga WEF 1 and associated infrastructure

The proposed project is not located within any of the Renewable Energy Development Zones (REDZs) gazetted in Gazette 41445, GN R114 on 16 February 2018; and Gazette 44191, GN R144 on 26 February 2021. The proposed Kwagga WEFs are also not located within any of the strategic power corridors gazetted in Gazette 41445, GN R113 on 16 February 2018. Therefore, a full Scoping and EIA Process is being undertaken for each of the proposed three WEFs with a 107-day decision-making timeframe, as opposed to a BA Process and 57-day decision-making timeframe allowed for in the REDZs and strategic power corridors.

The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

"*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure*".

The Competent Authority for the proposed WEF project is the national Department of Forestry, Fisheries and the Environment (DFFE), previously first operating as the national Department of Environmental Affairs (DEA. As mentioned above, the proposed Kwagga WEF 1, Kwagga WEF 2 and Kwagga WEF 3 are <u>not</u> located within any of the Renewable Energy Development Zones (REDZs) gazetted in Gazette 41445, GN R114 on 16 February 2018; and Gazette 44191, GN R144 on 26 February 2021. The proposed Kwagga WEFs are also not located within any of the strategic power corridors gazetted in Gazette 41445, GN R113 on 16 February 2018.

The proposed Kwagga WEF 1 project was identified and selected prior to the gazetting of the Phase 2 REDZs; however, it is nevertheless located approximately 2.3 km away (at its closest point) from the Beaufort West REDZ. In addition, the proposed Kwagga WEF 1 project site is located approximately 4.4 km away (at its closest point) from the Central Strategic Transmission Corridor (as gazetted on 16 February 2018, GN R113). Therefore, its proximity to the Beaufort West REDZ and the Central Strategic Transmission Corridor supports the development of a large-scale renewable energy project at the proposed location. The proposed project is therefore linked to the national planning vision for wind and solar development in South Africa.

This final EMPr has been prepared as part of the requirements of the 2014 NEMA EIA Regulations, as amended, and is being submitted to the DFFE as part of the Application for EA for the proposed project.

This final EMPr was made available to Interested and Affected Parties (I&APs), stakeholders and Organs of State, as part of the EIA Report, for a 30-day review period which extended to 22 November 2021. Comments received from stakeholders during this aforementioned review period have been incorporated into this final EMPr, where applicable. Following the incorporation of comments from I&APs, stakeholders and Organs of State, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed.

1.1 Authors of the EMPr

This EMPr has been compiled by the Environmental Assessment Practitioners (Paul Lochner, Lizande Kellerman and Dhiveshni Moodley) and the various specialists on the team (as indicated in Table 3). The details and expertise of the Environmental Assessment Practitioners and the specialists are provided in Chapter 6 - 16 of the EIA Report in the detailed specialist assessments. The Curriculum Vitae of Lizande Kellerman is also included in Appendix A of this EMPr.

Paul Lochner has more than 28 years of experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and Environmental Management Plans. Paul is a Registered EAP (2019/745) with the Environmental Assessment

Practitioners Association of South Africa (EAPASA). Paul has extensive experience in conducting environmental assessment and management processes throughout South Africa.

Lizande Kellerman has more than 10 years of experience in environmental impact studies, primarily in the planning, preparation and management of BAs, EIAs, and SEAs, as well as EMPrs, Screening/Fatal Flaw Studies, Biodiversity Risk Assessments, Biodiversity Resource Assessments and license applications for agriculture, atmospheric emissions, water use, waste management, mining, bioprospecting and biodiversity permitting, for numerous projects in the agricultural (including aquaculture), construction, conservation, mining and renewable energy sectors.. Lizande holds a BSc degree in Zoology and Entomology, with an Honours and Masters in Botany both at the University of Pretoria. She is currently working towards completing her PhD in Conservation Ecology. She is currently working towards completing her PhD in Conservation Ecology. Lizande is a registered Professional Natural Scientist (400046/10) with the South African Council for Natural Scientific Professions (SACNASP).

Dhiveshni Moodley has a Masters degree in Environmental Science and is a registered Candidate Natural Scientist (1472997/19) with the South African Council for Natural Scientific Professions (SACNASP). She has experience in conducting flood risk, hydropedological and wetland functional assessment specialist studies, as well as conducting BAs and Scoping/EIAs in the Renewable Energy sector.

Table C.1- 2: Details of the EIA Project Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Environmental Management Services (CSIR)		
Paul Lochner *(Registered EAP (2019/745))*	CSIR	Technical Advisor and Quality Assurance
Rohaida Abed (*Pr.Sci.Nat.)*	CSIR	Project Review
Lizande Kellerman (*Pr.Sci.Nat.)*	CSIR	Project Lead
Dhiveshni Moodley *(Cand.Sci.Nat.)*	CSIR	Project Manager
Specialists		
Johann Lanz (*Pr.Sci.Nat.)*	Private	Agriculture and Soils Compliance Statement
Dr Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology, Palaeontology and Cultural Landscape)
Dr John Almond	Natura Viva cc	
Chris van Rooyen, Albert Froneman (*Pr.Sci.Nat.)*	Chris van Rooyen Consulting	Avifauna Impact Assessment
Ashlin Bodasing, Michael Brits	ARCUS Consultancy Services Ltd	Bat Impact Assessment
Toni Belcher *(Pr.Sci.Nat.)*	Private	Aquatic Biodiversity Impact Assessment
Dr Noel van Rooyen *(Pr.Sci.Nat.)*	Ekotrust cc	Terrestrial Biodiversity and Species Impact Assessment
Dr Brett Williams	Safetrain cc T/A Safetech	Noise Impact Assessment
Menno Klapwijk	Bapela Cave Klapwijk cc	Visual Impact Assessment
Iris Wink, Adrian Johnson	JG Afrika (Pty) Ltd	Traffic Impact Assessment
Sue Reuther	SRK Consulting (Pty) Ltd	Socio-Economic Impact Assessment
Lizande Kellerman *(Pr.Sci.Nat.)*	CSIR	Civil Aviation Compliance Statement
Lizande Kellerman *(Pr.Sci.Nat.)*	CSIR	Defence Site Sensitivity Verification

1.2 Project Description

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EA should it be granted for the proposed project).

The preferred site for the proposed WEF project includes approximately 5 136 ha of land (as shown in Figure 1, Figure 2 and Figure 3), however only approximately 250 ha (about 4.8% of the total available assessed area) will be required for the proposed development footprint of the WEF and its associated infrastructure. The area specified here excludes access roads leading to the site. All infrastructure including access roads have been assessed as part of the S&EIA Process. The specialists assessed larger areas on the affected farm portions in order to avoid environmental constraints and sensitivities (highlighted by the specialists), during the siting and final design of the facilities and associated infrastructure.

The EMPR covers the following spatial domains:

1) **Kwagga WEF 1 site** of approximately 5136 ha
2) **Project footprint area** of approximately 250 ha that includes the turbine sites, laydown areas, compound and the on-site substation hub (which includes the facility substation, switchyard, collector infrastructure, BESS and associated O&M buildings)
3) **Access roads on site** (either using existing roads or new roads)
4) **Access road to site**, i.e. from the R308 road to the WEF facility.

The actions in the EMPR apply to the Project footprint area and the access roads on site, unless otherwise specified.

The proposed project will make use of wind technology to generate electricity from wind energy. Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The construction phase for each proposed project is expected to extend 18 to 24 months.

A summary of the key components of the proposed Kwagga WEF 1 project is provided in Table C below.

Table C.1- 3. Description of the proposed Kwagga WEF 1 project components and associated infrastructure

Infrastructure	Description
Number of turbines:	45 (maximum)
Turbine Capacity:	At least 6.2 MW (up to maximum of 10 MW)
Hub Height:	Up to 180 m
Rotor (Blade) Diameter:	Up to 200 m
Blade length:	Up to 100 m
WEF Project Size / Generation Capacity:	Approximately 279 MW
On-site substation hub:	The proposed project will include one on-site substation hub incorporating the facility substation, switchyard, collector infrastructure, BESS and associated O&M buildings.

Infrastructure	Description
	Four possible locations or placement alternatives for the on-site substation hub have been identified and were assessed during the EIA Phase.
Area of on-site substation hub alternatives:	
Alternative 1	8.56 ha
Alternative 2	4.65 ha
Alternative 3	7.59 ha
Alternative 4	5.21 ha (*preferred*)
Height of substation hub:	Maximum 10 m
Capacity of on-site substation:	33/132 kV
Area occupied by construction compound and lay down area:	Size = Six (6) ha (i.e. 300 m x 200 m) Three possible locations or placement alternatives for the construction compound and laydown area have been identified and were assessed during the EIA Phase. Construction Compound and Laydown Area No. 3 has been selected as the preferred alternative.
Internal service roads:	There are a number of existing gravel farm roads (some just jeep tracks) with widths ranging between 4 m and 6 m located around and within the proposed Kwagga WEF 1 project site boundary. The width of the existing internal service roads will be extended to a maximum width of 10 m, where necessary. The length of the internal service road network for the proposed Kwagga WEF 1 is approximately 45 km. The existing internal service road network in addition to all additional internal service roads that are to be constructed on the project site have been confirmed by the Project Developer following the outcome of the Scoping Phase, and were subjected to detailed specialist assessment during the EIA Phase.
Concrete batching plant:	50 m x 50 m (on-site batching) (0.25 ha)
Operational and Maintenance (O&M) Building:	1 ha
General temporary Hardstand Area (boom erection, storage, and assembly area):	1 ha
Battery Energy Storage System (BESS):	The BESS will cover an area of approximately five (5) ha, have a maximum height of 8 m (as recommended) and have a storage capacity of up to 500 MW/500 MWh. The BESS technologies that were considered include: - Lead Acid and Advanced Lead Acid

Infrastructure	Description
	- Lithium ion, NiCd, NiMH-based Batteries (*preferred*) - High Temperature (NaS, Na-$NiCl_2$, Mg/PB-Sb) - Flow Batteries (VRFB, Zn-Fe, Zn-Br)
Site Access:	The proposed Kwagga WEF 1 project site can be accessed via the N12 main road, which is situated to the west of the site, via the R308 Rietbron bound public access gravel road that is located to the south of the site (Figure 3). The N12 is a surfaced national road that connects Beaufort West and the N1 main road in the north with Klaarstroom, De Rust, Oudtshoorn and other Garden Route towns to the south. The R308 Rietbron bound public access road is a well-maintained gravel road with widths ranging between 6 m and 8 m, and will be widened to a maximum width of 10 m, where necessary. A new access road, which will serve as the main access point to the Kwagga WEF 1 with a maximum width of 10 m will be constructed to facilitate the connection between the Kwagga WEF 1 project site, across the Kwagga WEF 2 site, and the existing R308 Rietbron bound public access gravel road located to the south. The affected farm portions that were assessed for purposes of this access road are: • Wolve Kraal 17 / RE, 7, 8, 10, 11 and 12
Proximity to grid connection:	Eskom's Droërivier Substation is ideally located within the Central Strategic Transmission Corridors (as gazetted on 16 February 2018, GN R113) and approximately 55 km north of the proposed Kwagga WEF 1. It is proposed that a 132kV overhead transmission line, which will be constructed for the proposed Kwagga WEF 1 at a later stage, will extend between the proposed on-site collector substation at the Kwagga WEF 1 and the existing Droërivier–Proteus 400 kV line that runs parallel to the N12 in a north-south direction and connects Beaufort West with the George/Mossel Bay area further south. ***Note from the CSIR:*** *A separate Environmental Assessment Process will be undertaken at a later stage once the grid connection and the 132 kV power line routing for the proposed Kwagga WEF 1 has been confirmed, and hence does not form part of this S&EIA Process.*
Fencing:	For various reasons such as security, public protection and lawful requirements, the proposed built infrastructure on site will be secured via the installation of appropriate fencing. Existing livestock fencing on the affected farms portions may be upgraded in places where deemed insufficiently secure, whereas permanent fencing will be required around the O&M area and on-site

Infrastructure	Description
	substation hub. Access points will be managed and monitored by an appointed security service provider. The type and height of fencing to be installed will be confirmed during the detailed design phase prior to construction.

Based on the above, the following final EMPRs have been compiled and are provided in this EIA Report:

- Final EMPr for the proposed WEF and all associated infrastructure. **This Final EMPr comprises Part C.1 of this EIA Report.**
- Final EMPr for the proposed On-Site Substation Hub to be located at the proposed WEF. **This Final EMPr is included in Part C.2 of this EIA Report. It complies with the Generic EMPr published for Substation development (Government Gazette 42323, GN 435, dated 22 March 2019).**

The proposed project can be divided into the following four main phases:

- Design and Planning Phase (Pre-construction phase);
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has been assessed in the specialist studies (included in Chapters 6 -16 of this EIA Report (Part A)). Management and mitigation measures required to address all the impacts are included within this final EMPr.

The construction phase will take place subsequent to the issuing of the EA from the DFFE and a successful BID in terms of the Renewable Energy Independent Power Producer Programme (REIPPPP) (i.e. the issuing of a PPA).

The main activities that will form part of the construction phase of the project are:
- Removal of vegetation for the proposed infrastructure, where necessary;
- Excavations for the wind turbine foundations at each turbine location and excavations for other infrastructure;
- Construction and/or erection of the WTGs and additional infrastructure;
- Establishment of a temporary laydown area to enable the storage of construction equipment and machinery and will include the establishment of the construction site camp (including site offices and other temporary facilities for the appointed contractors);
- Stockpiling of topsoil and cleared vegetation, where necessary;
- Creation of employment opportunities; and
- Transportation of material and equipment to site, and personnel to and from site.

The following activities will occur during the operational phase of the project:
- The generation of electricity from the proposed WEF; and
- Maintenance of the WTGs and associated infrastructure.

During the life span of the proposed project (approximately 20 years), on-going maintenance will be required on a scheduled basis.

Should it be decided not to extend the operational lifespan of the project beyond 20 years, the project will be decommissioned. The main aim of decommissioning is to return the land to its original, pre-construction condition.

Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedure will involve removing the WTGs and associated infrastructure, and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation. Whether all components of the WEF will be removed still needs to be agreed upon with the landowners (some components may be useful for the landowners and therefore it could be decided that those remain on site). Any other supporting infrastructure no longer in use will be removed from the site and either disposed of at a registered disposal facility or recycled if possible.

It should be noted that a detailed project description (based on the conceptual design) is provided in Chapter 2 of the EIA Report (Part A).

1.3 Environmental Sensitivities

Chapters 6 to 18 of the EIA Report provides a detailed description of the environmental features and sensitive areas that were identified and assessed in detail by the specialists for consideration in the layout and location of the proposed project.

The preferred site for the proposed WEF project includes approximately 5 136 ha of land (as shown in Figure 1), however only approximately 250 ha (about 4.8% of the total available assessed area) will be required for the proposed WEF and its associated infrastructure. The larger 5 136 ha areas and the preliminary project layout of the proposed Kwagga WEF 1 was assessed by the specialists during the Scoping Phase in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility.

Based on scoping level findings from the specialist assessments, the preliminary layout was refined to avoid (where possible) the most sensitive features that were identified by the specialists within the original assessed study area. This revised project layout with a maximum of 45 turbine sites was taken forward into the EIA Phase for further assessment by the specialist team (Figure 2 and Figure 3). The specialists have, based on their impact assessment of the proposed development footprint of the Kwagga WEF 1 refined their sensitivity mapping of the proposed project layout with recommendations regarding micro siting and selection of infrastructure location alternatives, as well as required mitigation measures and management actions. All existing access roads to be utilised for the proposed project have been assessed during the Scoping Phase; additionally the planned internal road network including all additional access service roads to be constructed has been confirmed as part of the project layout and has undergone detailed specialist assessments during the EIA Phase. As a result, the final siting of the proposed Kwagga WEF 1 on the preferred site is discussed in Chapter 20 of this EIA Report, whereby the sensitive features identified are avoided by the proposed layout, together with specialist recommendations.

A combined sensitivity map showing the revised project layout (assessed during the EIA Phase) and combined environmental sensitivity map has been produced and is included in Appendix H of this EIA Report and below as Figure 4 in Appendix F of this EMPr. Figure 4 shows the identified and assessed environmental sensitivities such as agricultural potential, terrestrial biodiversity, watercourse features, avifauna and bats ‘no-go’ areas, and sensitive heritage and noise features, present within the study area, but excluding the potential visual sensitivity that is associated with a typical wind farm development. Based

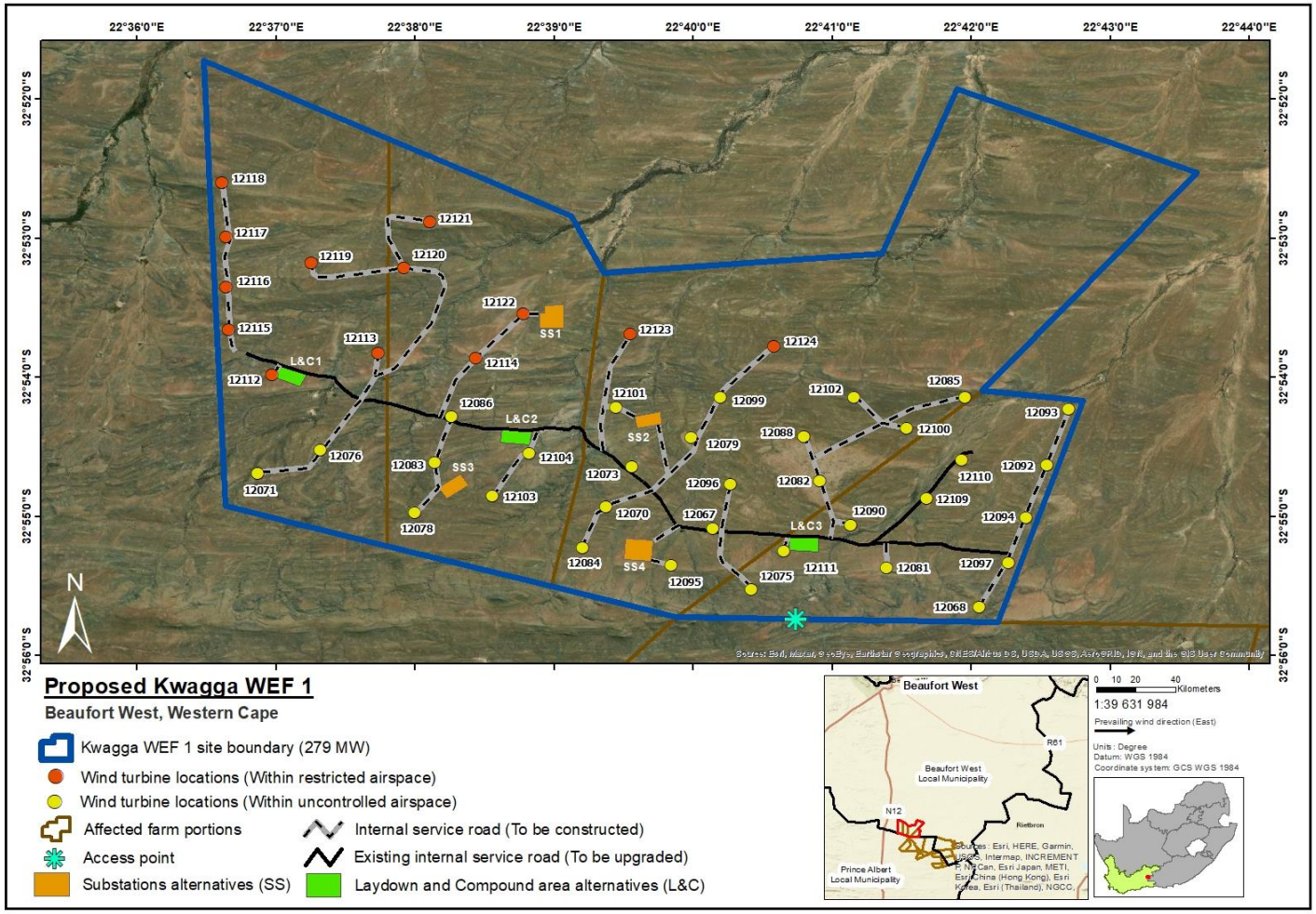

Figure C.1- 2. Revised project layout of the proposed Kwagga WEF 1 development footprint with 45 turbines

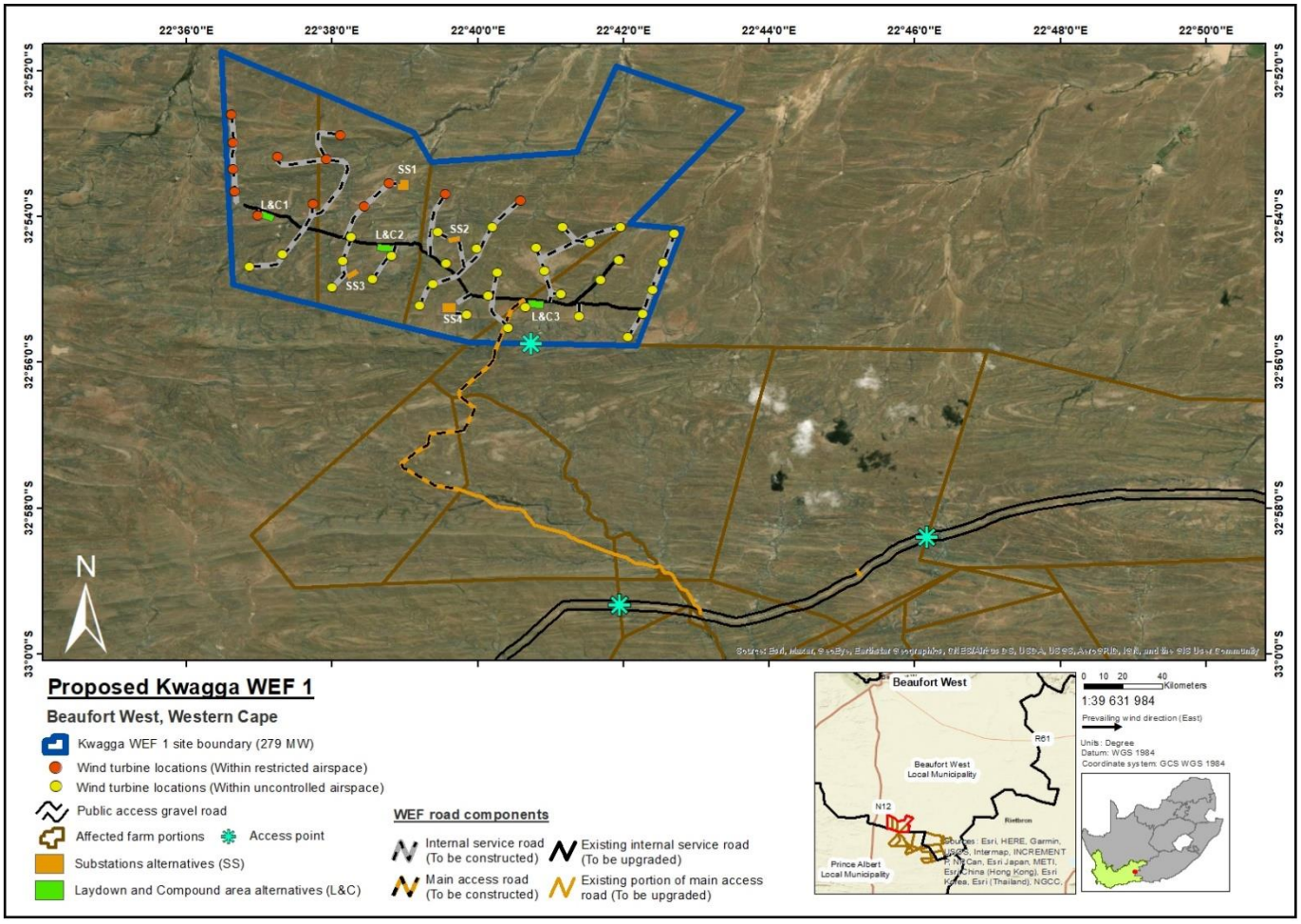

Figure C.1-3. Revised project layout of the proposed Kwagga WEF 1 development footprint, including the main site access road from the R308 .

1.4 Impacts identified during the EIA process

Based on the specialist studies (as shown in Table 2), the following main direct potential impacts, as indicated in Table 4, were identified and appropriate management and mitigation measures included within the final EMPr (where required) to ensure the potential impacts are suitably addressed and managed during all phases of the project. Indirect and cumulative impacts are noted in Sections 4 to 10 of this final EMPr.

It should be noted that other impacts for which specialist studies were not undertaken but where mitigation or management actions may be required, are also included in the final EMPr.

Table C.1- 4: Impacts identified in the S&EIA Process

Specialist Assessment / Input	Impact Identified
Agriculture and Soils Compliance Statement	**Construction and Operational Phases:** ▪ Loss of agricultural land use; ▪ Soil degradation including erosion, topsoil loss and contamination; and ▪ Increased financial security for farming operations[1].
Aquatic Biodiversity	**Construction Phase:** ▪ Disturbance and possible loss of aquatic habitats within the watercourses with the associated impact to sensitive aquatic biota; ▪ The removal of indigenous riparian and instream vegetation that has the potential to reduce the ecological integrity and functionality of the watercourses; ▪ Water demand for construction could place stress on the existing available water resources should external water sources not be utilised; ▪ Road crossing structures if not adequately designed could impede flow in the watercourses; ▪ Alien vegetation infestation within the aquatic features due to disturbance; and ▪ Increased sedimentation and risks of contamination of surface water runoff during construction. **Operational Phase:** ▪ Ongoing disturbance of aquatic features and associated vegetation along access roads or adjacent to the infrastructure that needs to be maintained; ▪ Modified runoff characteristics from hardened surfaces at the turbines and the substations, as well as along the access roads that have the potential to result in erosion of hillslopes and watercourses; and ▪ Possible increased potential for water quality impacts such as contamination from sewage generated on site because of the operation on site. **Decommissioning Phase:** ▪ An increased disturbance of aquatic habitat due to the increased activity on the site; and ▪ Increased sedimentation and risks of contamination of surface water runoff.
Terrestrial Biodiversity and Species	**Construction Phase:** ▪ The clearing of natural vegetation and resultant loss of faunal habitat; ▪ The loss of endangered, threatened, protected and endemic plants/animals; ▪ Direct faunal mortalities due to construction activities and increased vehicle traffic;

[1] This potential issue is considered to have a positive impact because of the proposed development.

Specialist Assessment / Input	Impact Identified
	▪ Increased human activity, noise and light levels; and ▪ Increased dust deposition. ▪ Establishment of alien vegetation as a result of the clearing of the vegetation; ▪ Increased stormwater run-off and erosion; and ▪ Changes in animal behaviour. **Operational Phase:** ▪ Direct faunal mortalities; and ▪ Increased human activity, light and noise levels. ▪ Establishment of alien vegetation will continue; and ▪ Increased erosion and water run-off and **Decommissioning Phase:** ▪ Increased dust deposition; and ▪ Direct faunal mortalities ▪ Establishment of alien invasive vegetation; and ▪ Increased erosion and stormwater run-off.
Avifauna Impact Assessment	**Construction Phase:** ▪ Total or partial displacement of avifauna due to habitat transformation associated with the presence of the wind turbines and associated infrastructure; ▪ The noise and movement associated with the construction activities at the project footprint will be a source of disturbance, which would lead to the displacement of avifauna from the area. **Operational Phase:** ▪ Avifauna mortality and injury through collisions with the wind turbines; and ▪ Electrocution of priority species on the internal electrical grid network. **Decommissioning Phase:** ▪ The noise and movement associated with the activities at the study area will be a source of disturbance, which would lead to the displacement of avifauna from the area.
Bat Impact Assessment	**Construction Phase (Direct Impacts):** ▪ Displacement of bats due to habitat loss / habitat transformation; ▪ Roost disturbance; and ▪ Roost destruction. **Operational Phase:** ▪ Mortality of bats due to turbine collisions while commuting/foraging and/or due to barotrauma; ▪ Mortality of bats due to turbine collisions during migrations; and ▪ Light pollution associated risks including loss of insect prey and increased collision risks for bats foraging closer to turbines. **Decommissioning Phase:** ▪ Displacement of bats due to disturbance associated with the decommissioning activities.
Heritage Impact Assessment (including Archaeology and Cultural Landscape)	**Construction Phase:** ▪ The damage or destruction or disturbance of archaeological artefacts or sites; ▪ The damage or destruction or disturbance of graves or burial sites; ▪ The damage or disturbance of historic built infrastructure; and

Specialist Assessment / Input	Impact Identified
	▪ Visual intrusion of visually sensitive heritage resources and/or cultural landscape features, which might erode its association with intangible heritage. **Operational Phase:** ▪ Visual intrusion of the WEF into the landscape. **Decommissioning Phase:** ▪ Visual intrusion of the WEF into the landscape.
Palaeontology Impact Assessment	**Construction and Operational Phases:** ▪ Damage and/or destruction of scientifically valuable fossils preserved at o beneath the ground due to surface clearance or excavations
Noise Impact Assessment	**Construction and Decommissioning Phases:** ▪ Noise pollution due to construction activities i.e. increase in ambient sound levels due to construction activities (e.g. equipment and vehicle noise). **Operational Phase:** ▪ Mechanical and aerodynamic noise from the operation of the wind turbine components. **Decommissioning Phase:** ▪ Mechanical and aerodynamic noise from the operation of the wind turbine components.
Socio-Economic Assessment	**Construction Phase:** ▪ Capital investment and the contribution to the national, regional and local economy[1]; ▪ Generation of employment, income and skills[1]; and ▪ Social disruption and change in social dynamics **Operational Phase:** ▪ Lower national CO_2 emissions per unit of energy generated[1]; ▪ Investment and the contribution to the national, regional and local economy[1]; ▪ Generation of employment, income and skills[1]; and ▪ Increased community prosperity through contributions and income from the WEF ▪ Increased South African power generation reducing the probability of load shedding **Decommissioning Phase:** ▪ Loss of employment due to decommissioning of the facility.
Traffic Impact Assessment	**Construction and Decommissioning Phases:** ▪ Increase in vehicle traffic due to construction activities – Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution.
Visual Impact Assessment	**Construction and Operational Phases:** ▪ Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors; ▪ Visual intrusion by wind turbines and associated structures and infrastructure on landscape receptors; ▪ Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors

Specialist Assessment / Input	Impact Identified
	Decommissioning Phase: ▪ Visual intrusion and increased dust emissions due to decommissioning activities including disassembly of project components, heavy machinery, increased vehicle traffic and rehabilitation; and ▪ Potential visual impact of security and construction lighting on the nightscape of the region.

2. APPROACH TO PREPARING THE FINAL EMPr

2.1 Compliance with relevant legislation

In terms of legal requirements, a crucial objective of the EMPr is to satisfy the requirements of Appendix 4 of the NEMA EIA Regulations, 2014, as amended (i.e. GN R326 dated 7 April 2017), and Section 24N of the NEMA. These regulations regulate and prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the authorities. An overview of where the requirements are addressed in this final EMPr is presented in Tables 5 and 6.

Table C.1- 5: Compliance with Section 24N of NEMA

Requirements of Section 24N of NEMA	Where it is included in this final EMPr?
2) The environmental management programme must contain- a) information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of: (i) planning and design; (ii) pre-construction and construction activities; (iii) the operation or undertaking of the activity in question; (iv) the rehabilitation of the environment; and (v) closure, if applicable;	Columns detailing the impact description, mitigation and management objectives, and mitigation and management actions in Sections 4 to 10 of this EMPr.
b) details of- (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Section 1.1 and Appendix A of this EMPr. In addition, Appendix A of the EIA Report.
c) a detailed description of the aspects of the activity that are covered by the environmental management programme;	Section 1 and Section 1.2
d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);	Columns in Section 4 to 10 of the EMPr regarding the monitoring responsibility, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3.
e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and

Requirements of Section 24N of NEMA	Where it is included in this final EMPr?
	responsibility in Sections 4 to 10 of this EMPr.
f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and	Sections 4 to 10 of this EMPr, as applicable to the post-construction, rehabilitation phase and the decommissioning phase.
g) a description of the manner in which it intends to- (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; and (iii) comply with any prescribed environmental management standards or practices.	The columns detailing the mitigation and management objectives, mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr.
3) The environmental management programme must, where appropriate- a) set out time periods within which the measures contemplated in the environmental management programme must be implemented; b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation which may occur inside and outside the boundaries of the operations in question; and c) develop an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr. Section 9 of this EMPr includes an Environmental Awareness Plan.
5) The Minister, the Minister responsible for mineral resources or an MEC may call for additional information and may direct that the environmental management programme in question must be adjusted in such a way as the Minister, the Minister responsible for mineral resources or the MEC may require.	Not applicable at this stage.
6) The Minister, the Minister responsible for mineral resources or an MEC may at any time after he or she has approved an application for an environmental authorisation approve an amended environmental management programme.	Not applicable at this stage.
7) The holder and any person issued with an environmental authorisation- a) must at all times give effect to the general objectives of integrated environmental management laid down in section 23; b) must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment; c) must manage all environmental impacts (i) in accordance with his or her approved environmental management programme, where appropriate; and (ii) as an integral part of the prospecting or mining, exploration or production operation, unless the Minister responsible for mineral resources directs otherwise; d) must monitor and audit compliance with the requirements of the environmental management programme; e) must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to	Throughout the EMPr.

Requirements of Section 24N of NEMA	Where it is included in this final EMPr?
its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and f) is responsible for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation as a result of his or her operations to which such right, permit or environmental authorisation relates.	
8) Notwithstanding the Companies Act, 2008 (Act No. 71 of 2008), or the Close Corporations Act, 1984 (Act No. 69 of 1984), the directors of a company or members of a close corporation are jointly and severally liable for any negative impact on the environment, whether advertently or inadvertently caused by the company or close corporation which they represent, including damage, degradation or pollution.	Section 3 and Appendix B of this EMPr details the responsibility of the Project Applicant.

Table C.1-6: Compliance with Appendix 4 of the 2014 NEMA EIA Regulations (as amended)

Requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017 in GN R326)	Where it is included in this EMPr?
1. (1) An EMPr must comply with section 24N of the Act and include: a) details of: (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.2 and Appendix A of this EMPr, and Appendix F of the **BA Report**. Appendix C of the **BA Report** includes the Curriculum Vitae of the specialists as well.
b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.2
c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Appendix F of this EMPr.
d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Columns detailing the impact description, mitigation and management objectives, and mitigation and management actions in Sections 4 to 10 of this EMPr.
f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to: (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	The columns detailing the mitigation and management actions in Sections 4 to 10 of this EMPr. The outlined management actions in this EMPr do not require any financial provisions for rehabilitation in terms of NEMA.

Requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017 in GN R326)	Where it is included in this EMPr?
g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	The columns detailing the monitoring methodology in Sections 4 to 10 of this EMPr.
h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	The columns detailing the monitoring frequency in Sections 4 to 10 of this EMPr.
i) an indication of the persons who will be responsible for the implementation of the impact management actions;	The columns detailing the monitoring responsibility in Sections 4 to 10 of this EMPr.
j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	The columns detailing the mitigation and management actions, and the monitoring methodology and frequency in Sections 4 to 10 of this EMPr.
k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr.
l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Sections 4 to 10 of the EMPr, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3 and Appendix B.
m) an environmental awareness plan describing the manner in which: (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 9 of this EMPr.
n) any specific information that may be required by the competent authority.	Not applicable at this stage.
(2) Where a government notice *gazetted* by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Government Notice 435 includes two gazetted generic EMPrs for power lines and substation infrastructure. A separate EMPr has been compiled in order to comply with Government Notice 435 for the substation components of the proposed project. Please note that the Project Developer is still investigating options for possible grid connection, from the proposed Kwagga WEF 1 to a proposed on-site collector substation, and/or a third party major transmission station (MTS) to be constructed nearby, and therefore a separate Environmental Assessment Process will be undertaken at a later stage once the grid connection and the power line routing has been confirmed.

2.2 Structure and contents of the EMPr

This final EMPr covers the proposed Kwagga WEF 1 and associated infrastructure but excludes the management actions for the on-site SS development. The 132 kV on-site substation will be covered in a separate EMPr which complies with the Generic EMPr for substation development published in GN 435.

Where applicable, each section of the final EMPr is divided into the following four phases of the project cycle:

- Planning and Design Phase (Pre-construction Phase);
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

The final EMPr includes the findings and recommendations of the S&EIA Process and specialist studies. However, the final EMPr is considered a "living" document and must be updated with additional information or actions during the design, construction, operational and decommissioning phases if applicable.

The final EMPr follows an approach of identifying an over-arching goal and objectives, accompanied by management actions that are aimed at achieving these objectives (the outcomes). The management actions are presented in a table format in order to show the links between the goal and associated objectives, actions, responsibilities, and monitoring requirements and targets.

The management plans for the design, construction, operational and decommissioning phases consist of the following components:

- **Impact:** The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated.
- **Objectives:** The objectives necessary in order to meet the goal; these take into account the findings of the specialist studies.
- **Mitigation/Management Actions**: The actions needed to achieve the objectives of enhancing positive benefits and mitigating or eliminating negative impacts; taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- **Monitoring**: The key monitoring actions required to check whether the objectives are being achieved, taking into consideration methodology, frequency and responsibility.

In this final EMPr, the following spatial parameters apply to the management actions, unless where specified differently:

- The study area is referred to as the larger assessed area (i.e. 5 136 ha and greater);
- The site as the as the development footprint of the proposed WEF (i.e. approximately 250 ha).

2.3 Goal for environmental management

The overall goal for environmental management for the proposed WEF project is to plan, design, construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna, flora and freshwater ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area;

- Enhances the socio-economic benefits in the local area; and
- Contributes to the environmental baseline and understanding of environmental impacts of WEFs in a South African context.

3. ROLES AND RESPONSIBILITIES

Since the Generic EMPr is applicable for the on-site substation, it is best to adopt the definitions of the roles and responsibilities as captured in in the gazetted EMPr of GN 435. This will allow consistency of the management of the project from an environmental perspective and will avoid any contradiction in terms of the roles and responsibilities.

The generic roles and responsibilities required for key role players are those of the:

- Project Developer / Developer's Project Manager (DPM);
- Developer Site Supervisor (DSS);
- Environmental Control Officer (ECO);
- Developer's Environmental Officer (DEO);
- Contractor; and
- Contractor's Environmental Officer (CEO).

The definitions of the roles and responsibilities are included in Appendix B of this final EMPr.

4. ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

Impact	Mitigation/ Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and the access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION PHASE)					
4.1. Impacts due to establishment of alien invasive plants as a result of the project	Ensure the appropriate removal of alien invasive vegetation from the proposed project area and prevent the establishment and spread of alien invasive plants due to the project activities.	4.1.1. Compile an alien vegetation baseline and prepare an alien invasive vegetation management plan. Take into account the relevant legislation, including, but not limited to, the Alien and Invasive Species Regulations under the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM: BA)).	▪ Appoint a suitable specialist to compile an alien invasive vegetation management plan. Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ ECO
B. CONSTRUCTION PHASE					
4.2. Impacts due to the establishment of and increased spread of alien invasive plants as a result of the construction of the project	Avoid establishment and reduce the spread of alien invasive plants due to the project activities.	4.2.1. Appoint a specialist or contractor to undertake a sweep and survey of the final development footprint site. 4.2.2. Establish an ongoing monitoring programme for the construction phase to detect and quantify any alien species that may become established as a result of the project activities and identify the problem species (as per Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) and NEM: BA).	▪ Appoint a suitable vegetation contractor to inspect the site and document the extent of invasive alien vegetation, which will serve as a baseline. ▪ Prepare a monitoring programme for alien invasive species on the site (i.e. the 250 ha footprint), including mapping of alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	▪ Prior to the commencement of construction ▪ Once-off	▪ Project Developer, ECO and Specialist Contractor ▪ ECO and Contractor

Impact	Mitigation/ Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and the access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
		4.2.3. Ensure proper management of soil stockpiles. Do not import soil stockpiles from areas with alien plants to ensure proper management of stockpiles.	▪ Monitor the presence of alien invasive plants during the construction phase via visual inspections and take action to remove and control these species.	▪ On-going	▪ ECO and Contractor
		4.2.4. Undertake rehabilitation of disturbed areas as soon as possible after construction. Stockpile the shallow topsoil layer separately from the subsoil layers. Reinstate the topsoil layers (containing seed and vegetative material) when construction is complete to allow the plants to rapidly re-colonise the bare soil areas.	▪ Rehabilitate disturbed areas and monitor the presence of alien invasive species on site.	▪ On-going	▪ ECO and Contractor
		4.2.5. Keep clearance and disturbance of indigenous vegetation to a minimum.	▪ Monitor and manage vegetation clearing by undertaking visual inspections to ensure minimal disturbance and to restrict activities to the demarcated project footprint.	▪ On-going	▪ ECO and Contractor
		4.2.6. Ensure that the footprint required for the proposed project activities (such as temporary stockpiling, earthworks, storage areas, site establishment etc.) is clearly demarcated and kept at a minimum.	▪ Verify that the proposed project area is determined and demarcated prior to the commencement of the construction phase by undertaking visual inspections.	▪ Once-off prior to construction and as required during the construction process.	▪ ECO and Contractor
		4.2.7. Ensure that the spread of alien invasive vegetation within the project footprint, is immediately controlled and removed promptly, in a scheduled manner throughout the construction phase. The removal of alien vegetation on site during the construction phase should use registered control methods and take into consideration the Alien and Invasive Species Regulations published in terms of Section 97(1) of the NEM: BA, if applicable.	▪ Monitor the presence of alien invasive plants during the construction phase via visual inspections and take action to remove and control these species. Map the distribution of any alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	▪ On-going	▪ ECO and Contractor

Impact	Mitigation/ Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and the access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		4.2.8. The removed alien invasive vegetation should be immediately disposed at a suitable waste disposal facility and should not be kept on site for prolonged periods of time, as this will enhance the spread of these species.	▪ Monitor the removal of the alien vegetation found on site via visual inspections.	▪ As necessary during the construction phase.	▪ ECO
		4.2.9. All construction machinery and plant equipment delivered to site for use during the construction phase should be cleaned in order to limit the introduction of alien species.	▪ Clean machinery and equipment prior to the construction phase. ▪ ECO to conduct visual inspections to verify that machinery and equipment are cleaned, and report any non-compliance.	▪ Prior to the commencement of construction. ▪ As necessary during the construction phase.	▪ ECO and Contractor
C. OPERATIONAL PHASE					
4.3. Impacts due to establishment of alien invasive plants. Exotic weed invasion may result in the ousting of natural vegetation and alteration of ecological processes on site, with incremental impacts on the adjacent veld types.	Reduce the establishment and spread of alien invasive plants. To remove exotic weeds as and when they may arise and thereby prevent alteration of local and adjacent habitat forms.	4.3.1. Continue with on-going monitoring programme to detect and quantify any alien species that may become established and identify the highly invasive species during the operational phase of the proposed WEF (i.e. for 20 years). 4.3.2. Ensure that the spread of alien invasive vegetation within the project footprint, is immediately controlled and removed promptly, in a scheduled manner throughout the operational phase. The removal of alien vegetation on site during the operational phase should use registered control methods and take into consideration the Alien and Invasive Species Regulations published in terms of Section 97(1) of the NEM: BA, if applicable. 4.3.3. The removed alien invasive vegetation should be immediately disposed at a suitable waste disposal facility and should not be kept on site	▪ Annual audit of project area and immediate surroundings. Map the distribution of any alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. ▪ Monitor the presence of alien invasive plants during the operational phase via visual inspections and take action to remove and control these species. Map the distribution of any alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	▪ Annual ▪ Ongoing ▪ As necessary during the construction phase.	▪ Developer's Project Manager ▪ ECO and Contractor ▪ ECO

Impact	Mitigation/ Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and the access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		for prolonged periods of time, as this will enhance the spread of these species.	▪ Monitor the removal of the alien vegetation found on site via visual inspections.		
D. DECOMMISSIONING PHASE					
4.4. Exotic weed invasion of the decommissioned site resulting in ecological change Exotic weed invasion.	To reduce the spread of exotic weeds on disturbed lands that formed a portion of the WEF.	4.4.1. All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	▪ Final external audit of area to confirm that area is rehabilitated to an acceptable level.	▪ Once off	▪ Contractor with advice from specialist
		4.4.2. Exotic weed control measures to be instituted through alien invasive vegetation management programme. Regular redress of alien invasive vegetation through the use of herbicide and manual removal.	▪ Compile alien invasive vegetation management programme for a period of 12 months after the decommissioning exercise. ▪ Appoint contractor to undertake the alien invasive vegetation management programme. ▪ Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established after decommissioning and rehabilitation. ▪ Post bi-yearly monitoring of the project footprint to hinder proliferation of exotic species as a result of the development. Final external audit of the project footprint to confirm that area is free of alien invasive plants after 5 years.	▪ Alien invasive vegetation management programme to be undertaken every 6 months for a period of 12 months following decommissioning. ▪ Prior to the commencement of the decommissioning phase. ▪ Once-off ▪ Once-off	▪ Project Developer ▪ Project Developer ▪ Project Developer and Specialist/ Contractor ▪ Project Developer and Specialist/ Contractor

5. TRAFFIC MANAGEMENT PLAN INCLUDING TRANSPORTATION PLAN

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply on site as well as for use of public access roads to site)	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION PHASE)					
5.1. Increased traffic generation	Manage impact that additional traffic generation will have on road network	5.5.1. For abnormal loads that need to be transported by road to the site, a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act (Act 93 of 1996) and the National Road Traffic Regulations, 2000. In addition, authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections. 5.5.2. Ensure that a port permit is applied for prior to construction (i.e. Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act (Act 12 of 2005)).	▪ Ensure that the permits are applied for and obtained prior to commencement of construction. ▪ Verify that this has been undertaken by reviewing approved permits.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Project Developer and Contractor ▪ ECO
		5.5.3. The preferred route to the site should be further investigated and surveyed to identify problem areas e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. 5.5.4. Design and maintenance of internal roads. The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ Project Developer and Traffic Specialist

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply on site as well as for use of public access roads to site)	Monitoring		
			Methodology	Frequency	Responsibility
		designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill. 5.5.5. Any low hanging overhead lines (lower than 5.1 m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.			
		5.5.6. Ensure that the construction phase is designed and planned in a manner in which the timeframe of the construction period is reduced, where reasonably possible.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ Project Developer and ECO
		5.5.7. The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network. Ensure that this is taken into consideration in the design phase for implementation during the construction phase.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ Project Developer and ECO
B. CONSTRUCTION PHASE					
5.2. Increased dust and noise pollution as a result of increased traffic during construction. In addition, traffic congestion and delays on the road network as a result of project	Plan the project to spread and reduce the amount of road based traffic and avoid local congestion periods during the construction phase.	5.2.1. Implement management strategies for dust suppression during the construction phase e.g. apply dust suppressant on the gravel roads on site, exposed areas and stockpiles. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative approved sources, where possible. 5.2.2. Ensure that gravel roads are maintained on a regular basis by the Contractor.	▪ Ensure that there is regular monitoring of the road surface quality.	▪ Before construction commences and regularly during the construction phase.	▪ Project Developer and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply on site as well as for use of public access roads to site)	Monitoring		
			Methodology	Frequency	Responsibility
related traffic generation.	Minimise the impact on the road network as a result of the proposed project	5.2.3. After the road modifications have been implemented as per the assessments undertaken during the design phase, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.	▪ Check if this was undertaken by reviewing signed minutes of meetings or signed reports, as well as appointment letters.	▪ Prior to the commencement of the construction phase	▪ Project Developer and ECO
		5.2.4. The delivery of wind turbine components to the site must be staggered and trips are to be scheduled to occur outside of peak traffic periods, as best as possible. 5.2.5. Ensure that the construction of the turbines is staggered. 5.2.6. Staff and general trips should occur outside of peak traffic periods as far as possible, so that they minimise movement in the nearby towns during the peak periods.	▪ Monitor and management of traffic generated and when trips are made.	▪ During construction	▪ Contractor and ECO
		5.2.7. The use of public transport (buses and/or minibus taxis) to convey construction personnel to the site should be encouraged.	▪ Contractor should record the arrival and departure times as well as the number of workers using public transport.	▪ Once a month on a randomly selected day.	▪ Appointed Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply on site as well as for use of public access roads to site)	Monitoring		
			Methodology	Frequency	Responsibility
5.3. Increased level of road accidents (involving pedestrians, animals, other motorists on the surrounding tarred/ gravel road network) due to increased traffic during construction.	Minimise the impact of the construction activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding roads. Reduce number of road accidents due to increased traffic during construction.	5.3.1. Well maintained vehicles should be used together with well-trained drivers during the construction phase. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. The Contractors must ensure that construction vehicles are roadworthy, properly serviced and maintained, and respect the vehicle safety standards implemented by the Project Developer.	▪ Carry out random checks of driver licenses and conduct random visual inspections of construction vehicles for roadworthiness.	▪ Random visual inspection of vehicles weekly.	▪ Contractor
		5.3.2. To ensure reduced speeds along the roads, implement speed control mechanisms on site, as well as speed limits and placement of road signage for the speed limits.	▪ Implement speed control mechanisms prior to commencement of construction. ▪ Carry out random inspections to verify whether proper speed control is being implemented.	▪ On-going ▪ Random during the construction phase	▪ Contractor and ECO ▪ ECO
		5.3.3. Adhere to all speed limits applicable to all roads used.	▪ Ensure that speed limits are adhered to. ▪ Carry out random visual inspections to verify speed limits and general awareness of vehicle drivers.	▪ Daily ▪ Random during the construction phase	▪ Contractor and ECO ▪ ECO
5.4. Impact on air quality due to dust generation, noise and exhaust emissions from construction vehicles and equipment.	Limit the release of noise, pollutants and dust emissions	5.4.1. Implement management strategies for dust generation e.g. apply dust suppressant on the gravel roads on site, exposed areas and stockpiles. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative approved sources, where possible	▪ Ensure dust management measures are in place to adequately decrease the generation of dust.	▪ On-going	▪ Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply on site as well as for use of public access roads to site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		5.4.2. Postpone or reduce dust-generating activities during periods with strong wind. Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased. 5.4.3. Dust generated must comply with the National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).	▪ Ensure dust management measures are in place to decrease the dust generated. ▪ Ensure compliance with National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013).	▪ On-going ▪ On-going	▪ Contractor and ECO ▪ ECO
		5.4.4. Avoid using unmaintained construction equipment (which generate high sound levels and greater exhaust emissions) and ensure equipment is well maintained.	▪ Manage noise levels and air pollutants from construction vehicles through checking the condition of vehicles.	▪ On-going	▪ Contractor and ECO
C. OPERATIONAL PHASE					
5.5. Increased level of road accidents (involving pedestrians, animals, other motorists on the surrounding tarred/ gravel road network) due to increased (but limited) traffic during the operational phase.	Minimise the impact of the operational activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/ gravel roads. Reduce number of road accidents due to increased traffic during the operational phase.	5.5.1. Well maintained vehicles should be used together with well-trained drivers during the operational phase, as required. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. Vehicles must be roadworthy, properly serviced and maintained.	▪ Carry out random checks of driver licenses and conduct random visual inspections of vehicles for roadworthiness.	▪ Random visual inspection of vehicles weekly.	▪ Project Developer
		5.5.2. Adhere to all speed limits applicable to all roads used.	▪ Ensure that speed limits are adhered to.	▪ Daily	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply on site as well as for use of public access roads to site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			▪ Carry out random visual inspections to verify speed limits and general awareness of vehicle drivers.	▪ Random during the operational phase	
		5.5.3. Implement clear and visible signage and signals indicating movement of vehicles at intersections.	▪ Implement clear signalisation. ▪ Carry out random inspections to verify whether proper signage is being implemented.	▪ Ongoing ▪ Random during the operational phase	▪ Project Developer
		5.5.4. The use of public transport (buses and/or minibus taxis) or carpooling to convey operational personnel to the site should be encouraged.	▪ Monitor the requirements	▪ On-going	▪ Project Developer
		5.5.5. Limit access to the site to personnel.	▪ Maintain a register of visitors and staff that enter site and restrict access to personnel.	▪ On-going	▪ Project Developer
5.6. Accelerated degradation of road structure due to operational traffic.	Limit the deterioration of the road condition due to operational phase traffic.	5.6.1. The main access roads to site should be inspected on a weekly basis for structural damage.	▪ Ensure that the main access road to site maintains current condition through photographic surveys and monitoring.	▪ Weekly	▪ Project Developer
		5.6.2. Vehicles must not be overloaded during the operational phase (where applicable) in order to reduce impacts on the road structures, particularly the access roads leading to the site. Random visual inspection of vehicles should be undertaken in order to monitor for overloading (where applicable).	▪ Perform visual inspection of vehicles.	▪ Random visual inspection of vehicles weekly.	▪ Project Developer
D. DECOMMISSIONING PHASE					
5.7. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

6. STORM WATER MANAGEMENT PLAN

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION PHASE)					
6.1. Impact of the project if a detailed storm water management plan is not correctly prepared.	To limit the effect of uncontrolled storm water run-off from developed areas onto natural areas	6.1.1. Prepare a detailed stormwater management plan outlining appropriate treatment measures to address runoff from disturbed portions of the site	▪ Check compliance with specified conditions. ▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during design followed by regular control ▪ During the planning and design phase	▪ Contractor ▪ ECO
B. CONSTRUCTION PHASE					
6.2. Diversion and impedance of surface water flows – Changes to the hydrological regime and increased potential for erosion.	Prevent interference with natural run-off patterns, diverting flows and increasing the velocity of surface water flows.	6.2.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase.	▪ Compile a Method Statement for Stormwater Management during the construction phase. ▪ Inspect and verify if a Method Statement for Stormwater Management has been compiled by the Contractor via audits prior to the commencement of the construction phase.	▪ Prior to the construction phase. ▪ Once-off prior to the commencement of the construction phase.	▪ Contractor ▪ ECO
Diversion and increased velocity of surface water flows – reduction in permeable surfaces		6.2.2. Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno mattresses or similar) and the re-vegetation of any disturbed riverbanks.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO
		6.2.3. Reinforce soil slopes to minimise erosion during rehabilitation (as needed, and once construction in a specific area has ceased).	▪ Monitor activities and record and report non-compliance.	▪ As needed during the construction phase	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		6.2.4. Any irrigation of the development area for landscaping or dust control purposes should be controlled, such that it does not result in any measurable increase in moisture being passed into natural drainage lines.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO
		6.2.5. Drainage along the sides of the roads should be designed so that it does not result in concentrated flows into watercourses.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO
6.3. Pollution of the surrounding environment as a result of the contamination of stormwater. Contamination could result from the spillage of chemicals, oils, fuels, sewage, solid waste, litter etc.	To prevent contaminated stormwater from entering into and adversely impacting on freshwater ecosystems and reducing the water quality. To reduce sedimentation of nearby water systems. To apply best practice principles in managing risks to storm water pollution.	6.3.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase.	▪ Compile a Method Statement for Stormwater Management during the construction phase. ▪ Inspect and verify if a Method Statement for Stormwater Management has been compiled by the Contractor via audits prior to the commencement of the construction phase.	▪ Prior to the construction phase. ▪ Once-off prior to the commencement of the construction phase.	▪ Contractor ▪ ECO
		6.3.2. Provide secure storage for fuel, oil, chemicals and other waste materials to prevent contamination of stormwater runoff. Fuels and chemicals (i.e. any hazardous materials and dangerous goods) used during the construction phase must be stored safely on site and in bunded areas. Fuel and chemical storage containers must be inspected to ensure that any leaks are detected early.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents. Monitor if spillages have taken place and if they are removed correctly.	▪ Weekly	▪ ECO
		6.3.3. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised. Erosion and	▪ Monitor the excavations and stockpiling process throughout the construction phase via visual site	▪ Weekly	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
		sedimentation into water bodies must be minimised through effective stabilisation. No stockpiling should take place within a watercourse. 6.3.4. Stockpiles must be located away from river channels i.e. greater than 32 m.	inspections. Record non-compliance and incidents.		
		6.3.5. Littering and contamination of water resources during construction must be prevented by effective construction camp management.	▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections).	▪ Weekly	▪ Contractor and ECO
		6.3.6. Emergency plans must be in place to deal with potential spillages (especially those leading to any watercourses).	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO
		6.3.7. Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno mattresses or similar) and the re-vegetation of any disturbed riverbanks, as applicable.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO
		6.3.8. Ensure that the temporary site camp and ablution facilities are established at least 32 m away from the banks of the major drainage lines, as applicable.	▪ Monitor the placement of the site camp via visual inspections, and record and report any non-compliance.	▪ Once-off prior to construction and as required during the construction phase.	▪ ECO
		6.3.9. Ensure that there is no ad-hoc crossing of channels (as applicable) by vehicles during the construction phase. Access routes across the site should be strictly demarcated and selected with a view to minimise impacts on drainage lines.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		6.3.10. Ensure that no waste materials or sediments are left in the surrounding drainage lines (as applicable) (as a result of the construction).	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Monthly	▪ ECO
		6.3.11. Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds.	▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections).	▪ Monthly	▪ Contractor and ECO
C. OPERATIONAL PHASE					
6.4. Stormwater discharge into the surrounding environment during operations	To minimise the contamination of stormwater by uncontrolled release of contaminated or grey water. To protect soil resources and prevent soil erosion.	6.4.1. An operational phase Stormwater Management Plan should be designed and implemented, with a view to prevent the passage of concentrated flows from hardened surfaces and onto natural areas.	▪ Compile a Stormwater Management Plan for the operational phase. ▪ Inspect and verify if a Stormwater Management Plan has been compiled prior to the commencement of the operational phase.	▪ Continuously during operational phase. ▪ Once-off prior to the commencement of the operational phase.	▪ Project Developer
		6.4.2. All release points into the natural environment must have appropriate energy dissipaters to minimise scouring/erosion.	▪ Monitor activities and record and report non-compliance. ▪ Monitor the placement of energy dissipaters via visual inspections, and record and report any non-compliance.	▪ On-going	▪ Project Developer
		6.4.3. As far as reasonably possible, separate “clean” and “dirty” storm water. As far as reasonably possible, capture and contain “dirty” stormwater for appropriate disposal/discharge.	▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing inspections).	▪ Weekly or as required during operations.	▪ Project Developer
		6.4.4. Regular inspections of stormwater infrastructure should be undertaken to	▪ Undertake regular inspections of the stormwater infrastructure (i.e. by	▪ Weekly/Monthly	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
		ensure that it is kept clear of all debris and weeds.	implementing walk through inspections).		
D. DECOMMISSIONING PHASE					
6.5. The proposed WEF would be expected to run for a minimum period of 20 years, after which it would either be decommissioned, alternatively upgraded or an application submitted to obtain a new license. Should the facility be decommissioned, the project area would be rehabilitated to its original (pre-development) state. In the (unlikely) event that none of the mitigation measures outlined for the construction and operational phases of the proposed project had been implemented, the period of time for recovery to take place would be extended. In the event that decommissioning occurs, and assuming implementation of mitigation measures, the hydrological regime should fully recover over time to present day conditions.					

7. EROSION MANAGEMENT PLAN

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION PHASE)					
7.1. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that land disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.1.1. Design an effective system of storm water run-off control, where required (e.g. areas with concentrated volumes of run-off). The system must effectively collect and safely disseminate run-off water from all accumulation points and prevent down slope erosion.	▪ Ensure that the storm water run-off control is included in the engineering design.	▪ Once-off during the planning and design phase.	▪ Project Developer
B. CONSTRUCTION PHASE					
7.2. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment	Ensure that land disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.2.1. Implement an effective system of storm water run-off control, where required. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces and it must prevent any potential down slope erosion.	▪ Undertake periodic site inspections to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	▪ Every 2 months during the construction phase	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
of hard surface areas including roads.					
7.3. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that vegetation clearing does not pose a high erosion risk.	7.3.1. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	▪ Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	▪ Every 3 months during the construction phase	▪ ECO
7.4. Increased wind erosion and resultant deposition of dust	Prevent wind erosion and resultant deposition of dust on surrounding indigenous vegetation.	7.4.1. Sand, stone and cement should be stored in demarcated areas, and covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	▪ Undertake regular inspections of the via site audits to verify that sand, stone and cement are stored and handled as instructed.	▪ Weekly	▪ ECO and Contractor
		7.4.2. During construction, efforts should be made to retain as much natural vegetation as possible on the site, to reduce disturbed areas and maintain plant cover, thus reducing erosion risks.	▪ Monitor activities via site inspections and record and report non-compliance.	▪ Weekly	▪ ECO and Contractor
		7.4.3. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised. Erosion and sedimentation into water bodies must be minimised through effective stabilisation.	▪ Monitor the stockpiling process throughout the construction phase via visual site inspections. Record non-compliance and incidents.	▪ Weekly	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
7.5. Excessive loss of natural vegetation within the development footprint area from erosion	Prevent loss of natural vegetation through erosion.	7.5.1. Vegetation clearing during construction must be restricted to the footprint of the proposed project components and planned infrastructure only. It should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.	▪ Monitor vegetation clearing throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Undertake regular monitoring for erosion to ensure is reduced and rectified as soon as possible.	▪ Weekly ▪ Weekly	▪ ECO and Contractor ▪ ECO
		7.5.2. Stockpile the shallow topsoil layer separately from the subsoil layers. Reinstate the topsoil layers (containing seed and vegetative material) when construction is complete to allow the plants to rapidly re-colonise the bare soil areas.	▪ Rehabilitate disturbed areas and monitor the presence of alien invasive species on site.	▪ Weeky (stockpiling) and once-off for the reinstatement of the top soil layer	▪ ECO and Contractor
		7.5.3. Re-seed with locally-sourced seed of indigenous vegetation species.	▪ Re-seed with seeds of indigenous grass species.	▪ Once off	▪ ECO with advice from a Terrestrial Ecology Specialist (if required)
		7.5.4. Topsoil stockpiles not used in three months after stripping must be seeded to prevent dust and erosion.	▪ Regular monitoring for erosion to ensure that no erosion problems are occurring at the site. All erosion problems observed should be rectified as soon as possible.	▪ Weekly initially and thereafter monthly	▪ ECO and Contractor
7.6. Erosion of surface soils, rilling and gulleys.	Measures to be implemented that address or avoid the loss of surface soils and exacerbates gulley formation.	7.6.1. Identify cause of erosion and possible means of redress (i.e. implement erosion control measures, where applicable), such as the use of geofabric, stone gabions and re-vegetation or similar measures.	▪ Monitor the erosion on site during construction, as well as the implementation and effectiveness of erosion control on site (such as the use of geofabric, stone gabions	▪ Ongoing and as required during erosion events.	▪ ECO and Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		7.6.2. Erosion control measures should seek to reduce surface flow velocity and allow for settlement on site of silt laden surface waters. Washaways, excessive loss of soils and gulleys can be considered to be indicative of excessive erosion.	and re-vegetation or similar measures).		
C. OPERATIONAL PHASE					
7.7. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics.	Ensure that existence of hard surfaces causes no erosion on or downstream of the site.	7.7.1. Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	▪ Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	▪ Annually	▪ Project Developer
7.8. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics.	That denuded areas are re-vegetated to stabilise soil against erosion.	7.8.1. Facilitate re-vegetation of denuded areas throughout the site.	▪ Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	▪ Annually	▪ Project Developer
7.9. Excessive loss of natural vegetation in the development footprint area and resulting impacts on	Prevent loss of natural vegetation and minimise habitat fragmentation and the loss of connectivity as a result of erosion.	7.9.1. The use of silt fences, sand bags or other suitable methods must be implemented in areas that are susceptible to erosion. All erosion control mechanisms need to be regularly maintained.	▪ Monitor efficiency of erosion control measures.	▪ Monthly	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
indigenous vegetation, faunal habitat and habitat fragmentation.		7.9.2. Conduct regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. Ensure that all erosion problems are rectified as soon as possible.	▪ Undertake regular monitoring for erosion to ensure is reduced and rectified as soon as possible.	▪ Monthly	▪ Project Developer
D. DECOMMISSIONING PHASE					
7.10. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by decommissioning related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.10.1. Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	▪ Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	▪ Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	▪ ECO
7.11. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by decommissioning related land surface disturbance, vegetation removal, and the establishment	Ensure that vegetation clearing does not pose a high erosion risk.	7.11.1. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	▪ Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	▪ Every 4 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
of hard surface areas including roads.					

8. HAZARDOUS SUBSTANCES LEAKAGE OR SPILLAGE MONITORING SYSTEM

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	Frequency	Responsibility
A. CONSTRUCTION PHASE					
8.1. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of concrete and cement.	To control concrete and cement batching activities in order to reduce spillages and resulting contamination of soil, groundwater and the vegetation and/or fauna.	8.1.1. If any concrete mixing takes placed on site, this must be carried out in a clearly marked, designated area at the site camp on an impermeable surface (such as on boards or plastic sheeting and/or within a bunded area with an impermeable surface).	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Weekly	▪ Project Developer Contractor and ECO
		8.1.2. Bagged cement must be stored in an appropriate facility.	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Weekly	▪ Project Developer, Contractor and ECO
		8.1.3. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted.	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Weekly	▪ Project Developer, Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	Frequency	Responsibility
		8.1.4. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Weekly ▪ Monthly	▪ Project Developer, Contractor and ECO ▪ ECO
		8.1.5. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. Empty cement bags must be collected from the construction area at the end of every day. Sand and aggregates containing cement must be kept damp to prevent the generation of dust.	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Weekly	▪ Project Developer, Contractor and ECO
		8.1.6. Any excess sand, stone and cement must be removed from site at the completion of the construction period and disposed at a licenced waste disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Weekly ▪ Monthly	▪ Project Developer, Contractor and ECO ▪ ECO
8.2. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils.	To control and eliminate fuel and oil spillages which may result in soil contamination and damage to vegetation and/or fauna.	8.2.1. Ensure that adequate containment structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bund areas must be provided for the storage of these materials at the site camp. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground. Bund areas should have a capacity of 110 % of the volume of the largest tank in the bund (tanks include storage of	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		fuel/diesel). Leak detection monitoring systems must be implemented.			
		8.2.2. Monitor and inspect construction equipment and vehicles to ensure that no fuel spillage takes place. Ensure that drip trays are provided for construction equipment and vehicles as required.	▪ Monitor the construction equipment and vehicles and monitor the occurrence of spills and the management process thereof. ▪ Record all spills and lessons learnt.	▪ Weekly ▪ During spill events	▪ Contractor and ECO ▪ ECO
		8.2.3. Contractor to compile a Method Statement for refueling activities under normal and emergency situations. If on-site servicing and refueling is required in emergency situations, a designated area must be created at the construction site camp for this purpose. Drip trays or similar impervious materials must be used during these procedures.	▪ Verify if a Method Statement is compiled by reviewing approved and signed off reports. ▪ Monitor the refueling/ servicing process and record the occurrence of any spillages.	▪ Once-off prior to commencement of construction. ▪ During emergency refueling and servicing activities.	▪ ECO ▪ ECO
		8.2.4. Suitable emergency and safety signage is to be provided on-site, and any areas which may pose a safety risk (including hazardous substances), clearly demarcated. Emergency numbers for the local police, fire department, Eskom and the local municipality must be placed in a prominent clearly visible area on-site.	▪ Ensure that suitable emergency and safety signage is placed in appropriate area on site.	▪ Once-off prior to commencement of construction	▪ Contractor and ECO
		8.2.5. Obtain written confirmation from a waste disposal facility confirming sufficient capacity to accept any hazardous waste emanating from the site.	▪ Verify if written confirmation confirming sufficient capacity was obtained	▪ Once-off prior to commencement of construction	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	Frequency	Responsibility
		8.2.6. Spilled fuel, oil or grease must be retrieved and contaminated soil removed, cleaned and replaced. Record and report all significant fuel, oil, hydraulic fluid or electrolyte spills or leaks so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle	▪ Monitor the handling and storage of fuels and oils via site audits and monitor and record if spillages have taken place and if so, are removed correctly and reported to authorities if significant. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Weekly (or during spills)	▪ Contractor and ECO
		8.2.7. Contaminated soil to be collected by the Contractor (under observation of the ECO) and disposed of at a registered waste facility designated for this purpose. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the correct removal of contaminated soil. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Weekly (or during spills)	▪ Contractor and ECO
		8.2.8. A Spill Response Method Statement must be compiled by the Contractor for the construction phase in order to manage potential spill events.	▪ Compile a Spill Response Method Statement. ▪ Audit signed and approved Spill Response Method Statement.	▪ Once-off (and thereafter updated as required during the construction phase).	▪ Contractor and Project Developer, ECO
		8.2.9. The Contractor must ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events. 8.2.10. Staff onsite must be trained on how to deal with the clean-up of a hazardous substance.	▪ Monitor via site audits to ensure equipment is available and ready to use and staff are appropriately trained.	▪ Monthly	▪ ECO and Contractor ▪ ECO and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	Frequency	Responsibility
		8.2.11. Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.	▪ Ensure that a well-maintained portable bioremediation kit is available on site and that construction personnel and contractors are aware of its location and instructions	▪ Monthly	▪ Contractor and ECO
		8.2.12. In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree and level of contamination, excavation and removal to a hazardous waste disposal facility could be necessary. If the spillage is widespread and the soil is considered to be significantly contaminated, a specialist will need to be immediately appointed to address the spillage. This will usually entail the collection of samples of the contaminated soil followed by analysis in terms of the 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (i.e. GN 331). If the soil is determined to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant, including notifying the Minister of Environment, Forestry and Fisheries of the significant contamination.	▪ Ensure that a suitably qualified specialist is appointed to collect and analyse the contaminated soil samples in terms of the 2014 Norms and Standards (i.e. GN 331) in order to determine if the soil is significantly contaminated or not. ▪ If the contaminated soil is considered to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant.	▪ During spill events	▪ Project Developer
		8.2.13. The DFFE and the Directorate: Pollution and Chemicals Management are to be immediately duly notified of any incident in terms of Section 30 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA). In terms of Section 30 of NEMA, an "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused	▪ Ensure that this is undertaken via onsite inspections and reported to the authorities when required.	▪ Throughout construction (in the event of such incidents)	▪ ECO and Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		or may cause significant harm to the environment, human life or property. 8.2.14. The Department of Human Settlements, Water and Sanitation (DHSWS) must be immediately notified of any pollution to surface water or groundwater resources due to the proposed project activities.			
		8.2.15. The Contractor must record and document all significant spill events.	▪ Monitor documentation and records of significant spill events via audits and record non-compliance and incidents.	▪ During spill events	▪ ECO
B. OPERATIONAL PHASE					
8.3. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils	To control and eliminate fuel and oil spillages which may result in soil contamination and damage to vegetation and/or fauna.	8.3.1. Monitor and inspect maintenance equipment and vehicles to ensure that no fuel spillage takes place.	▪ Implement specifications for maintenance equipment use as specified by the maintenance Contractor.	▪ Monthly	▪ Project Developer
		8.3.2. Spilled fuel, oil or grease is retrieved during operations where possible and contaminated soil removed, cleaned and replaced. 8.3.3. Record and report all significant fuel, oil, hydraulic fluid or electrolyte spills or leaks so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle.	▪ Monitor the handling and storage of fuels and oils via site audits and monitor and record if spillages have taken place and if so, are removed correctly and reported to authorities if significant. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	Frequency	Responsibility
		8.3.4. Contaminated soil to be collected by the Contractor and disposed of at a registered waste facility designated for this purpose. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the correct removal of contaminated soil. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer
		8.3.5. A Spill Response Plan must be compiled for the operational phase in order to manage potential spill events.	▪ Compile a Spill Response Plan. ▪ Audit signed and approved Spill Response Method Statement.	▪ Once-off (and thereafter updated as required). ▪ Once-off (and thereafter as required).	▪ Project Developer ▪ Facility Manager
		8.3.6. Ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events. Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required. 8.3.7. Ensure staff onsite are trained on how to deal with the clean-up of a hazardous substance.	▪ Ensure that a well-maintained portable bioremediation kit is available on site and that operational personnel are aware of its location and instructions.	▪ Monthly ▪ Before to commencement of operations and thereafter as required.	▪ Facility Manager ▪ Facility Manager
		8.3.8. In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree and level of contamination, excavation and removal to a hazardous waste disposal facility could be necessary. If the spillage is widespread and the soil is considered to be significantly contaminated, a specialist will need to be immediately appointed to address the spillage. This will usually entail the collection of samples of the contaminated soil followed by analysis in terms of the 2014 National Norms and Standards for the	▪ Ensure that a suitably qualified specialist is appointed to collect and analyse the contaminated soil samples in terms of the 2014 Norms and Standards (i.e. GN 331) in order to determine if the soil is significantly contaminated or not.	▪ During spill events	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		Remediation of Contaminated Land and Soil Quality (i.e. GN 331). If the soil is determined to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant, including notifying the Minister Environment, Forestry and Fisheries of the significant contamination.	▪ If the contaminated soil is considered to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant.		
		8.3.9. The DFFE are to be immediately duly notified of any incident in terms of Section 30 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA). In terms of Section 30 of NEMA, an "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property. 8.3.10. The DHSWS must be immediately notified of any pollution to surface water or groundwater resources due to the proposed project activities.	▪ Ensure that this is undertaken via onsite inspections and reported to the authorities when required.	▪ Throughout operations (in the event of such incidents)	▪ Environmental Manager
		8.3.11. Ensure that adequate containment structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bund areas must be provided for the storage of these materials at the WEF. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground. Bund areas should have a capacity of 110 % of the volume of the largest tank in the bund (tanks include storage of fuel/diesel). Leak detection monitoring systems must be implemented.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ Facility Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
8.4. Impacts due to management solid and liquid wastes disposed of on the site during operational phase.	Prevent environmental impacts as a result of the operational phase such as pollution.	8.4.1. All operation waste to be frequently and appropriately removed from the site and disposed by an appointed service provider.	▪ Waste removal and disposal to be monitored throughout operation.	▪ Monthly	▪ Facility Manager
		8.4.2. All liquid waste or spills (used oil, paints, lubricating compounds and grease from vehicles passing through the entrance facility) to be packaged and disposed appropriately at a registered landfill site.	▪ Monitor the correct removal of liquid waste or spills. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer
		8.4.3. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided in order to avoid spillages. 8.4.4. All cleaning substances that are to be used should be non-toxic or not harmful to the environment and must be responsibly managed to prevent the contamination of any nearby surface water resources and the receiving environment	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents. ▪ Ensure appropriate, non-toxic cleaning substance are used.	▪ Monthly ▪ Monthly	▪ Facility Manager ▪ Facility Manager
C. DECOMMISSIONING PHASE					
8.5. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.					

9. ENVIRONMENTAL AWARENESS AND FIRE MANAGEMENT PLAN

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION PHASE)					
9.1. Potential impacts resulting from the lack of overall compliance with the conditions of the EA (issued by the DFFE)	Ensure compliance with all environmental conditions of approval (issued by DFFE as part of the EA).	9.1.1. Audit the implementation of the EMPr requirements.	▪ Audit report on compliance with actions and monitoring requirements.	▪ Once-off pre-construction audit	▪ Project Developer
		9.1.2. Establish clear and transparent reporting of the activities undertaken with regard to all recommendations included in the EMPr.	▪ Audit report on compliance with actions and monitoring requirements.	▪ Once-off pre-construction audit	▪ Project Developer
9.2. Potential risk fire as a result of a lack of veld fire awareness	Mitigate risk of fire on site as a result of veld conditions.	9.2.1. Registration as a member of the Southern Cape Fire Protection Association (SCFPA) 9.2.2. Consult with the Forestry: Fire Advisor Paul Gerber (044 302 6920; PaulGe@daff.gov.za) under the National Veld and Forest Fire Act (NVFFA)	▪ Ensure that the Project Developer has consulted with the Forestry: Fire Advisor.	▪ Once-off prior to construction	▪ Project Developer and ECO
B. CONSTRUCTION PHASE					
9.3. Potential detrimental effect of dust on the environment and health as a result of construction activities.	Mitigate dust levels during high dust generating activities and implement appropriate dust suppression actions	9.3.1. Dust generated must comply with the National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).	▪ Ensure compliance with National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013).	▪ On-going	▪ ECO
9.4. Potential risk of fire due to construction activities or behaviour	Prevent fire on site resulting from workers smoking or starting fires	9.4.1. Designate smoking areas, as well as areas for cooking, where the fire hazard could be regarded as insignificant.	▪ Check to ensure workers are smoking or cooking in designated areas only.	▪ Weekly	▪ ECO and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
of staff on site during the construction phase	(i.e. for cooking or heating purposes).	9.4.2. Educate workers on the dangers of open and/or unattended fires.	▪ Ensure fire safety requirements are well understood and respected by construction personnel. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Ongoing. ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ Contractor/ ECO ▪ ECO
		9.4.3. Prohibit open fires. Appropriate fire safety training should also be provided to staff that are to be on the site for the duration of the construction phase.	▪ Ensure fire safety requirements are well understood and respected by construction personnel. Provide basic fire safety training.	▪ On-going	▪ ECO and Contractor
		9.4.4. Ensure that cooking takes place in a designated area shown on the site map. Ensure that no firewood or kindling may be gathered from the site or surrounds.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.4.5. Fire-fighting equipment must be made available at various appropriate locations on the construction site.	▪ Ensure fire safety requirements are well understood and respected by workers. ▪ Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.	▪ On-going ▪ Bi-annually	▪ ECO and Contractor ▪ Contractor
9.5. Inappropriate behaviour of civil contractors and sub-contractors during the construction phase	Prevent unnecessary impacts on the surrounding environment by ensuring that contractors are aware of the requirements of the EMPr.	9.5.1. Ensure that the EMPr and the EA (should it be granted by the DFFE), are included in all tender documentation and contractors and sub-contractors contracts.	▪ Check compliance with specified conditions using a report card and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.5.2. Contractors and sub-contractors must use the ablution facilities situated in a designated area within the site; and no	▪ Check compliance with specified conditions using a report card and allocate fines when necessary.	▪ On-going ▪ On-going ▪ On-going	▪ ECO, Facility Manager and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
	Ensure that contractors and sub-contractors do not induce impacts on the surrounding environment as a result of unplanned pollution on site. Ensure that actions by on-site contractors and sub-contractors and workers are properly managed in order to minimise impacts to surrounding environment.	bathing/washing should be permitted outside the designated area. 9.5.3. Portable chemical toilet/s (ablution facilities) at the construction camp, must be serviced weekly for the duration of the construction phase. 9.5.4. A conservancy tank system at the O&M buildings should be carefully managed to limit the risk of health, aesthetic and environmental problems during operation. The following mitigation actions must be adhered to: 9.5.4.1. Care should be taken with the installation of conservancy tanks to prevent cracks that could lead to leaks over time. Proper and regular servicing must be scheduled to prevent possible groundwater contamination. 9.5.4.2. The tank must be provided with a fresh air inlet and an intercepting grease tap; 9.5.4.3. The tank must have an airtight manhole cover to allow access to the tank for the removal and safe disposal of the tank contents; 9.5.4.4. The tank must have an airtight manhole cover to allow access to the tank for the removal and safe disposal of the tank contents 9.5.4.5. No industrial waste or refuse may be discharged into the conservancy tank	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary. ▪ Check compliance prior to installation of conservancy tank. ▪ Check compliance prior to installation of conservancy tank ▪ Check compliance prior to installation of conservancy tank ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary ▪ Check compliance prior to installation of conservancy tank. ▪ Check compliance with specified conditions using a report card, and allocate fines when necessary ▪ Check compliance prior to installation of conservancy tank. ▪ Check compliance prior to installation of conservancy tank. ▪ Check compliance prior to installation of conservancy tank.	▪ Once-off (prior to installation of conservancy tank) ▪ Once-off (prior to installation of conservancy tank) ▪ Once-off (prior to installation of conservancy tank) ▪ Once-off (prior to installation of conservancy tank) ▪ On going ▪ Once-off (prior to installation of conservancy tank) ▪ On-going ▪ Once-off (prior to installation of conservancy tank) ▪ Once-off (prior to installation of conservancy tank) ▪ Once-off (prior to installation of	

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
		except by written agreement with the relevant authorities. 9.5.4.6. The size of the conservancy tank must be determined by both the frequency of removal of its contents to the local Wastewater Treatment Works and by the quantity of sewage anticipated from the proposed Kwagga WEF project. Written confirmation must be obtained from the local municipality stating that it will provide the service of removal of the tank contents. 9.5.4.7. The content of the tank must be removed by a vacuum tanker ad conveyed to a local Wastewater Treatment Works that is capable of processing the volume and contents of the conservancy tank. On-going written confirmation must also be obtained from the local municipality and retained as proof that the contents of the conservancy tank has been received for the proper treatment at the said wastewater treatment works. 9.5.4.8. A contingency plan must be draw up to protect against overflow of the conservancy tank. A sump or lined pond can be designed below the conservancy tank to contain any overflows. 9.5.4.9. Ingress of stormwater into the conservancy tank must be prevented. 9.5.4.10. The conservancy tank must be located out of the 1:100 year flood line of any water	▪ Check compliance prior to installation of conservancy tank.	conservancy tank)	

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		resources of alternatively, more than 100 meters from the edge of a water resource or a borehole which is utilized for drinking water or stock watering, whichever is further. 9.5.4.11. A detailed geotechnical Investigation must be done to determine the most appropriate location of the conservancy tank.			
		9.5.5. All litter will be deposited in a clearly labelled, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.5.6. No person other than qualified specialist or personnel authorised by the Project Developer, will disturb or remove plants outside the demarcated construction area.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.5.7. No person other than qualified specialist or personnel authorised by the Project Developer, will disturb animals on the site.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.5.8. Educate workers on site about suitable behaviour on site and initiate environmental awareness. Staff must be informed that no trapping, snaring or feeding of any animal will be allowed.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor/ ECO ▪ ECO
9.6. Inappropriate planning and running of site construction camp.	Ensure that environmental issues are taken into consideration in the	9.6.1. All construction activities, materials, equipment and personnel must be restricted to the actual construction area specified (as required to undertake the	▪ Check areas are demarcated. ▪ Check restrictions are observed during construction.	▪ Before construction ▪ Ongoing	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
	planning and running of the site construction camp.	construction work), which includes the project footprint area and access roads. The construction area must be demarcated by the Contractor (excluding the access roads).			
		9.6.2. The Contractor should install and maintain Construction Site Information Boards in the position, quantity, design and dimensions specified by the Project Developer.	▪ Check boards are erected and maintained.	▪ Before construction, then ongoing	▪ ECO
		9.6.3. General building materials should be stored in appropriate designated areas on site such that there will be no runoff from these areas towards sensitive systems. The site camp must be removed after construction.	▪ Monitor compliance and record non-compliance and incidents.	▪ Before construction	▪ ECO
9.7. Increased animal road mortality	Reduction in animal mortality	9.7.1. The construction staff should be made aware of the presence of fauna and within the proposed project area. The construction personnel and staff must also be made aware of the general speed limits on site and must be alert at all times for potential crossings, and should be trained on how to react in these situations.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor/ ECO ▪ ECO
		9.7.2. To ensure that animals are not attracted to the site (and potentially resulting in increased road mortality), the waste collection bins and skips should be covered with suitable material, where appropriate, and the site camp must be kept clean on a daily basis.	▪ Monitor the activities via visual inspections, and record and report any non-compliance.	▪ Weekly	▪ Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
		9.7.3. Establish a monitoring programme to record the number of faunal road mortalities and collisions. If it is established that the number of collisions and faunal fatalities increase within a specific area, then identify appropriate actions such as additional road signage and driver education to raise awareness.	▪ Monitoring and recording of mortalities to be undertaken. ▪ Additional signage and driver education to be implemented if required.	▪ Weekly ▪ As required	▪ ECO ▪ ECO and Contractor
9.8. Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	9.8.1. Encourage the use of energy saving equipment at the site camp site (such as low voltage lights and low pressure taps to reduce hot water usage). Construction personnel must be made aware of energy conservation practices as part of the Environmental Awareness Training programme.	▪ Contractor to monitor energy usage via audits. ▪ Carry out Environmental Awareness Training and check the signed attendance registers.	▪ Monthly ▪ Once-off training and ensure that all new staff are inducted.	▪ Contractor ▪ Contractor/ ECO ▪ ECO
9.9. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during the construction phase.	9.9.1. Water conservation should be practiced as follows: ▪ Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down). ▪ Ensure that regular audits of water systems and all water-related infrastructure (e.g. pipes, pumps, reservoirs, toilets, taps etc.) are conducted to identify possible water leakages. Such infrastructure must be repaired immediately. 9.9.2. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative	▪ Monitor via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		approved water sources and dust suppressants, where possible.			
		9.9.3. Make construction personnel aware of the importance of limiting water wastage, as well as reducing water use.	▪ Carry out Environmental Awareness Training with a discussion on water usage and conservation. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor/ ECO ▪ ECO
C. OPERATIONAL PHASE					
9.10. Potential detrimental effect of dust on the environment and health as a result of construction activities.	Mitigate dust levels during high dust generating activities and implement appropriate dust suppression actions	9.10.1. Dust generated must comply with the National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).	▪ Ensure compliance with National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013).	▪ On-going	▪ ECO
9.11. Potential risk of fire due to behaviour of staff on site during the operational phase	Ensure appropriate and efficient fire prevention during the operational phase.	9.11.1. Designate smoking areas as well as areas for cooking, where the fire hazard could be regarded as insignificant.	▪ Random inspections during a month to ensure workers are smoking or starting fires in designated areas only.	▪ Monthly	▪ Facility Manager
		9.11.2. Educate workers on the dangers of open and/or unattended fires.	▪ Ensure fire safety requirements are well understood and respected by operational personnel. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Ongoing ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Facility Manager ▪ Facility Manager ▪ Facility Manager
		9.11.3. Prohibit open fires. Appropriate fire safety training should also be provided to staff that are to be on the site for the duration of the operational phase.	▪ Ensure fire safety requirements are well understood and respected by operational personnel. Provide basic fire safety training.	▪ On-going	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		9.11.4. Ensure that adequate fire-fighting equipment is available and easily accessible on site.	▪ Ensure fire safety requirements are well understood and respected by workers. ▪ Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.	▪ On-going ▪ Bi-annually	▪ Facility Manager ▪ Project Developer
9.12. Increased energy consumption during the operational phase.	Reduce energy consumption where possible.	9.12.1. Encourage the use of energy saving equipment at the WEF (such as low voltage lights and low pressure taps to reduce hot water usage). Operational personnel must be made aware of energy conservation practices as part of the environmental awareness training programme.	▪ Monitor energy usage via site investigations. ▪ Conduct training for all operational personnel.	▪ Monthly ▪ As and when required and ensure that all new staff are inducted.	▪ Facility Manager ▪ Project Developer
9.13. Non respect of waste management practices	Minimise the production of general waste. Ensure compliance with relevant waste management legislation. Minimise pollution of the environment.	9.13.1. Control and implement waste management plans. Ensure that relevant legislative requirements are respected. 9.13.2. Determine specific areas on site for temporary management of waste.	▪ Control of waste management practices throughout operation phase.	▪ Monthly	▪ Facility Manager
		9.13.3. Promote waste reduction, re-use, and recycling opportunities on site during the operation phase. 9.13.4. Ensure an adequate and sustainable use of resources.	▪ Monitor waste generation and collection throughout operation.	▪ Monthly	▪ Facility Manager
9.14. Excessive generation of waste water on site during the operation phase	Maintain reasonable levels of waste water generation	9.14.1. Wastewater must be collected and disposed of at a suitable licenced disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Wastewater generation to be monitored throughout the operational phase. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Quarterly	▪ Facility Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
D. DECOMMISSIONING PHASE					
9.15. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

10. SPECIFIC PROJECT RELATED ENVIRONMENTAL IMPACTS

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION PHASE)					
A.1. TERRESTRIAL BIODIVERSITY					
10.1. Potential impact on terrestrial biodiversity and species as a result of the proposed WEF.	To avoid or minimise impacts on terrestrial biodiversity and species on site regarding the placement of the infrastructure. Avoiding ridges, cliffs and rocky sheets will reduce the chances of loss of protected species.	10.1.1. Ensure that the placing of infrastructure takes the sensitivity mapping of the ecological assessment into account to avoid and reduce impacts on sensitive habitats and protected species. Refer to Appendix F of this EMPr for the combined sensitivity map.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once-off during the planning phase.	▪ Project Developer and appointed Ecological Specialist
A.2. AVIFAUNA					
10.2. Mortality of priority avifauna due to collisions with the wind turbines	To prevent mortality of priority avifauna	10.2.1. The results of the pre-construction monitoring must guide the lay-out of the turbines, especially as far as proposed no-turbine zones are concerned. No turbines must be constructed in the buffer zones which were identified based on the results of the pre-construction monitoring, with a specific view to limiting the risk of collisions to a variety of birds, including several Red Data species.	▪ Design the facility with 400m buffers around sources of surface water. ▪	▪ Once-off during the planning phase.	▪ Project Developer
10.3. Electrocution of raptors on the internal 33kV poles	To prevent electrocutions	10.3.1. Use underground cabling as much as is practically possible. 10.3.2. Where the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted to ensure that a raptor friendly pole design is used, and that appropriate mitigation is implemented pro-actively for	▪ Design the facility with underground cabling. ▪ Consult with Avifaunal Specialist during the design phase of the overhead lines.	▪ Once-off during the planning phase.	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		complicated pole structures e.g. insulation of live components to prevent electrocutions on terminal structures and pole transformers.			
A.3. BATS					
10.4. Displacement and destruction of bat roosts due to habitat loss / habitat transformation	Mitigate impacts on bat habitat caused by destruction, disturbance and displacement.	10.4.1. The final layout of the WEF must be designed and constructed in such a way as to avoid the destruction of potential and actual roosts, particularly large mature trees, buildings, rocky crevices (if blasting is required) 10.4.2. Limit the removal of vegetation, particularly large mature trees within 50 m of turbine positions.	▪ Ensure that No-go areas are identified and excluded from turbine placement during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Prior to construction during design and planning phase.	▪ Project Developer
A.4. VISUAL IMPACTS					
10.5. Potential impact on visual resources as a result of the proposed WEF and associated infrastructure. Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors	To avoid or minimise impacts on existing dwellings and potentially sensitive receptor locations in the WEF development area.	10.5.1. In areas of 'Very High' and 'High Sensitivity', the number of turbines should be limited, where possible. Ensure that that the design of the WEF takes the sensitivity mapping of the visual specialist into account. Refer to Appendix F of this EMPr for the combined sensitivity map. 10.5.2. Place site turbines at least 500 m from any occupied farmstead within the proposed site and at least 2 km from occupied farmstead outside of the proposed site, where possible 10.5.3. Turbine colours should adhere to Civil Aviation Authority (CAA) requirements. 10.5.4. The operation and maintenance buildings must be painted with natural tones that fit with the	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ During design cycle and before construction commences.	▪ Project Developer and

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		surrounding environment. Non-reflective surfaces must be utilised where possible. 10.5.5. Use non-reflective materials 10.5.6. Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour 10.5.7. Bright colours and logos should be avoided.			
A.5. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.6. Damage or destruction of archaeological sites or graves	To avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance.	10.6.1. Commission a pre-construction archaeological survey of the approved layout in order to confirm the micrositing of infrastructure and to check for archaeological sites or features that might have been missed during the original survey and could potentially be rescued or protected. Mitigation to be suggested if required. The survey should be done well in advance of construction. 10.6.2. Avoidance of the historical rubbish midden at Waypoint 419. If this rubbish midden cannot be avoided, then the rubbish midden should be excavated prior to construction. 10.6.3. Slight rerouting of the access road northwards, at Waypoint 327 to reduce the chances of impacts to the buildings situated there. 10.6.4. Slight rerouting of the access road (in the vicinity of Waypoint 309), so as to pass between the structures at waypoint 309 in such a way that the distance between road and structures is maximized.	▪ Appoint archaeologist to conduct survey well before construction. ▪ Ensure this recommendation is applied prior to construction ▪ Ensure this recommendation is applied prior to construction ▪ Ensure this recommendation is applied prior to construction	▪ Once-off (well before construction commences). ▪ Once-off (prior to construction). ▪ Once-off (prior to construction). ▪ Once-off (prior to construction).	▪ Project Developer ▪ Project Developer ▪ Project Developer ▪ Project Developer
A.6. SOIL AND AGRICULTURAL IMPACTS					

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.7. Soil degradation as a result of erosion. during construction	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	10.7.1. Design an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	▪ Ensure that the storm water run-off control is included in the engineering design by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once-off during the design phase	▪ Project Developer
A.8. AQUATIC ECOLOLGY IMPACTS					
10.8. Potential impact on freshwater ecology as a result of the proposed WEF and associated infrastructure	To limit the disturbance of aquatic habitat and minimise potential to modify flow/hydraulics related impacts and increase the potential for erosion	10.8.1. Ensure final layout of WEF avoids watercourses and recommended buffers as far as possible; utilisation should be made of existing disturbed areas where possible. Opportunities should also be sought to rationalise the number of road crossings and in particular, avoid the number of crossings over the very high sensitivity Swartbakens and Leeu Rivers. 10.8.2. A comprehensive stormwater management plan should be compiled for the compacted surfaces within the site by the project engineer with input from the freshwater specialist. The plan should aim to reduce the intensity of runoff particularly on the steeper slopes and reduce the intensity of the discharge into the adjacent drainage lines. Where necessary measures to dissipate flow intensity or protect erosion should be included in the plan. The plan should encourage infiltration rather than runoff and should prevent the impedance of surface or sub-surface flows. The plan should also mitigate any contaminated runoff from the construction and operation activities from being discharged into any of the aquatic features within the site	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once-off during the design phase and before construction commences.	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.8.3. Adequate and erosion mitigation measures should be incorporated into designs 10.8.4. For any new infrastructure placed within the watercourses: • The structure should not impede or concentrate the flow in the watercourse. It is recommended that low water crossings should be utilised.Any rubble or waste associated with the construction works within the aquatic features should be removed once construction is complete 10.8.5. Water consumption requirements for the site for the construction and operation of the site if not obtained from an authorised water user within the area, must be authorised by the DWS. 10.8.6. No liquid waste should be discharged into any of the aquatic features within the site without the approval of the DWS. 10.8.7. Wastewater should be properly contained on-site and removed to a licensed wastewater treatment facility that can treat the wastewater			
A.9 GEOHYDROLOGY IMPACTS					

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.9. Groundwater impact as a result of over-abstraction	To reduce the impact of the proposed WEF on groundwater resources.	10.9.1. If groundwater from existing boreholes is to be used as a water source during the project phases, then a registration process must be followed for the use of existing boreholes; i.e. Section 39 of the National Water Act (Act 36 of 1998, as amended). Ensure that the Department of Water and Sanitation (DWS) are consulted with to confirm the need and requirements of a General Authorisation for use of existing boreholes in the vicinity. In addition, agreements must be put in place with the current land owners for the use of groundwater. These agreements must be legally valid documents. 10.9.2. If no such agreements can be put in place, and if ground water needs to be used, then additional boreholes may be drilled on the relevant farm portions, followed by yield and water quality testing, and then authorization from DWS to use the ground water will be required.	▪ Ensure that the requirements of the DWS are considered during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the Water Use Licence or General Authorisation, if required, is submitted and approved prior to the commencement of construction by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once-off during the planning and design phase.	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.10.		10.10.1. If ground water from existing boreholes is to be used during the project phases, then a Geohydrology Specialist must be appointed and must undertake a site visit and hydrocensus during the design and planning phase to quantify the number of potential boreholes that could be used for abstraction, as well as, their proximity to the development and other nearby groundwater sources and users. Groundwater quality sampling is also recommended to determine whether the quality of the water meets the quality recommendations for specific purposes during the construction and operational phases.	▪ Ensure that this is taken into consideration during the planning and design phase and that Geohydrology Specialist with suitable qualifications and experience is appointed to undertake a hydrocensus and water quality sampling by reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the findings are taken into consideration during the planning and design phase, as necessary by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ During design cycle and before construction commences.	▪ Project Developer
A.10. CIVIL AVIATION IMPACTS					
10.11. Potential impacts on civil aviation installations as a result of the proposed project.	To minimise the impact on nearby landing strips and other civil aviation installations.	10.11.1. Ensure that feedback is obtained from the South African Civil Aviation Authority and relevant permits obtained, if necessary, and that recommendations are incorporated into the design, as necessary.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
A.11. IMPACTS RESULTING FROM THE BATTERY ENERGY STORAGE SYSTEM (BESS)					
10.12. Risk of fire, explosion or release of toxic gas, and spillage of electrolyte as a	To minimise the risk of fire, explosion or release of toxic gas, and spillage of electrolyte as a result of the lithium-ion BESS.	10.12.1. Ensure that adequate research is undertaken by the Project Developer during the planning and design phase to select the supplier with the best technology and which has substantial environmental and safety mechanisms built into the design of the BESS. Reputable suppliers that	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
result of the lithium- ion BESS.		comply with the necessary legislation and regulations must be selected.			
		10.12.2. Ensure that the DFFE is contacted if any BESS technology, other than lithium-ion, is being considered and that relevant approval from the Competent Authority is obtained, where necessary.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
		10.12.3. Engage with a Risk Assessment specialist prior to construction to advise on any additional mitigation measures that need to be considered from a fire, explosion or release of toxic gas perspective.	▪ Ensure that a Risk Assessment Specialist is appointed during the planning and design phase by keeping the appointment letter on file. ▪ Ensure that the recommendations of the Risk Assessment specialist are taken into consideration in the design, as required.	▪ During design cycle and before construction commences. ▪ During design cycle and before construction commences.	▪ Project Developer ▪ Project Developer
		10.12.4. Ensure that the BESS is located in a clearly demarcated area in order to prevent unnecessary access. 10.12.5. Ensure that the BESS is placed on an impermeable surface (e.g. concrete surface) which has adequate containment mechanisms to collect contaminated storm water. 10.12.6. On-site battery maintenance should only be undertaken on impermeable surfaces with secondary containment measures. Any resulting hazardous substances must be disposed of appropriately. 10.12.7. Adhere to the appropriate international standards and South African National Standards	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings, designs or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		(SANS) requirements in terms of the assembly and operation of the BESS. 10.12.8. Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions.			
		10.12.9. Ensure that the responsibilities of the various parties are defined clearly for the life cycle of the BESS, such as when the BESS is being transported to site, when it reaches site, during operations, during transport off site in the event of malfunction or any technical issues. A clear plan must be devised that deals with the above.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings, designs or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
		10.12.10. A fire management plan must be compiled and implemented during the construction, operational and decommissioning phases, which must include an action plan for fires and emergency response specifically relating to the BESS. 10.12.11. Ensure that the individual BESS is located at adequate distances from each other in order to limit the knock-on effect or propagation of potential fires.	▪ Verify that the fire management plan is compiled and being implemented and signed off prior to the commencement of operations.	▪ Prior to the construction phase	▪ Project Developer
		10.12.12. The Project Applicant must develop a Spill Contingency Plan and Emergency Response Action Plan that deals with all potential spills and emergency response, specifically relating to the BESS.	▪ Ensure there is a spill and emergency response plan specifically relating to BESS.	▪ Prior to the construction phase	▪ Project Developer
		10.12.13. Ensure that the contact details of the local municipality, Eskom and emergency response	▪ Verify that the contact details of the local municipality, emergency response officials and the selected	▪ Prior to the construction phase	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		officials, such as the police and fire department are kept on file and clearly sign-posted on site. 10.12.14. Ensure that the contact details for the supplier of the BESS is kept readily available and sign-posted on site, should they need to be contacted during emergency situations.	BESS supplier and retained and maintained on file prior to construction.		
A.12. TRAFFIC					
10.13. Degradation of roads (on the entire road network) that will be affected by the proposed development	To ensure that no more than normal deterioration and additional maintenance costs are experienced by the Road Authority during the construction and operating phases. It is required that any design affecting any Proclaimed Provincial Road must carry The Western Cape Government Transport and Public Works - Roads Department Branch's Chief Directorate Road Design's approval before implementation thereof may commence	10.13.1. Commission a geotechnical and geometric design report, including improvement proposals, to ensure that all the roads (on the entire road network) that will be affected by this development are adequately improved and maintained before any other construction activity may commence on any of the farm portions.. 10.13.2. Confirmation that a similar geotechnical proposal will be compiled and approval obtained prior to commencing with any major upgrade or decommissioning phase; whenever that may be.	▪ Ensure that the required reports are compiled and approvals are obtained from the relevant authorities regarding the affected road network.	▪ Once off prior to construction	▪ Project Developer
B. CONSTRUCTION PHASE					
B.1. TERRESTRIAL BIODIVERSITY					
10.14. Clearance of vegetation	To confine vegetation clearance to footprint and	10.14.1. Demarcate all infrastructure sites clearly to avoid unnecessary clearance of the vegetation	▪ Ensure that mitigation measures are enforced by site inspections, reviewing signed minutes of	▪ Monthly	▪ ECO must monitor and report any

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
	minimise disturbance of adjacent areas	10.14.2. Permits have to be obtained for the removal of WCNECO protected species within the footprint of the development.	meetings or signed reports or the appointment letter.		incidents to the Project Developer
10.15. Impact on animal species	To avoid or minimise impacts that could potentially affect animal behaviour.	10.15.1. Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. 10.15.2. Holes and trenches should not be left open for long periods of time. These should be regularly inspected for the presence of trapped animals. 10.15.3. Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site. 10.15.4. Speed limits should be strictly adhered to. (40km/h for cars and 30km/h for trucks) and if areas are identified with higher occurrence of crossing by animals then signage should erected to alert drivers to be cautious. 10.15.5. Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. 10.15.6. No construction activity should be allowed on site at night.	▪ Ensure compliance with these mitigation measures by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ During design cycle and before construction commences. ▪ Daily ▪ As required during the construction stage ▪ Daily ▪ On-going ▪ Random during the construction phase ▪ Daily	▪ ECO must monitor and report any incidents to the Project Developer
10.16. Increased dust levels	Avoid or minimise increased dust levels.	10.16.1. Dust control measures should be implemented.	▪ Ensure that dust control measures are in place.	▪ Daily	▪ ECO must monitor and report any incidents to the Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.17. Possible presence of *Bunolagus monticularis* on site.	Determine whether the riverine rabbit (*Bunolagus monticularis*) is present on the site.	10.17.1. Favorable habitat for the riverine rabbit does not appear to be present on any of the proposed Kwagga project sites due to intensive grazing by livestock, exacerbated by the current drought, the vegetation on site and along the majority of drainage lines was extremely degraded. Specialist communication with the EWT Drylands Programme regarding the neighbouring proposed Trakas and Beaufort West WEF sites, has indicated that monitoring for the presence of this species at those sites was unnecessary. Furthermore, the camera trap monitoring that was employed at these neighbouring sites did not find any evidence of the presence of riverine rabbit in the area. Currently, it is therefore deemed unnecessary for camera trapping or other monitoring for riverine rabbit to be conducted during construction. However, this is being confirmed with EWT. If necessary, a riverine rabbit monitoring programme could be initiated to determine whether the species is present at the proposed Kwagga project sites.	▪ Camera trapping, if recommended by EWT. EWT to advise on the position and number of camera traps to be employed.	▪ Ongoing	▪ ECO must monitor and report any incidents to the Project Developer.
B.2 AVIFAUNA					
10.18. The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which	Prevent unnecessary displacement of priority avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.)	10.18.1. A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: ▪ No off-road driving. ▪ Maximum use of existing roads.	▪ Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. ▪ Ensure that construction personnel are made aware of	▪ Weekly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly	▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
would lead to the displacement of avifauna from the area		▪ Measures to control noise and dust according to latest best practice. ▪ Restricted access to the rest of the property. Strict application of all recommendations in the botanical specialist report pertaining to the limitation and rehabilitation of the footprint.	the impacts relating to off-road driving. ▪ Construction access roads must be demarcated clearly. Undertake site inspections to verify. ▪ Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. ▪ Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		
B.3. BATS					
10.25. Displacement of bats due to habitat loss / habitat transformation.	Minimise impacts on bats during construction activities.	10.25.1. Adhere to No-go areas incorporated into the Kwagga WEF 1 Layout. Keep construction activities out of bat sensitive areas (refer to the sensitivity map in Appendix F). 10.25.2. During construction laydown areas and temporary access roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation. Construction of the infrastructure should, where possible, be situated in areas that are already disturbed.	▪ Carry out visual inspection and continuous monitoring of high sensitivity areas.	▪ Throughout construction. ▪ ECO to be present during all site clearance activities. ▪ Access to bat specialist if ECO needs information or confirmation concerning bat presence.	▪ Project Developer. ▪ ECO ▪ Appointed bat specialist to train the ECO, if necessary.

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.25.3. This impact must be reduced by limiting the removal of vegetation, particularly large mature trees within 50 m of turbine positions.			
10.26. Bat roost displacement and destruction as a result of the proposed project activities.	To minimise impacts on bat roost displacement and destruction as a result of the proposed project activities during the construction phase.	10.26.2. Avoid construction activities near roosts to limit roost abandonment. 10.26.3. Large mature trees within 50 m of the turbine positions should be inspected for roosting bats. 10.26.4. It is recommended that potential roosts, specifically buildings and rocky crevices, are buffered by 200 m, inside which no turbine infrastructure may be placed. No turbines should be installed within 50 m of large mature trees.	▪ Ensure that this is undertaken by carrying out visual inspections and monitoring compliance.	▪ Throughout construction phase	▪ Project Developer and ECO.
B.4. VISUAL IMPACTS					
10.27. Visual intrusion and potential flicker effect by wind turbines and associated infastructure (including the access road and the on-site substation hub) on visual receptors	To avoid or minimise construction impacts on existing visual resources and potentially sensitive receptor locations in the proposed WEF development.	10.27.1. Limit area of disturbance for turbine footprint, access roads and construction camp or sites . 10.27.2. Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors 10.27.3. Suppress dust during construction especially during periods of high winds. 10.27.4. Place site turbines at least 500 m from any occupied farmstead within the proposed site and at least 2 km from occupied farmstead outside of the proposed site. 10.27.5. Limit area of disturbance for access roads, substations and construction camp sites. 10.27.6. Locate construction camps and all related facilities such as stockpiles, lay-down areas,	▪ Ensure that this is taken into consideration prior to the commencement of construction. ▪ Conduct site inspections to monitor implementation and report any noncompliance.	▪ Ongoing during construction.	▪ Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors. 10.27.7. Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld. 10.27.8. Blend edges of road and platforms with surrounding landscape. 10.27.9. Rehabilitate exposed disturbed areas. 10.27.10. Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape 10.27.11. Limit need for security lighting 10.27.12. Use non-reflective materials 10.27.13. Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour 10.27.14. Avoid bright colour/patterns and logos.			
B.5. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.28. Damage or destruction of archaeological sites or graves	To rescue information, artefacts or burials before extensive damage occurs.	10.28.1. Reporting chance finds as early as possible, protect in situ and stop work in immediate area. 10.28.2. No materials (e.g. rocks or bricks) may be removed from any historical sites	▪ Inform staff and carry out inspections of excavations. ▪ Monitoring of surface clearance relative to approved layout.	▪ Whenever on site (at least monthly). ▪ As required.	▪ Contractor and ECO ▪ ECO and Contractor
10.29. Visible landscape scarring	To minimise landscape scarring.	10.29.1. Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	▪ Monitoring of surface clearance relative to approved layout. ▪ Monitoring of surface clearance relative to approved layout.	▪ As required. ▪ At the end of the Construction phase,	▪ ECO and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.29.2. Fully rehabilitate temporary laydown areas once the Construction Phase concludes	temporary laydowns re fully rehabilitated before the operational phase commences.	before operations commence	▪ ECO and Contractor
B.6. HERITAGE IMPACTS (PALAEONTOLOGY)					
10.30. Loss of fossils by their being unnoticed and/ or destroyed. (i.e. Direct destruction of fossil resources as a result of all bulk earthworks, viz. turbine foundation excavations, trenches for cabling and infrastructure, power line and substation foundations, spoil from excavations).	To notice and rescue fossil material that may be exposed in the excavations during the construction of the WEF.	10.30.1. Inform staff of the need to monitor and watch for potential fossil occurrences.	▪ Carry out Awareness Training. ▪ Conduct audits of the signed attendance registers. Ensure that all new staff are inducted.	▪ As required during the pre-construction stage	▪ The Project Developer, the ECO and contractors
		10.30.2. Inform staff of the Fossil Finds Procedures to be followed in the event of fossil occurrences. A copy of this is included in Appendix C of this EMPr.	▪ Carry out Awareness Training to inform staff of the fossil find procedures. ▪ Conduct audits of the signed attendance registers. Ensure that all new staff are inducted.	▪ As required during the pre-construction stage	▪ ECO/Specialist
		10.30.3. Monitor for the presence of fossils. Construction staff sighting potential objects of palaeontological significance are to cease construction at sighted location and report to the field supervisor who, in turn, must report to the ECO. The ECO must inform the developer and contact the contracted palaeontologist to be on standby in the case of potential fossil finds. The latter will liaise with SAHRA on the nature of the find and consequent actions (permitting and collection of find).	▪ Regular visual inspection of substantial excavations and cleared areas for fossil remains.	▪ As required during the construction stage	▪ Contracted personnel and ECO
		10.30.4. Liaise with palaeontologist on the nature of potential finds and appropriate actions.	▪ Conduct site inspections to monitor implementation and report any non-compliance.	▪ As required during the construction stage.	▪ ECO and Specialist, SAHRA

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.30.5. ECO to conduct inspections of open excavations whenever on site.	▪ Regular visual inspection of substantial excavations and cleared areas for fossil remains.	▪ Ongoing during the construction phase.	▪ ECO
		10.30.6. Obtain a permit from SAHRA for the fossil finds collection should resources be discovered.	▪ Verify that a Palaeontologist has been appointed to undertake the required fossil excavations, where required, and permit requirements. Review of the appointment letters kept on file.	▪ As required during the construction stage.	▪ Project Developer and Specialist
		10.30.7. Excavate main finds, inspect pits and record and sample excavations. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA.	▪ Verify that a Palaeontologist has been appointed to undertake the required fossil excavations, where required, and permit requirements. Review of the appointment letters kept on file.	▪ As required during the construction stage.	▪ Specialist
B.7. SOIL AND AGRICULTURAL IMPACTS					
10.31. Soil degradation as a result of erosion. during construction.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site. That vegetation clearing does not pose a high erosion risk.	10.31.1. Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. 10.31.2. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	▪ Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring. Undertake a periodic site inspection to record the occurrence of and re-	▪ Every 2 months during the construction phase ▪ Every 4 months during the construction phase	▪ ECO ▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			vegetation progress of all areas that require re-vegetation		
10.32. Soil degradation as a result of topsoil loss.	To minimize topsoil loss	10.32.1. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	▪ Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.	▪ As required (whenever areas are disturbed).	▪ ECO
B.8. SOCIO-ECONOMIC IMPACTS					
10.33. Capital investment contributing to the national, regional and local economy	To promote contributions to the national, regional and local economy.	10.33.1. Source as many goods and services as far as possible from the local and regional economy (e.g., use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). 10.33.2. Provide suitable training to service providers, where possible and practicable. 10.33.3. Develop and implement a fair and transparent procurement policy. 10.33.4. Consult with existing IPP projects that successfully procure from local SMMEs to share learnings, where possible.	▪ Composition of workforce to be monitored during construction to assess the number of de facto local residents employed. Review of the registers held by the contractors. ▪ Undertake inspections to monitor compliance.	▪ Monthly	▪ Contractor and ECO
10.34. Generation of employment, income and skills	To promote a transparent labour and recruitment policy.	10.34.1. Maximise use of local skills and resources through preferential employment of locals where practicable and transparent labour and recruitment policy.	▪ Composition of workforce to be monitored during construction to assess the number of de facto local residents employed. Review	▪ Monthly	▪ Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.34.2. Ensure gender equality in recruitment, as far as possible. 10.34.3. Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends.	of the registers held by the contractors. ▪ Undertake inspections to monitor compliance.		
10.35. Social disruption and change in social dynamics	Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital.	10.35.1. Clearly publicise and implement a recruitment policy. 10.35.2. Work together with impartial local representatives to identify local people during the recruitment process. 10.35.3. Provide transport to site and other incentives to reduce the number of workers accommodated in EPC accommodation to an absolute minimum. 10.35.4. Consult with the municipality regarding the capacity of existing services and infrastructure (e.g. provision of water, electricity, waste removal, sanitation and housing) to cope with additional workers brought into the area during the construction period. 10.35.5. Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises.	▪ Composition of workforce to be monitored during construction to assess the number of de facto local residents employed. Review of the registers held by the contractors. ▪ Undertake inspections to monitor compliance. .	▪ Monthly	▪ Contractor and ECO
B.9. NOISE IMPACTS					
10.36. Noise pollution due to construction activities (equipment and vehicle noise)	Reduce construction noise	10.36.1. Conduct noise sensitivity training for all construction staff. 10.36.2. No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions.	▪ Provide noise sensitivity training all construction staff. ▪ Undertake inspections to monitor compliance. ▪ Undertake inspections to monitor compliance.	▪ Before construction commences ▪ On-going during construction ▪ On-going during construction	▪ Project Developer ▪ ECO, Contractor ▪ ECO, Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.36.3. All machinery that may cause a significant noise nuisance during the construction phase may only be utilised during the daytime hours.	▪ Undertake inspections to monitor compliance.		
		10.36.4. All directly affected parties should be notified of any activities on site that will cause a significant noise disturbance prior to activities taking place. 10.36.5. All blasting must be conducted during the daytime hours and all affected parties be notified prior to commencement	▪ Monitoring to ensure directly affected parties are notified accordingly.	▪ On-going during construction	▪ Contractor, ECO
		10.36.6. Ambient noise monitoring to be conducted.	▪ As per the requirements of SANS 10103:2008.	▪ Three times during the construction phase	▪ Specialist noise consultant
		10.36.7. Regularly service equipment to ensure no unnecessary noise is emitted	▪ Undertake inspections to monitor compliance.	▪ On-going during construction (as required)	▪ ECO, Contractor
B.10. AQUATIC ECOLOGY IMPACTS					
10.37. Potential impact on freshwater ecology as a result of the proposed WEF and associated infrastructure.	To limit the disturbance of aquatic habitat. To limit the potential for contamination/pollution of aquatic ecosystems	10.37.1. For all project-related components within the site, the aquatic features of high sensitivity should be treated as no-go areas during the construction phase. 10.37.2. Any activities that require construction within the delineated aquatic features and the recommended buffers should be described in method statements that are approved by the ECO. 10.37.3. Rehabilitation of any the disturbed areas within the aquatic features and the recommended buffer areas should be undertaken immediately following completion of the disturbance activity according to rehabilitation measures as included	▪ Monitoring to ensure no-go areas are adhered to on an ongoing basis for the duration of the construction phase. ▪ Ongoing monitoring of the implementation of method statements and rehabilitation measures should be undertaken in the construction phase. ▪ Monitoring of basic water quality constituents (Dissolved oxygen, electrical conductivity, suspended solids, and pH) should be undertaken upstream and	▪ Ongoing during construction	▪ Project Developer, Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		in a method statement for that specific activity as described above; 10.37.4. Ablution facilities should not be placed within 100m of any of the aquatic features delineated within the site; 10.37.5. Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc.) must have drip trays beneath them/beneath the nozzle fixtures. Material safety data sheets (MSDS) must be available on site (if required) where products are stored so that in the event of an incident, the correct action can be taken. Depending on the types of materials stored on-site during the maintenance activities, suitable product recovery materials (such as Spillsorb or Drizit products) must be readily available. Vehicles should ideally be washed at their storage yard as opposed to on-site. 10.37.6. Proper waste management should be undertaken within the site with facilities provided for the on-site disposal of waste and the removal of stored waste to the nearest registered solid waste disposal facility.	downstream of sites where construction activities will need to take place within aquatic features. This monitoring must take place before, during (weekly) and after construction. This should be accompanied by ongoing visual inspections.		
B.10. TRAFFIC IMPACTS					
10.38. Increase in traffic due to construction activities	Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution.	10.38.1. Stagger turbine component delivery to site. 10.38.2. Stagger the construction of the turbines. 10.38.3. The use of quarries in close proximity to the site would decrease the impact on the surrounding road network. 10.38.4. Staff and general trips should occur outside of peak traffic periods, if possible.	▪ Undertake inspections to monitor compliance.	▪ Monthly	▪ Project Developer and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.38.5. Design and maintenance of internal roads.			
B.11. WASTE MANAGEMENT					
10.39. Pollution of the surrounding environment as a result of the handling, temporary stockpiling and disposal of general waste.	Reduce environmental impacts such as soil, surface water and groundwater contamination as a result of incorrect storage, handling and disposal of general waste. Minimise the production of waste. Ensure compliance with waste management legislation.	10.39.1. General waste (i.e. construction waste, building rubble, discarded concrete, bricks, tiles, wood, glass, window panes, air conditioners, plastic, metal, excavated material, packaging material, paper and domestic waste etc.) generated during the construction phase should be stockpiled temporarily (i.e. once-off) on site in a designated area within suitable waste collection bins and skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate.	▪ Monitor the strategic placement of the temporary, designated waste stockpiling area at the site camp via visual inspections, and record and report any non-compliance. ▪ Monitor the temporary storage and handling of general waste on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area).	▪ Once-off prior to the commencement of the construction phase and as required as the construction phase process evolves. ▪ Weekly	▪ ECO, Contractor and Project Developer
		10.39.2. Should the on-site stockpiling of general waste exceed 100 m^3 and a period of 90 days, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) must be adhered to.	▪ Record the amount of general waste that is temporarily stockpiled at the designated area on site, as well as the duration and record non-compliance and incidents. ▪ Monitor the duration and amounts of general waste that is temporarily stockpiled at the designated area on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area). ▪ Audit compliance with the Norms and Standards for the Storage of	▪ Weekly ▪ Monthly ▪ Quarterly	▪ Contractor ▪ ECO ▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			Waste (published on 29 November 2013 under GN 926) if the storage amounts are exceeded (i.e. only if required).		
		10.39.3. Ensure that the designated stockpiling area for general waste (i.e. skips and waste collection bins) is inspected on a weekly basis to verify its condition and integrity, particularly after rainfall events.	▪ Monitor the temporary, designated waste stockpiling area at the site camp, as well as the handling of general waste on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ ECO
		10.39.4. Ensure that general waste generated during the construction phase is removed from the site on a regular basis, and safely disposed of at an appropriate, licensed waste disposal facility by an approved waste management Contractor. Waste disposal slips or waybills should be kept on file as proof of disposal. As a general principle, waste manifests must be obtained to prove legal disposal of waste.	▪ Ensure that a suitable Waste Management Contractor is appointed to remove and dispose the general waste at an appropriate, licenced waste disposal facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Once-off prior to the construction phase. ▪ Monthly	▪ Project Developer and ECO
		10.39.5. Ensure that the construction site is kept clean at all times and that construction personnel are made aware of correct waste disposal methods. Littering must be prevented through effective site camp management.	▪ Monitor the condition of the site camp throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Weekly ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO
		10.39.6. Sufficient general waste disposal bins must also be provided for use by construction personnel	▪ Monitor general waste generation by construction staff and collection	▪ Weekly	▪ ECO and Contractor.

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		throughout the site. These bins must be emptied on a regular basis.	via audits throughout the construction phase.		
		10.39.7. Ensure that all general waste emanating from the construction phase is removed from site prior to the commencement of the rehabilitation and operational phases.	▪ Undertake a final inspection at the end of the construction phase in order to verify and ensure that all general waste is removed from site and correctly disposed, prior to the commencement of the rehabilitation and operational phases.	▪ At the end of the construction phase.	▪ ECO and Contractor.
		10.39.8. Promote waste reduction, re-use, and recycling opportunities on site during the construction phase.	▪ Monitor waste generation and collection throughout construction. ▪ Investigate if any complaints have been expressed by the surrounding community regarding waste handling.	▪ Monthly	▪ ECO and Contractor
		10.39.9. Ensure an adequate and sustainable use of resources.	▪ Monitor waste generation and collection throughout construction.	▪ Monthly	▪ ECO and Contractor
		10.39.10. Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	▪ Control of waste management practices throughout construction phase	▪ Monthly	▪ ECO and Contractor
10.40. Pollution of the surrounding environment as a result of the handling, temporary stockpiling and disposal of	Reduce environmental impacts such as soil, surface water and groundwater contamination as a result of incorrect storage, handling and disposal of hazardous waste.	10.40.1. Hazardous waste (i.e. empty tins, oils, fuel spillages, spilled materials and chemicals etc.) generated during the construction phase should be stockpiled temporarily (i.e. once-off) on site in a designated area in suitable waste collection bins and leak-proof storage skips (or similar). Waste collection bins and skips should be covered with suitable material, where	▪ Monitor the strategic placement of the temporary, designated waste stockpiling area at the site camp via visual inspections, and record and report any non-compliance. ▪ Monitor the temporary storage and handling of hazardous waste on site via site audits and record	▪ Once-off prior to the commencement of the construction phase and as required as the construction process evolves. ▪ weekly	▪ ECO and Contractor ▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
hazardous waste.		appropriate. Hazardous waste must be stored separately from all other general waste. The designated stockpiling area must be labelled correctly.	non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area).		
		10.40.2. Should the on-site stockpiling of hazardous waste exceed 80 m^3, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) must be adhered to.	▪ Record the amount of hazardous waste that is temporarily stockpiled at the designated area on site, as well as the duration and record non-compliance and incidents. ▪ Monitor the duration and amounts of hazardous waste that is temporarily stockpiled at the designated area on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area). ▪ Audit compliance with the Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) if the storage amounts are exceeded (i.e. only if required).	▪ Weekly ▪ Monthly ▪ Quarterly	▪ Contractor ▪ ECO ▪ Project Developer
		10.40.3. Ensure that the designated stockpiling area for hazardous waste (i.e. leak proof skips and waste collection bins) is inspected on a weekly basis to verify its condition and integrity, particularly after rainfall events.	▪ Monitor the temporary, designated waste stockpiling area at the site camp, as well as the handling of hazardous waste on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.40.4. Ensure that all hazardous waste is removed from the site on a regular basis, and safely disposed at an appropriate, licensed hazardous waste disposal facility by an approved waste management Contractor.	▪ Ensure that a suitable Waste Management Contractor is appointed to remove and dispose the hazardous waste at an appropriate, licensed hazardous waste disposal facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Once-off prior to the construction phase. ▪ Monthly	▪ Project Developer/ Contractor ▪ ECO
		10.40.5. Ensure that the construction site is kept clean at all times and that construction personnel are made aware of correct waste disposal methods. Littering must be prevented through effective site camp management.	▪ Monitor the condition of the site camp throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Weekly ▪ Once-off training and ensure that all new staff are inducted. ▪ Quarterly	▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO
		10.40.6. Ensure that all hazardous waste emanating from the construction phase is removed from site prior to the commencement of the rehabilitation and operational phases.	▪ Undertake a final inspection at the end of the construction phase in order to verify and ensure that all general waste is removed from site and correctly disposed, prior to the commencement of the rehabilitation and operational phases.	▪ At the end of the construction phase.	▪ ECO and Contractor.
		10.40.7. All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	▪ Waste removal and disposal to be monitored throughout construction	▪ Monthly	▪ ECO and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.40.8. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	▪ Waste removal and disposal to be monitored throughout construction	▪ Monthly	▪ ECO and Contractor
		10.40.9. Wastewater from construction and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	▪ Waste removal and disposal to be monitored throughout construction	▪ Monthly	▪ ECO and Contractor
		10.40.10. Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	▪ Control of waste management practices throughout construction phase.	▪ Monthly	▪ ECO and Contractor
B.12. GEOHYDROLOGY IMPACTS					
10.41. Groundwater impact as a result of over-abstraction	To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases)	10.41.1. The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be determined. This includes a Step Test, Constant Discharge Test and recovery monitoring. 10.41.2. The boreholes should also be sampled and chemically and microbiologically analysed by a SANAS accredited laboratory. 10.41.3. Once the boreholes are in use they should be equipped with: • Observation pipes - so that the water levels can be measured (either manually or by data loggers); • Flow meters – to assess how much water is used and thereby all authorisations in place for use of the water are adhered to; and	▪ Ensure that this is taken into consideration and that a Geohydrology Specialist with suitable qualifications and experience is appointed to undertake relevant tests by reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the borehole parameters are documented to ensure trends and consumption can be monitored by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once off prior to use and then monthly to monitor the parameters.	▪ Project Developer and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		• Sampling tap – to enable annual sampling to ensure the groundwater is safe for continued use – especially if it is to be used as drinking water. 10.41.4. Adhere to the borehole's safe yield and to monitor water levels and flow.			
10.42. Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.	To reduce the potential groundwater pollution	10.42.1. Avoid using old or damaged construction equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. 10.42.2. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. 10.42.3. Vehicles should be refueled on paved (impervious) areas, optimally off-site. If off-site refueling is not possible, a designated area and impermeable surface should be established at the construction site camp for this purpose. If liquid product is being transported it must be ensured this does not spill during transit. 10.42.4. If spillages occur during refueling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. 10.42.5. Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage.	▪ Construction vehicles and equipment need to be monitored throughout the construction phase. Monitor via site audits and record non-compliance and incidents. ▪ Monitor the placement of fuel storage tanks and use of drip trays at the site camp via visual inspections. Monitor the usage of spill containment measures and record and report non-compliance. ▪ Monitor the placement and designation of the area for refueling at the site camp via visual inspections. Monitor the occurrence of potential spills and the usage of spill containment measures and record and report non-compliance. ▪ Monitor the refueling/ servicing process and record the occurrence of any spillages. ▪ Monitor the implementation of emergency spill containment and contingency plans, including	▪ Quarterly ▪ Weekly ▪ Weekly ▪ Weekly ▪ Monthly ▪ Monthly ▪ Monthly	▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.42.6. Vehicle and washing areas must also be on paved surfaces and the by-products removed to an evaporative storage area or a hazardous waste disposal site (if the material is hazardous).	holding emergency drills. Record and report non-compliance. ▪ Monitor the placement of vehicle and washing area via visual inspections. Monitor the correct disposal of spilled material or contaminated soil and audit the waybills. Record and report non-compliance. ▪ Waste removal and disposal to be monitored. Monitor via site audits and record non-compliance and incidents. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.		
C. OPERATIONAL PHASE					
C.1. TERRESTRIAL BIODIVERSITY					
10.43. Impact on animal species	To avoid or minimise impacts that could potentially affect animal behaviour.	10.43.1. Proper waste management procedures should be put in place. 10.43.2. Appropriate lighting should be installed to minimise negative effects on nocturnal animals 10.43.3. Fences are to be erected around the substations and laydown areas. The jackal-proof fencing on the farm boundaries is considered adequate.	▪ Ensure compliance with these mitigation measures.	▪ Monthly	▪ Project Developer and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.44. Alien species invasion	Avoid invasion by alien species	10.44.1. Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species.	▪ Ensure implementation of a control programme to combat alien invasive plants.	▪ Quarterly	▪ Project Developer and ECO
C.2. AVIFAUNA					

10.45. Displacement due to habitat transformation: Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the wind turbines and associated infrastructure.	To prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study.	10.45.1. Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. 10.45.2. Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance. 10.45.3. Once operational, vehicle and pedestrian access to the site should be controlled and restricted to the facility footprint as much as possible to prevent unnecessary destruction of vegetation. 10.45.4. Formal live-bird monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the Best Practice Guidelines (Jenkins et al. 2015). The purpose of this would be to establish if displacement of priority species has occurred and to what extent. The exact time when operational monitoring should commence, will depend on the construction schedule, and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute minimum, operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter for the operational lifetime of the facility. If estimated annual collision rates indicate unacceptable mortality levels of priority species, i.e., if it exceeds the pre-determined threshold determined by the avifaunal specialist in consultation with BirdLife South Africa, additional measures will have to be implemented which could include shut down on demand or other proven measures.	▪ Appointment of rehabilitation specialist to develop Habitat Restoration Plan (HRP). ▪ Site inspections to monitor progress of HRP.	▪ Once-off ▪ Once a year	▪ Operations Manager ▪ SHE Manager ▪ SHE Manager ▪ Operations Manager ▪ Operations Manager

		10.45.5. Conduct regular inspections of the overhead sections of the internal reticulation network to look for carcasses.			

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.46. Mortality due to collisions with the wind turbines (i.e Mortality due to electrocution).	Prevention of collision mortality on the wind turbines.	10.46.1. Formal live-bird monitoring and carcass searches should be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015) to assess collision rates. If estimated annual collision rates indicate unacceptable mortality levels of priority species, i.e., if it exceeds the pre-determined threshold determined by the avifaunal specialist in consultation with BirdLife South Africa, additional measures will have to be implemented which could include shut down on demand or other proven measures.	▪ Appoint Avifaunal Specialist to design operational monitoring plan, including live bird monitoring and carcass searches. ▪ Implement operational monitoring plan. ▪ Design and implement mitigation measures if mortality thresholds are exceeded. ▪ Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any recommended mitigation measures.	▪ Years 1,2, 5 and every five years after that for the duration of the operational lifetime of the facility in accordance with the Post Construction Monitoring Plan included in Appendix D).	▪ Operations Manager ▪ Operations Manager ▪ Operations Manager ▪ Operations Manager
10.47. Bird electrocutions on the overhead sections of the internal 33kV cables	Prevention of electrocution mortality on the overhead sections of the 33kV internal cable network.	10.47.1. Conduct regular inspections of the overhead sections of the internal reticulation network to look for carcasses.	▪ Carcass searchers under the supervision of the Avifaunal Specialist.	▪ At least once every two months.	▪ Operations Manager
C.3. BATS					
10.48. Mortality of bats due to turbine collisions while	Mitigate mortality of bats due to turbine collisions while commuting/foraging	10.48.1. The height of the lower blade swept area must be maximised, and should not be lower than 30 m. If the minimum blade sweep is lower than 30 m, fatality thresholds would need to be	▪ Monitor the register and reports. ▪ Implement the mitigation measures in Section 9.2 (Tables 7	▪ Throughout the operational phase	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
commuting/foraging		evaluated every 3 – 4 months against the South African Bat Assessment Association fatality threshold guidelines (i.e. if they exceed an estimated 101 bat fatalities per year). Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. 10.48.2. Operational monitoring should be done according to the guidelines for the first 2 years and every 5 years thereafter 10.48.3. Blade feathering should be implemented at the start of operation. 10.48.4. Apply curtailment during spring, summer and autumn based on the below table if mortality occurs beyond threshold levels as determined based on applicable guidance (MacEwan et al. 2018). The threshold calculations must be done at a minimum of once a quarter (i.e. not only after the first year of operational monitoring) so that mitigation can be applied as quickly as possible should thresholds be reached. ▪ **1 September – 30 November (Spring)**: 19h00 – 00h00 (Time Period); Between 13°C and 23°C (Temperature); Below 4.5 m/s (Cut in Wind Speed) ▪ **1 December – 29 February (Summer):** 20h00 – 01h00 (Time Period); Between 14 °C and 21°C (Temperature); Below 6.5 m/s (Cut in Wind Speed) ▪ **1 March – 31 May (Autumn):** 20h00 – 01h00 (Time Period); Between 13.5 °C and 22.5°C (Temperature); Below 4.5 m/s (Cut in Wind Speed)	and 8) of the Bat Impact Assessment Report. ▪ Appoint a suitably qualified bat specialist must be appointed at the start of the operational phase.		▪ Avifauna specialist

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.49. Mortality of bats due to turbine collisions during migrations	To mitigate mortality of bats due to turbine collisions during migrations	10.49.1. The height of the lower blade swept area must be maximised, and should not be lower than 30 m. If the minimum blade sweep is lower than 30 m, fatality thresholds would need to be evaluated every 3 – 4 months against the South African Bat Assessment Association fatality threshold guidelines (i.e. if they exceed an estimated 101 bat fatalities per year). Lighting of WEF should be kept to a minimum and directed downwards. 10.49.2. Operational monitoring should be done according to the guidelines for the first 2 years and every 5 years thereafter. 10.49.3. Blade feathering should be implemented at the start of operation. 10.49.4. Apply curtailment during spring, summer and autumn based on the below table if mortality occurs beyond threshold levels as determined based on applicable guidance (MacEwan et al. 2018). The threshold calculations must be done at a minimum of once a quarter (i.e. not only after the first year of operational monitoring) so that mitigation can be applied as quickly as possible should thresholds be reached. ▪ **1 September – 30 November (Spring)**: 19h00 – 00h00 (Time Period); Between 13°C and 23°C (Temperature); Below 4.5 m/s (Cut in Wind Speed) ▪ **1 December – 29 February (Summer):** 20h00 – 01h00 (Time Period); Between 14 °C and 21°C (Temperature); Below 6.5 m/s (Cut in Wind Speed)	▪ Monitor bat fatalities and document non-compliance. ▪ Monitor reports and schedules and document non-compliance.	▪ During operations	▪ Project Developer or Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		▪ **1 March – 31 May (Autumn):** 20h00 – 01h00 (Time Period); Between 13.5 °C and 22.5°C (Temperature); Below 4.5 m/s (Cut in Wind Speed)			
10.50. Light pollution associated risks including loss of insect prey and increased collision risks for bats foraging closer to turbines.	To monitor potential impacts on bats during the operation of the wind farm.	10.50.1. This impact can be mitigated by using as little lighting as possible, and only where essential for operation of the facility. 10.50.2. Where lights need to be used such as at the collector substation and switching station and elsewhere, these should have low attractiveness for insects such as low pressure sodium and warm white LED lights (Rydell 1992; Stone 2012). High pressure sodium and white mercury lighting is attractive to insects (Blake et al. 1994; Rydell 1992; Svensson & Rydell 1998) and should not be used as far as possible. 10.50.3. Lighting should be fitted with movement sensors to limit illumination and light spill, and the overall lit time. In addition, the upward spread of light near to and above the horizontal plane should be restricted and directed to minimise light trespass and sky glow. 10.50.4. Increasing the spacing between lights, and the height of light units can reduce the intensity and volume of the light to minimise the area illuminated and give bats an opportunity to fly in relatively dark areas between and over lights.	▪ Keep and monitor bat carcass records and document non-compliance.	▪ During the operational phase	▪ Project Developer
C.4. VISUAL IMPACTS					
10.51. Visual intrusion and potential flicker effect by wind turbines	To avoid or minimise operational impacts on existing visual resources and	10.51.1. Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors	▪ Ensure that this is undertaken prior to operations via onsite inspections.	▪ Once-off prior at the beginning of the operational phase.	▪ Developer and Environmental Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
and associated infrastructure and infrastructure on visual and landscape receptors	potentially sensitive receptor locations.	10.51.2. Manage need for top of turbine red hazard lighting to only when a plane enters the affected airspace rather than be permanently lit. 10.51.3. Use non-reflective materials 10.51.4. Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour 10.51.5. Avoid bright colour/patterns and logos 10.51.6. Limit need for security lighting.	▪ Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage, lighting and wastes on the site by the appointed Environmental Manager.	▪ Ongoing during operation.	▪ Project Developer and Environmental Manager
10.52. Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and		10.52.1. Maintain rehabilitated disturbed areas	▪ Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage, lighting and wastes on the site by the appointed Environmental Manager.	▪ Ongoing during operation.	▪ Project Developer and Environmental Manager
C.5. SOCIO-ECONOMIC IMPACTS					
10.53. Operational investment contributing to the national, regional and local economy	Realize opportunity to enhance growth of national, regional and local economy.	10.53.1. Source as many goods and services as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). 10.53.2. Provide suitable training to service providers, where possible and practicable. 10.53.3. Develop and implement a fair and transparent procurement policy.	▪ Verify purchase of local goods and services through proof of purchase. ▪ Verify if this is taken into consideration by reviewing signed minutes of meetings or signed reports.	▪ Annually	▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.54. Generation of employment, income and skills	Enhance benefits of long-term employment particularly for Beaufort West residents.	10.54.1. Maximise use of local skills and resources through preferential employment of locals where practicable. 10.54.2. Develop and implement a fair and transparent labour and recruitment policy. 10.54.3. Ensure gender equality in recruitment, as far as possible. 10.54.4. Provide suitable training. 10.54.5. Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme.	▪ Composition of workforce to be monitored during operations to assess the number of Beaufort West local residents employed. ▪ Review of the employment registers. ▪ Verify that local communities are informed of employment desks and such desks are being implemented with written proof kept on file. ▪ Verify that employment desks consulted, with written proof kept on file. ▪ Compliance with employment legislation to be monitored and composition of workforce to be monitored during operations to assess the number of de facto local residents employed and range of educational background. ▪ Review of the registers held by the contractors. ▪ Record of skills training to be reviewed. Register of attendance reviewed.	▪ Bi-annually.	▪ Project Developer
10.55. Increased community prosperity through contributions	Benefits to be provided to the local community derived from the establishment of the proposed WEF.	10.55.1. Regularly engage with community stakeholders to develop meaningful strategies for community development. 10.55.2. Define vision for economic development in consultation with communities.	▪ Undertake audits to ensure that the community communication strategy is compiled, and that dates and outcomes of engagement are reviewed. Report non-compliance.	▪ Monthly ▪ Once-off during the planning and design phase. ▪ Bi-annually	▪ Project Developer and ECO ▪ Project Developer

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
and income from the WEF		10.55.3. Develop a Governance Plan with clear governance rules for the Community Trust, including administration and trustee and beneficiary selection. 10.55.4. Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. 10.55.5. Set clear goals for each project and phase out funding once these goals are achieved. 10.55.6. Ensure regular external auditing of the Community Trust as well as supported projects. 10.55.7. Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.	▪ Draft the Governance Plan which would in serve as the method through which the mitigation actions are monitored. ▪ Review governance rules of Governance Plan and reports to monitor inclusion of Beaufort West developmental needs and priorities during the operational phase.		
C.6. NOISE IMPACTS					
10.56. Reduce operational noise	To reduce operational noise	10.56.1. Ambient noise monitoring to be conducted at NSA 6,7 & 8 when operations commence to verify the noise emissions meet the night time noise rating limit. Mitigation measures to be implemented if the noise impact exceeds the 35dB(A) night noise rating limit such as running the turbines in low power mode at certain wind speeds at night.	▪ As per the requirements of SANS 10103:2008.	▪ Once off during operational phase.	▪ Specialist noise consultant
C.7. AQUATIC ECOLOGY IMPACTS					
10.57. Potential impact on freshwater ecology as a result of the proposed WEF	Limit the disturbance of aquatic habitat; Minimise potential to modify flow/hydraulics related	10.57.1. Ongoing control of invasive alien plants within the site should be undertaken according to an approved plan. The plan should make use of alien clearing methods as provided by the Working for Water Programme. Monitoring and control	▪ Ongoing monitoring of invasive alien plants within the site should be undertaken according to an approved plan.	▪ Ongoing during operation	▪ Project Developer and Contractor

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
and associated infrastructure	impacts and increase the potential for erosion; Control of invasive alien plants in riparian zones and wetland areas; Limit the potential for contamination/pollution of aquatic ecosystems	measures should take place at least biannually for the first 3 years of the project 10.57.2. Invasive alien plant material that has been cleared should be removed from the riparian zones and not left on the river banks or burnt within the riparian zone and buffer area; 10.57.3. Ongoing monitoring of the structures, in particular before the rainfall period, should be undertaken to ensure that the integrity of the structures is intact and that they are not blocked with sediment or debris. Ongoing monitoring post large rainfall events should also be undertaken to identify and address any erosion occurring within the watercourses.	▪ Once the construction activities have ceased, the frequency of the monitoring can be reduced.		
C.8. AGRICULTURE AND SOILS IMPACTS					
10.58. Erosion	That existence of hard surfaces causes no erosion on or downstream of the site.	10.58.1. Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	▪ Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	▪ Bi-annually	▪ Facility Environmental Manager
10.59. Erosion	That denuded areas are re-vegetated to stabilise soil against erosion	10.59.1. Facilitate re-vegetation of denuded areas throughout the site	▪ Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	▪ Bi-annually	▪ Facility Environmental Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.60.		10.60.1.	▪	▪	▪
C.9. WASTE MANAGEMENT					
10.61. Pollution of the surrounding environment as a result of the handling, temporary storage and disposal of solid waste (general and hazardous).	Reduce soil and groundwater contamination as a result of incorrect storage, handling and disposal of general and hazardous waste.	10.61.1. Sufficient waste collection bins and skips (or similar) should be provided at the WEF. Waste collection bins and skips should be covered with suitable material and correctly labelled, and should be kept in a designated, demarcated area, where access control is monitored and managed.	▪ Monitor waste generation and collection throughout the operational phase.	▪ Weekly	▪ Facility Manager
		10.61.2. Segregation of hazardous waste from general waste to be in place. Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	▪ On-site inspection of waste segregation. ▪ Control of waste management practices throughout operational phase.	▪ Weekly ▪ Weekly	▪ Facility Manager ▪ Facility Manager
		10.61.3. General waste and hazardous waste should be removed from the site on a regular basis and disposed of at an appropriate, licenced waste disposal facility. Hazardous waste should be removed by an approved waste management Contractor. General solid waste could be removed from the site by municipal services. Waste disposal slips or waybills should be kept on file for auditing purposes as proof of disposal, as applicable	▪ Inspection of the waste storage area. ▪ Monitor via site audits and record non-compliance and incidents. Facility Manager to monitor and audit disposal slips.	▪ Weekly ▪ Quarterly	▪ Facility Manager
		10.61.4. Ensure that the WEF is kept clean at all times and that operational personnel are made aware of correct waste disposal methods.	▪ Conduct training for all operational personnel. ▪ Monitor the state of the WEF via site audits and record non-compliance and incidents.	▪ Once-off during operations and ensure that all new staff are inducted. ▪ Weekly	▪ Facility Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.61.5. No solid waste may be burned or buried on site.	▪ Monitor via site audits and record non-compliance and incidents.	▪ Weekly	▪ Facility Manager
		10.61.6. Waste amounts shall be recorded on a monthly basis.	▪ Waste amounts to be documented.	▪ Monthly	▪ Facility Manager
		10.61.7. All operational waste (concrete, steel, rubbles etc.) to be removed from the site and waste hierarchy of prevention, as the preferred option, followed by reuse, recycling, recovery must be implemented, where possible.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.61.8. Other non-hazardous solid waste (e.g. packaging material) to be disposed of at a licensed landfill.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.61.9. All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.61.10. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.61.11. Wastewater from operations and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
C.10. GEOHYDROLOGY IMPACTS					
10.62. Groundwater impact as a result of over-abstraction	To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases).	10.62.1. The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be	▪ Ensure that this is taken into consideration and that a Geohydrology Specialist with suitable qualifications and experience is appointed to undertake relevant tests by	▪ Once off prior to use and then monthly to monitor the parameters.	▪ Project Developer and Environmental Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		determined. This includes a Step Test, Constant Discharge Test and recovery monitoring. 10.62.2. Adhere to the borehole's safe yield and to monitor water levels and flow.	reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the borehole parameters are documented to ensure trends and consumption can be monitored.		
10.63. Potential impact on groundwater quality as a result of using cleaning agents.	To reduce the potential of groundwater pollution.	10.63.1. Environmentally safe cleaning agents that breakdown naturally must be used for cleaning the panels. No chemicals that that could cause adverse effects to the natural environment should be allowed.	▪ Ensure that these mitigation measures are monitored on an on-going basis, and any non-compliances reported.	▪ On-going	▪ Project Developer and Environmental Manager
10.64. Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.	To reduce the potential of groundwater pollution	10.64.1. Avoid using old or damaged equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. 10.64.2. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. 10.64.3. Vehicles should be refueled on paved (impervious) areas, optimally off-site. If off-site refueling is not possible, a designated area and impermeable surface should be established at the facility for this purpose. If liquid product is being transported it must be ensured this does not spill during transit. 10.64.4. If spillages occur during refueling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled	▪ Vehicles and equipment need to be monitored throughout the operational phase. Monitor via site audits and record non-compliance and incidents. ▪ Monitor the placement of fuel storage tanks and use of drip trays at the site camp via visual inspections. Monitor the usage of spill containment measures and record and report non-compliance. ▪ Monitor the placement and designation of the area for refueling at the site camp via visual inspections. Monitor the occurrence of potential spills and the usage of spill containment measures and record and report non-compliance.	▪ Four times per annum ▪ Weekly ▪ Weekly ▪ Weekly ▪ Monthly ▪ Weekly ▪ Weekly	▪ Project Developer and Environmental Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. 10.64.5. Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage. 10.64.6. Vehicle and washing areas must also be on paved surfaces and the by-products removed to a hazardous waste disposal site (if the material is hazardous).	▪ Monitor the refueling/ servicing process and record the occurrence of any spillages. ▪ Monitor the implementation of emergency spill containment and contingency plans, including holding emergency drills. Record and report non-compliance. ▪ Monitor the placement of vehicle and washing area via visual inspections. Monitor the correct disposal of spilled material or contaminated soil and audit the waybills. Record and report non-compliance. ▪ Waste removal and disposal to be monitored. Monitor via site audits and record non-compliance and incidents. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.		
C.11. IMPACTS RESULTING FROM THE BATTERY ENERGY STORAGE SYSTEM					
10.65. Risk of fire, explosion or release of toxic gas and spillage of electrolyte as a result of the lithium-ion BESS	Minimise the risk of fire, explosion or release of toxic gas and spillage of electrolyte as a result of the Lithium Ion BESS	10.65.1. Ensure that the operational staff are trained on the risks associated with fire, explosion and release of toxic gas, and potential electrolyte spillages, and how to react under these situations. 10.65.2. To ensure the safety of the workers, appropriate Personal Protective Equipment (PPE) (appropriate gloves, safety glasses/face shield,	▪ Carry out Environmental Awareness Training with a discussion on the risks associated with the BESS. ▪ Conduct audits of the signed attendance registers.	▪ Prior to operations and as required by the Environmental Manager. Ensure that all new staff are inducted. ▪ Monthly	▪ Project Developer and Environmental Manager ▪ Environmental Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		appropriate clothing) should be worn in the vicinity of the BESS.			
		10.65.3. Ensure that adequate measures are put in place to verify that the pre-assembled BESS is in good working order before it gets transported to site to prevent any unnecessary risks.	▪ Ensure that this is undertaken via onsite inspections.	▪ Prior to operations	▪ Environmental Manager
		10.65.4. Ensure that the BESS is assembled and operated in line with the specifications of the supplier or manufacturer.	▪ Ensure that this is undertaken prior to operations via onsite inspections.	▪ Throughout operations	▪ Environmental Manager
		10.65.5. Ensure that the contact details of the local municipality, Eskom and emergency response officials, such as the police and fire department, are kept on file and clearly sign-posted on site. 10.65.6. Ensure that the contact details for the supplier of the BESS is kept readily available and sign-posted on site, should they need to be contacted during emergency situations.	▪ Verify that the contact details of the local municipality, emergency response officials and the selected BESS supplier and retained and sign-posted throughout operations.	▪ Prior to the operational phase	▪ Project Developer
		10.65.7. Any spill or leakage from the battery storage facility must be attended to and cleaned immediately and must be disposed of at an appropriate licensed waste disposal facility. Waybills must be retained and retained on file.	▪ Monitor if spillages have taken place and if so, are removed correctly. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer
		10.65.8. The DFFE are to be immediately duly notified of any incident in terms of Section 30 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA). In terms of Section 30 of NEMA, an “incident” means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has	▪ Ensure that this is undertaken via onsite inspections and reported to the authorities when required.	▪ Throughout operations	▪ Environmental Manager

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		caused or may cause significant harm to the environment, human life or property. 10.65.9. The DHSWS must be immediately notified of any pollution to surface water or groundwater resources due to the proposed project activities.			
		10.65.10. Ensure that there is no maintenance of the battery on site; and that old BESS's are removed from the site by the supplier or manufacturer.	▪ Ensure that this is undertaken via onsite inspections.	▪ Throughout operations	▪ Environmental Manager
D. DECOMMISSIONING PHASE					
D.1. TERRESTRIAL BIODIVERSITY					
10.66. Clearance of vegetation	Minimise disturbance and clearance of vegetation.	10.66.1. Unnecessary clearance of natural vegetation should be avoided.	▪ Ensure that mitigation measures are enforced.	▪ Every three months	▪ ECO monitor and report to Project Developer
10.67. Impact on animal behaviour	Avoid or minimise impacts that could potentially affect animal behaviour.	10.67.1. Proper waste management procedures should be put in place	▪ Ensure compliance with these mitigation measures	▪ Monthly	▪ ECO monitor and report to Project Developer
10.68. Alien species invasion	Avoid invasion by alien species	10.68.1. Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species.	▪ Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species.	▪ Every three months	▪ ECO monitor and report to Project Developer
D.2. AVIFAUNA					
10.69. The noise and movement associated with	Prevent unnecessary displacement of avifauna by ensuring that contractors are	10.69.1. A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be	1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and	1. On a daily basis 2. Weekly 3. Weekly	1. Contractor and ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
the de-commissioning activities at the WEF footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	aware of the requirements of the CEMPr.	conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: ▪ No off-road driving. ▪ Maximum use of existing roads. ▪ Measures to control noise and dust according to latest best practice. ▪ Restricted access to the rest of the property. ▪ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.	enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Construction access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. ▪ Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.	4. Weekly 5. Weekly ▪	2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO 5. Contractor and ECO
D.3. BATS					
10.70. Displacement of bats due to disturbance associated with the decommissioning activities	To mitigate disturbance due to decommissioning activities.	10.70.1. The impacts to bat during this phase are likely to be restricted to disturbance. Provided decommissioning activities are restricted to daylight hours, the impact to bats are predicted to be negligible.	▪ Record any signs of bat collisions / fatalities and report it to the necessary specialists.	▪ During decommissioning phase.	▪ ECO.

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
D.4. VISUAL IMPACTS					
10.71. Potential impact on visual resources as a result of the decommissioning of the proposed WEF and associated infrastructure.	Avoid or minimise impacts of decommissioning activities on existing visual resources and potentially sensitive receptor locations in the WEF development area.	10.71.1. Remove all project components from site 10.71.2. Rip all compacted hard surfaces such as platforms, words areas, access and service roads etc. and reshape to blend with the surrounding landscape 10.71.3. Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting	▪ Ensure that procedures for the removal of structures and stockpiles during decommissioning are implemented, including recycling of materials. In addition, it must be ensured that rehabilitation of the site to a visually acceptable standard is undertaken.	▪ During decommissioning.	▪ Contractor and ECO
D.5. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.72. Visible landscape scarring.	Minimise landscape scarring.	10.72.1. Ensure disturbance is kept to a minimum and does not exceed project requirements. 10.72.2. Landscape scarring must be kept to an absolute minimum	▪ Monitoring of surface clearance relative to approved layout.	▪ Ongoing basis, as required.	▪ Manager or Contractor ▪ ECO
D.6. SOIL AND AGRICULTURAL IMPACTS					
10.73. Soil degradation as a result of erosion.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	10.73.1. Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	▪ Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	▪ Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	▪ ECO
	That vegetation clearing does not pose a high erosion risk	10.73.2. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas	▪ Undertake a periodic site inspection to record the occurrence of and re-vegetation	▪ Every 4 months during the decommissioning phase, and then every 6 months after	▪ ECO

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		throughout the site, to stabilize disturbed soil against erosion.	progress of all areas that require re-vegetation.	completion of decommissioning, until final sign-off is achieved.	
10.74. Soil degradation as a result of top soil loss.	That topsoil loss is minimised	10.74.1. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	▪ Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). ▪ Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.	▪ As required, whenever areas are disturbed.	▪ ECO
D.7. SOCIO-ECONOMIC IMPACTS					
10.75. Social impacts associated with retrenchment including loss of jobs, and source of income.	Avoid or reduce negative social impacts associated with the decommissioning phase.	10.75.1. Clearly communicate project duration to staff and communities. 10.75.2. Assist with recommendations and referrals where possible. 10.75.3. Assist with the sustainable administration of funds throughout the project lifetime. 10.75.4. The developer should comply with relevant South African labour legislation when retrenching employees. 10.75.5. The developer should implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning.	▪	▪ During the operational phase.	▪ Project Developer
D.8. NOISE IMPACTS					
10.76. Various decommissioning activities	Reduce the increase in ambient sound levels due to air-borne noise from the	10.76.1. Staff to receive training on noise sensitivity.	▪ Ensure that reasonable and valid noise complaints are investigated.	▪ Throughout the decommissioning phase	▪ Project Developer,

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
taking place simultaneously during the day may increase ambient sound levels due to air-borne noise.	decommissioning activities during day and night.	10.76.2. Monitoring of noise during the construction phase to confirm noise levels are within limits. 10.76.3. Limit construction to daytime in order to take advantage of unstable weather conditions. 10.76.4. Regularly service equipment to ensure no unnecessary noise is emitted	▪ Conduct site inspections to monitor implementation and report any non-compliance.	▪ Throughout the decommissioning phase	Contractor and ECO ▪ ECO
D.9. TRAFFIC IMPACTS					
10.77. Increase in Traffic due to construction activities	To mitigate traffic congestion and delays on the surrounding road network and associated noise and dust pollution.	Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase 10.77.1. Stagger turbine component removal from site. 10.77.2. Stagger the deconstruction of the turbines. 10.77.3. The use of quarries in close proximity to the site would decrease the impact on the surrounding road network. 10.77.4. Staff and general trips should occur outside of peak traffic periods 10.77.5. Maintenance of haulage routes and internal roads.	▪ Undertake inspections to monitor compliance and report any non-compliance.	▪ Monthly	▪ Project Developer
10.60. Erosion and slope instability in areas where structures are removed	Enhance slope stability during the decommissioning phase.	10.77.6. Fill any excavations or flatten any slopes that may form due to and during the removal of infrastructure during the decommissioning phase.	▪ Conduct site inspections to monitor implementation and report any non-compliance.	▪ Throughout the decommissioning phase	▪ Project Developer, Contractor and ECO
D.10. AQUATIC ECOLOGY IMPACTS					
10.78. Potential impact on freshwater ecology as a	Limit the disturbance of aquatic habitat.	10.78.1. For all project-related components within the site, the aquatic features of high sensitivity should be demarcated by the appointed ECO	▪ Monitoring that no-go areas are adhered to should be undertaken on an ongoing basis for the	▪ Ongoing during decommissioning	▪ Project Developer,

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
result of the proposed WEF and associated infrastructure		before the commencement of the decommissioning activities and treated as no-go areas during the decommissioning phase. 10.78.2. Any activities that require decommission activities within the delineated aquatic features and the recommended buffers should be described in method statements that are approved by the ECO. 10.78.3. Rehabilitation of any disturbed areas within the aquatic features and the recommended buffer areas should be undertaken immediately following completion of the disturbance activity according to rehabilitation measures as included in a method statement for that specific activity. 10.78.4. Control of invasive alien plants within the site should be undertaken according to the approved plan.	duration of the decommissioning phase. ▪ Ongoing monitoring of the implementation of method statements and rehabilitation measures should be undertaken in the decommissioning phase. ▪ Ongoing monitoring of invasive alien plants within the site should be undertaken according to an approved plan.		Contractor and ECO
D.11. WASTE MANAGEMENT					
10.79. Generation of waste due to disassembly of the WEF.	Avoid substantial negative impacts at the decommissioning phase due to insufficient planning.	10.79.1. Suitable receptacles must be provided for the temporary storage of various waste types such as scrap metal and concrete, until it is removed to the nearest licensed landfill.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO
		10.79.2. Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO
D.12. GEOHYDROLOGY IMPACTS					
10.80. Potential impact on groundwater quality as a	To reduce the potential of groundwater pollution.	10.80.1. Implement the same management actions as those during the construction phase.	▪ Implement the same monitoring methodology as those during the construction phase.	▪ Implement the same monitoring frequency	▪ Implement the same monitoring

Impact	Mitigation/Management Outcomes	Mitigation/Management Actions (these apply to the Project footprint area and access roads on site)	Monitoring		
			Methodology	**Frequency**	**Responsibility**
result of accidental oil spillages or fuel leakages.				as those during the construction phase.	responsibility as those during the construction phase.
D.13. IMPACTS RESULTING FROM THE BATTERY ENERGY STORAGE SYSTEM					
10.81. Risk of fire, explosion or release of toxic gas and spillage of electrolyte as a result of the Lithium Ion BESS	Minimise the risk of fire, explosion or release of toxic gas and spillage of electrolyte as a result of the Lithium Ion BESS	10.81.1. Ensure that the BESS is dissembled in line with the specifications of the supplier or manufacturer. 10.81.2. Used batteries must be transported off site inside containers via suitable vehicles by the supplier of the BESS. 10.81.3. The transport vehicle should be designated with relevant health and safety symbols. 10.81.4. A set of equipment necessary to combat any spillage or leakage should be provided and the transport team trained on how to use it.	▪ Carry out site visits and inspections of the sites to verify the implementation of mitigation measures	▪ As required during dissembling	▪ Project Developer and ECO

APPENDIX A – CV OF THE EAP

CURRICULUM VITAE – LIZANDE KELLERMAN

Full Name:	Millicent Johanna Susanna (Lizande) Kellerman
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BIO-SKETCH:

Lizande Kellerman is a Principal EAP and scientist at the CSIR in Stellenbosch, with more than 10 years of experience in environmental impact studies, primarily in the planning, preparation and management of BAs, EIAs, and SEAs, as well as EMPrs, Screening/Fatal Flaw Studies, Biodiversity Risk Assessments, Biodiversity Resource Assessments and license applications for agriculture, atmospheric emissions, water use, waste management, mining, bioprospecting and biodiversity permitting, for numerous projects in the agricultural (including aquaculture), construction, conservation, mining and renewable energy sectors.

Lizande holds a BSc degree in Zoology and Entomology, with an Honours and Masters in Botany both at the University of Pretoria. She is currently working towards completing her PhD in Conservation Ecology. She commenced work at the CSIR in 2012 after spending three years working as an environmental scientist in the private sector. She has published several articles, both peer reviewed scientific and popular, and presented at five international conferences. She has also lectured on biodiversity, ecological and EIA at various universities in South Africa. Her training and experience as a qualified terrestrial ecologist has enabled her to provide expert input into ecological impact assessments and to perform specialist reviews of various terrestrial biodiversity and ecology impact assessments as part of BAs, EIAs and SEA.

Lizande is a registered Professional Natural Scientist (400046/10) with the South African Council for Natural Scientific Professions (SACNASP).

PROJECT EXPERIENCE RECORD

The following table presents a sample of key projects that Lizande Kellerman has undertaken to date:

Completion Date	Project description	Role	Client
2020 - 2021	Basic Assessments for the proposed development of the 810 MW Rinkhals Solar PV energy facilities 1-7 and associated infrastructure near Kimberley, Northern Cape and Free State	Project Leader and Environmental Assessment Practitioner	ABO Wind renewable energies (Pty) Ltd
2020 - 2021	Scoping and EIA for the proposed development of the 825 MW Kwagga Wind Energy Facilities 1-3 and associated infrastructure near Beaufort West in the Western Cape	Project Leader and Environmental Assessment Practitioner	ABO Wind renewable energies (Pty) Ltd
2021 - 2022	Landscaping and development of educational walkways with teaching materials at the CSIR Science Centre in Cofimvaba, Eastern Cape Province	Project Manager and Environmental Assessment Practitioner	Department of Science and Innovation (previously DST)
2020	A Desktop Fatal Flaw Assessment of the property affected by the proposed development of a solar photovoltaic (PV) energy facility near Windmeul, Western Cape (i.e. Project Suikerbekkie)	Project Manager and Principal Author	ABO Wind renewable energies (Pty) Ltd
2020	A Desktop Fatal Flaw Assessment of the properties affected by the proposed development of two solar photovoltaic (PV) energy facilities near Kimberley, Northern Cape (i.e. Project Rinkhals) and Vryburg in the North West (i.e. Project Skilpad)	Project Manager and Principal Author	ABO Wind renewable energies (Pty) Ltd
2020	A Desktop Fatal Flaw Assessment of the properties affected by the proposed development of two solar photovoltaic (PV) energy facilities near Kimberley, Free State Province (i.e. Project Rinkhals 1 and Project Rinkhals 2)	Project Manager and Principal Author	ABO Wind renewable energies (Pty) Ltd
2019 – 2020	Environmental compliance and performance improvement for the foundry industry of South Africa: Phase 1 – Status Quo Assessment	Project Manager and Principal author	National Cleaner Production Centre of South Africa
2016 – 2019	Strategic Environmental Assessment for Marine and Freshwater Aquaculture Development in South Africa	Project Manager, Principal Author and Report Editor	Department of Environmental Affairs and Department of Agriculture, Forestry and Fisheries
2019	Risk Assessment with Alien and Invasive Species Permit Application Process for the EA1TM Dust Suppressant	Environmental Assessment Practitioner	Earth Alive Clean Technologies Inc.
2019	Environmental Screening Study for the proposed Wool Scouring Facility on Erf 3476 at Mount Fletcher in the Elundini Local Municipality, Eastern Cape Province	Project Manager and Environmental Assessment Practitioner	CSIR Advanced Agriculture and Food Division
2019 - 2020	Water Use License Application Process for the Vryburg Solar 1 (Pty) Ltd Photovoltaic Energy Facility and Supporting Electrical Grid Infrastructure near Vryburg, North West Province	Project Manager and Environmental Assessment Practitioner	ABO Wind renewable energies (Pty) Ltd
2019 - 2020	Water Use License Application Processes for the Kuruman Phase 1 and Phase 2 Wind Energy Facilities and Supporting Electrical Grid Infrastructure near Kuruman, Northern Cape Province	Project Manager and Environmental Assessment Practitioner	Mulilo Renewable Project Developments (Pty) Ltd
2019	National Coastal Climate Change Vulnerability Index Assessment	Public Participation Practitioner	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
2018 – 2019	Strategic Environmental Assessment for the Identification of Energy Corridors, as well as Assessment and Management Measures for the Development of a Phased Gas Pipeline Network in South Africa: Biodiversity and Ecology Specialist Assessment	Specialist Input and Principal Author	Department of Environmental Affairs, Eskom and iGas

Completion Date	Project description	Role	Client
	including Terrestrial and Aquatic Ecosystems, and Species of the Desert, Nama Karoo & Succulent Karoo Biomes		
2018	The Implementation of the Development of an Ecological Infrastructure Investment Framework (EIIF) and an Alien Invasive Species Strategy (AISS) for the Western Cape Province	Public Participation Practitioner	Western Cape Department of Environmental Affairs and Development Planning
2018	Basic Assessment for the proposed development of the 325 MW Kudusberg Wind Energy Facility and associated infrastructure between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces: Terrestrial Ecology Specialist Study	Specialist Input and Contributing Author	G7 Renewable Energies (Pty) Ltd
2018	Development of a Biodiversity Economy Transformation Strategy for the North West Province, South Africa	Specialist Input and Contributing Author	North West Rural, Environment and Agricultural Development
2018	Bioprospecting, biotrade and biodiversity permitting applications for Boscia albitrunca, as part of a Feasibility Study on Motlopi coffee, North West	Project Manager and Environmental Assessment Practitioner	North West Finance, Economy and Enterprise Development
2017 – 2018	Environmental Impact Assessment for Kuruman Wind Energy Facilities Phase 1 and Phase 2 near Kuruman, Northern Cape	Project Manager and Environmental Assessment Practitioner	Mulilo Renewable Project Developments (Pty) Ltd
2017 – 2018	Basic Assessment for supporting electrical infrastructure for the Kuruman Wind Energy Facilities Phase 1 and Phase 2 near Kuruman, Northern Cape	Project Manager and Environmental Assessment Practitioner	Mulilo Renewable Project Developments (Pty) Ltd
2012 – 2016	Bioprospecting beneficiation and implementation of the Nourivier Medicinal Plants Project at Nourivier, Northern Cape	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2012 – 2016	Bioprospecting beneficiation and implementation of the Witdraai Medicinal Plants Project at Andriesvale, Northern Cape	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2012 – 2016	Bioprospecting beneficiation and implementation of the Letsemeng Medicinal Plants Project at Petrusburg, Free State	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2013 – 2016	Bioprospecting beneficiation and implementation of the Abbey Medicinal Plants Project near Madibeng, Northern Cape	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2013 – 2016	Bioprospecting beneficiation and implementation of the Driekop Essential Oils and Moringa Project near Burgersfort, Limpopo	Project Manager, Environmental Scientist	Department of Rural Development and Land Reform (DRDLR)
2013 – 2014	Resource assessment, including bioprospecting, biotrade and biodiversity permitting applications for *Elephantorrhiza elephantina*, Northern Cape	Project Manager, Environmental Scientist	DST and CSIR Biosciences
2009 – 2010	Environmental screening and legal compliance of the Sidasoas Essential Oils (Rose Geranium) project near Onseepkans, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2010	Environmental screening and legal compliance of the Pelsan Essential Oils (Rose Geranium) project near Pella, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2010	Environmental screening and legal compliance of the Oppermans Essential Oils (Rose Geranium) project near Maubane, North West	Environmental Scientist	DST and CSIR ECD
2009 – 2010	Section 24G Rectification Application for the Sidasoas Essential Oils (Rose Geranium) project near Onseepkans, Northern Cape	Environmental Scientist	DST and CSIR ECD

Completion Date	Project description	Role	Client
2009 – 2011	Bioprospecting beneficiation, environmental screening and legal compliance of the Nourivier Medicinal Plants Project at Nourivier, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2011	Bioprospecting beneficiation, environmental screening and legal compliance of the Witdraai Medicinal Plants Project at Witdraai, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2010	EIA and Waste Management License Application at the Kumba Iron Ore Mine at Sishen, Northern Cape	Project Manager and EAP	Anglo American / Kumba Iron Ore
2009 – 2010	EIA for the development of the new Veremo Magnetite Mine near Stoffberg, Mpumalanga	Project Manager and EAP	Veremo Holdings / Kermas Limited
2009 – 2010	EIA for the proposed construction and upgrades of roads on various properties east of Orange Farm and west of the R82, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the proposed establishment of the new head office complex for the National Department of Land Affairs (DLA) as part of a public private partnership process, Pretoria, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the proposed construction of the internal road network and associated storm water pipes at Flamingo Park X2, Welkom, Free State	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the proposed construction of an access road and a sewer pipeline for the use of the proposed Gautrain Visitors Centre, Midrand, Gauteng	Project Manager and EAP	Bombela Consortium
2009 – 2010	BA for the proposed residential development and associated infrastructure on Erf 7402 and Erf 19642, Mamelodi-West, City of Tshwane, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the MTN Fibre Optic Deployment along roads R21 and R101, Gauteng	Project Manager and EAP	MTN Group Limited
2009 – 2010	BA and Waste Management License Application for the establishment of Phase 1 of the proposed provision of Bulk Water Supply Infrastructure and Purified Water Supply, Jozini, Kwa-Zulu Natal	Project Manager and EAP	PD Naidoo and Associates
2009 – 2010	BA for the proposed housing development situated on Klipspruit Ext 11, a portion of the remaining extent of the Farm Freehold 389 IQ, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	Environmental Management Plan for the Blouberg Local Municipality, Capricorn District, Limpopo	Project Manager and EAP	Capricorn District Municipality
2009 – 2010	Environmental Fatal Flaw Assessment for the proposed development of the Statistics South Africa Head Office Complex: Persequor Park, Gauteng	Project Manager and EAP	Eco-Agent CC
2009 – 2010	Environmental Fatal Flaw Assessment for the proposed development of the Statistics South Africa Head Office Complex: Salvokop, Gauteng	Project Manager and EAP	Eco-Agent CC

EMPLOYMENT RECORD

- CSIR Environmental Management Services (EMS) — Apr 2016 – present
- CSIR Enterprise Creation for Development (ECD) — Jan 2012 – Mar 2016
- Midrand Graduate Institute — Jan 2011 – Dec 2011
- Polygon Environmental Planning cc — Jan 2011 – Dec 2011
- The MSA Group (Environmental, Legal and Mining Services) — Apr 2009 – Dec 2010
- Department of Botany, University of Pretoria — Aug 2003 – Mar 2009

QUALIFICATIONS

- 2006 University of South Africa (Postgraduate Certificate for Higher Education and Further Training)
- 2004 University of Pretoria MSc *Cum Laude* (Botany)
- 2001 University of Pretoria BSc Honours (Botany)
- 2000 University of Pretoria BSc (Zoology and Entomology)

SHORT-COURSES / WORKSHOPS

- 2015 Finances for Non-Financial Managers, CSIR Innovation Leadership & Learning Academy, Pretoria.
- 2014 IWRM, the NWA, and Water Use Authorisations, focusing on Water Use License Applications – Procedures, Guidelines, IWWMP's and Monitoring, Carin Bosman Sustainable Solutions, Pretoria.

CONFERENCE PRESENTATIONS & PAPER PUBLICATIONS

INTERNATIONAL CONFERENCES

- **Kellerman, L.** Snyman-Van der Walt, L., Morant, P., Mashabela, K. & Lochner, P. (2017). Progress on the Strategic Environmental Assessment (SEA) for aquaculture development in South Africa. International Association for Impact Assessment – South Africa Conference 2017, Rawsonville, Western Cape Province.
- **Kellerman, L.** Snyman-Van der Walt, L., Morant, P., Mashabela, K. & Lochner, P. (2017). National Strategic Environmental Assessment (SEA) for aquaculture development in South Africa – A synopsis of the current marine and freshwater aquaculture environment and the need to promote sustainable growth and incentivisation. World Aquaculture Conference 2017, Cape Town, Western Cape Province.
- **Kellerman, L.** (2012). Success with Technology Transfer activities within the context of Enterprise Development that generate Social and Economic Development Opportunities. Conference on Innovation for Poverty Alleviation: South Africa - European Union Summit, Brussels, Belgium.
- **Kellerman, L.** (2012). New Medicinal Plants Demonstration Agronomy. European Union's Conference for Sector Budget Support. Department of Science and Technology, Roodevallei, Pretoria, Gauteng Province.
- **Kellerman, L.** (2012). Wild-harvesting for Commodity Beneficiation. European Union's Conference for Sector Budget Support. Department of Science and Technology, Roodevallei, Pretoria, Gauteng Province.

NATIONAL CONFERENCES

- **Kellerman, L.** & Moeng, E. (2013). Technology transfer to facilitate the sustainable cultivation harvesting and processing of arid zone indigenous plants. Annual Conference of the Indigenous Plant Use Forum, Agricultural Research Council, Nelspruit, Mpulamalanga Province.
- **Kellerman, L.** (2012). Capitalizing on South Africa's Indigenous Plants – Demonstration agro-processing for social impact. Annual Conference of the Indigenous Plant Use Forum, University of Venda, Thohoyandou, Limpopo Province.
- **Kellerman, M.J.S.**, Strobach, M. & Van Rooyen, M.W. (2008). Comparison of leaf trait spectra of two contrasting southern African environments. Annual Conference of South African Association for Botanists, Drakensville, Free State Province.
- Strobach, M, **Kellerman, M.J.S.** & Van Rooyen, M.W. (2008). Comparison of leaf functional types of two contrasting southern African environments. Annual Conference of South African Association for Botanists, Drakensville, Free State Province.
- **Kellerman, M.J.S.** & Grote, W. (2007). The Tswaing Crater… A blast from the past. 10th Annual Conference of the South African Association for Science and Technology Centres, Bayworld, Port Elizabeth, Eastern Cape Province.
- **Kellerman, M.J.S.** & Van Rooyen, M.W. (2006). Plant diversity in old fields of various ages in the Upland Succulent Karoo, South Africa. Arid Zone Ecology Forum, Kamieskroon, Northern Cape Province.
- **Kellerman, M.J.S.** & Van Rooyen, M.W. (2002). Seed bank dynamics of selected habitat types in the Tembe Elephant Park, Maputaland. Annual Conference of South African Association for Botanists, Rhodes University, Eastern Cape Province.

SCIENTIFIC BOOKS / JOURNAL PUBLICATIONS

- **Kellerman, L.** & Wild, S. (2015): A 'happy pill' to boost rural economies. – In: Wild, S. (Author), Fraser, S. [Editor]: Innovation – Shaping South Africa Through Science. Part 3: pp. 113-120, Pac Macmillan South Africa, in association with the Gordon Institute of Business Science, University of Pretoria.
- Wesuls, D., Strohbach, M., Horn, A., Kos, M., Zimmermann, J., Hoffmann, J., Geldenhuys, C., Dreber, N., **Kellerman, L.**, van Rooyen, M. W., Poschlod, P. (2010): Plant functional traits and types as a tool to analyse landuse impacts on vegetation. – In: Schmiedel, U., Jürgens, N. [Eds.]: Biodiversity in southern Africa. Volume 2: Patterns and processes at regional scale: pp. 222–232, Klaus Hess Publishers, Göttingen & Windhoek.

- **Kellerman, L** & Van Rooyen, G. (2009). Can time heal the old fields of the Kamiesberg? Veld & Flora 95(2): 78-81.
- **Kellerman, M.J.S.** & Van Rooyen, M.W. (2007). Seasonal variation in soil seed bank size and species composition of selected habitat types in Maputaland, South Africa. Bothalia 37,2: 249-258.
- Van Rooyen, M.W., Tosh, C.A., Van Rooyen, N., Matthews, W.S. & **Kellerman, M.J.S.** (2004). Impact of harvesting and fire on *Phragmites australis* reed quality in Tembe Elephant Park, Maputaland. Koedoe 47(1): 31-40.
- Steenkamp, Y., **Kellerman, M.J.S.** & Van Wyk, A.E. (2001). Fire, frost, waterlogged soil or something else: What selected for the Geoxylic Suffrutex growth form in Africa? Plantlife 25: 4-6.

MEDIA INTERVIEWS / PUBLICATIONS

- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published online at the Landbouweekblad on 26 May 2017. http://www.landbou.com/nuus/help-die-wnnr-met-nylkurper-opname/
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published in the Farmersweekly Magazine on 09 June 2017.
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published in the Stywe Lyne/Tight Lines Magazine, Issue 690 in August 2017.
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published online at the CSIR website on 26 June 2017. https://www.csir.co.za/csir-calls-public-participate-rapid-citizen-science-survey/
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published online at the DEA website in July 2017. https://www.environment.gov.za/projectsprogrammes/operationphakisa/oceanseconomy/
- **Kellerman, L**. (2015). Landbou – Kougoed. kykNet – Dagbreek television show.
- Interviewed by Wild, S. (2015). Bushmen cure – all's prospects hit a new high. Mail & Guardian Newspaper, pp: 26-27.
- Interviewed by Mostert, M. (2015). Kougoed-projek in Nourivier. Die Plattelander Newspaper, pp: Annexure.
- Interviewed by Smith, M. (2015). Geld te maak uit Kougoed, Jantjie-Bêrend. Landbouweekblad Magazine, pp: 28.
- **Kellerman, L**. (2014). Kougoed (*Sceletium tortuosum*) Medicinal Plants Project in Nourivier. SKEP eNews – www.skep.org.za
- Interviewed by Van Rooyen, B. (2014). Reaping rewards from South Africa's botanical riches. – In: Improving lives – Careers at the CSIR. ScienceScope, Volume 7(1), pp: 38-39. Publication of the Council for Scientific and Industrial Research, Pretoria.
- Interviewed by Van Rooyen, B. (2014). Successful cultivation of medicinal plants in the Kalahari generates work for hundreds. CSIR eNews – Enterprise Creation for Development.
- Interviewed by Van Rooyen, B. (2012). Local succulents yield natural, calmative agent. CSIR eNews – Enterprise Creation for Development.
- Interviewed by Van Rooyen, B. (2012). Mr Derek Hanekom visits DST-funded projects in the Northern Cape. CSIR eNews – Enterprise Creation for Development.

LANGUAGE CAPABILITY

	Speaking	**Reading**	**Writing**
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

PROFESSIONAL REGISTRATIONS / MEMBERSHIPS

- Professional Natural Scientist (Pr.Sci.Nat. Number 400076/10 – Botanical Sciences) with the SACNASP
- International Association of Impact Assessment South Africa (IAIAsa) – Registration number: 343955
- Botanical Society of South Africa (BotSoc) – Registration Number: S01/58657

APPENDIX B – ROLES AND RESPONSIBILITIES

Responsible Person(s)	Role and Responsibilities
Developer's Project Manager (DPM)	Role The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the Competent Authority (CA). Where required, an Environmental Control Officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role

Responsible Person(s)	Role and Responsibilities
	The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns;

Responsible Person(s)	Role and Responsibilities
	- Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports;

Responsible Person(s)	Role and Responsibilities
	- Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	Role The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: Responsibilities - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site;

Responsible Person(s)	Role and Responsibilities
	- Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

APPENDIX C – CHANCE FIND PROCEDURE FOR PALAEONTOLOGICAL RESOURCES

- **MONITORING**

A constant monitoring presence over the period during which excavations for developments are made, by either an archaeologist or palaeontologist, is generally not practical.

The field supervisor/foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossil and buried archaeological material. Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the ECO. The ECO will inform the archaeologist and/or palaeontologist contracted to be on standby in the case of fossil finds.

To this end, responsible persons must be designated. This will include hierarchically:

- The field supervisor/foreman, who is going to be most often in the field.
- The Environmental Control Officer (ECO) for the project.
- The Project Manager/Site Agent.

- **RESPONSE BY PERSONNEL IN THE EVENT OF FOSSIL FINDS**

In the process of excavation fossils may be spotted in the hole sides or bottom, or as they appear in excavated material on the spoil heap.

- Stop work at fossil find. The site foreman and ECO must be informed.
- Protect the find site from further disturbance and safeguard all fossil material in danger of being lost such as in the excavator bucket and scattered in the spoil heap.
- The ECO or site agent must immediately inform the SAHRA and/or the contracted standby palaeontologist of the find and provide via email the information about the find, as detailed below.
    - Date.
    - Position of the excavation (GPS) and depth.
    - A description of the nature of the find.
    - Digital images of the excavation showing vertical sections (sides) and the position of the find showing its depth/location in the excavation.
    - A reference scale must be included in the images (tape measure, ranging rod, or object of recorded dimensions).
    - Close-up, detailed images of the find (with scale included).

The SAHRA and/or the contracted standby palaeontologist will assess the information and a suitable response will be established which will be reported to the developer and the ECO, such as whether rescue excavation or rescue collection by a palaeontologist is necessary or not. The response time/scheduling of the rescue fieldwork is to be decided in consultation with developer/owner and the ECO. It will probably be feasible to "leapfrog" the find and proceed to the next excavation, or continue a trench excavation farther along, so that the work schedule and machine time is minimally disrupted. The strategy is to rescue the material as quickly as possible.

- **APPLICATION FOR A PERMIT TO COLLECT FOSSILS**

A permit from SAHRA is required to excavate fossils. The applicant should be the qualified specialist responsible for assessment, collection and reporting (palaeontologist). Should fossils be found that require rapid collecting, application for a palaeontological permit must immediately be made to SAHRA. All fossils must be deposited at a SAHRA-approved institution. In addition to the information and images of the find, the application requires details of the registered owners of the sites, their permission and a site-plan map

<table>
<tr><th colspan="3">KWAGGA WIND ENERGY FACILITIES 1-3 located south of Beaufort West</th></tr>
<tr><td>Province & region:</td><td colspan="2">Western Cape (Central Karoo District): Beaufort West and Prince Albert Local Municipalities</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">Heritage Western Cape (Contact details: Heritage Western Cape. 3rd Floor Protea Assurance Building, 142 Longmarket Street, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 021 483 5959 Email: ceoheritage@westerncape.gov.za)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Abrahamskraal & Teekloof Formations (Lower Beaufort Group), Late Caenozoic alluvium</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Fossil vertebrate bones, teeth, trace fossils, trackways, petrified wood, plant-rich beds in the Lower Beaufort Group bedrocks.
Fossil mammal bones, teeth, horn cores, freshwater molluscs, plant material in Late Caenozoic alluvium.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
• Context – describe position of fossils within stratigraphy (rock layering), depth below surface
• Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
• Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
• Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
• Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
• Photograph fossils against a plain, level background, with scale
• Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
• Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
• Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>

APPENDIX D – AVIFAUNAL POST-CONSTRUCTION MONITORING

1. Introduction

The avifaunal post-construction monitoring at the proposed Kwagga WEF 1 must be conducted in accordance with the latest version (2015) of the *Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa* (Jenkins *et al*. 2011)[2].

1.1. Aim of Post-Construction Monitoring

The avifaunal post construction monitoring aims to assess the impact of the WEF by comparing pre- and post-construction monitoring data and to measure the extent of bird fatalities caused by the WEF. Post-construction monitoring is therefore necessary to:

- Confirm as far as possible what the actual impacts of the WEF are on avifauna; and
- Determine what mitigation is required if need be (adaptive management).

The proposed post-construction monitoring can be divided into three categories:

- Habitat classification;
- Quantifying bird numbers and movements (replicating baseline pre-construction monitoring)
- Quantifying bird mortalities.

Post-construction monitoring will aim to answer the following questions:

- How has the habitat available to birds in and around the WEF changed?
- How has the number of birds and species composition changed?
- How have the movements of priority species changed?
- How has the WEF affected priority species' breeding success?
- How many birds collide with the turbines? And are there any patterns to this?
- What mitigation is necessary to reduce the impacts on avifauna?

2. Timing

Post-construction monitoring should commence as soon as possible after the first turbines become operational to ensure that the immediate effects of the facility on resident and passing birds are recorded, before they have time to adjust or habituate to the development. However, it should be borne in mind that it is also important to obtain an understanding of the impacts of the facility as they would be over the lifespan of the facility. Over time the habitat within the WEF may change, birds may become habituated to, or learn to avoid the facility. It is therefore necessary to monitor over a longer period than just an initial one year.

[2] Jenkins, A.R., Van Rooyen, C.S., Smallie, J.J., Anderson, M.D., & A.H. Smit. 2011. Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa. Produced by the Wildlife & Energy Programme of the Endangered Wildlife Trust & BirdLife South Africa.

3. Duration

Monitoring should take place in Year 1 and 2 of the operational phase, and then repeated in Year 5 and every five years after that. After the first year of monitoring, the programme should be reviewed in order to incorporate significant findings that have emerged. This may entail the revision of the number of turbines to be searched, and the size of the search plots, depending on the outcome of the first year of monitoring. If significant impacts are observed and mitigation is required, the matter should be taken up with the operator to discuss potential mitigation. In such instances the scope of monitoring could be reduced to focus only on the impacts of concern.

4. Habitat Classification

Any observed changes in bird numbers and movements at a WEF may be linked to changes in the available habitat. The avian habitats available must be mapped at least once a year (at the same time every year), using the same methods which were used during pre-construction.

5. Bird Numbers and Movements

In order to determine if there are any impacts relating to displacement and/or disturbance, all methods used to estimate bird numbers and movements during baseline monitoring must be applied as far as is practically possible in the same way to post-construction work in order to ensure maximum comparability of these two data sets. This includes sample counts of small terrestrial species, counts of large terrestrial species and raptors, focal site surveys and vantage point surveys according to the current best practice.

6. Collisions

The collision monitoring must have three components:

- Experimental assessment of search efficiency and scavenging rates of bird carcasses on the site;
- Regular searches in the immediate vicinity of the wind farm turbines for collision casualties;
- Estimation of collision rates.

7. Searcher Efficiency and Scavenger Removal

The value of surveying the area for collision victims is only valid if some measure of the accuracy of the survey method is developed. The probability of a carcass being detected and the rate of removal/decay of the carcass must be accounted for when estimating collision rates and when designing the monitoring protocol. This must be done in the form of searcher and scavenger trails twice a year.

8. Collision Victim Surveys

8.1. Aligning search protocols

The search protocol must be agreed upon between the bat and bird specialists to constitute an acceptable compromise between the current best practice guidelines for bird and bat monitoring.

Searches must begin as early in the mornings as possible to reduce carcass removal by scavengers. A carcass searcher must walk in straight line transects, 6 m apart, covering 3 m on each side. A team of searchers and one supervisor must be trained to implement the carcass searches. The searchers must have a vehicle available for transport per site. The supervisor must assist with the collation of the data at each site and to provide the data to the specialist in electronic format on a weekly basis. The specialists must ensure that the supervisor is completely familiar with all the procedures concerning the management of the data. The following must be sent to the

specialist on a weekly basis:

- Carcass fatality data (hardcopy and scans as well as data entered into Excel spreadsheets);
- Pictures of any carcasses, properly labelled;
- GPS tracks of the search plots walked; and
- Turbine search interval spreadsheets.

When a carcass is found, it must be bagged, labeled and kept refrigerated for species confirmation when the specialist visits the site.

8.3. Estimation of collision rates

Observed mortality rates need to be adjusted to account for searcher efficiency and scavenger removal. There have been many different formulas proposed to estimate mortality rates. The available methodologies must be investigated, and an appropriate method will be applied. The current method which is used widely is the GenEst method.

9. Deliverables

9.1 Annual report

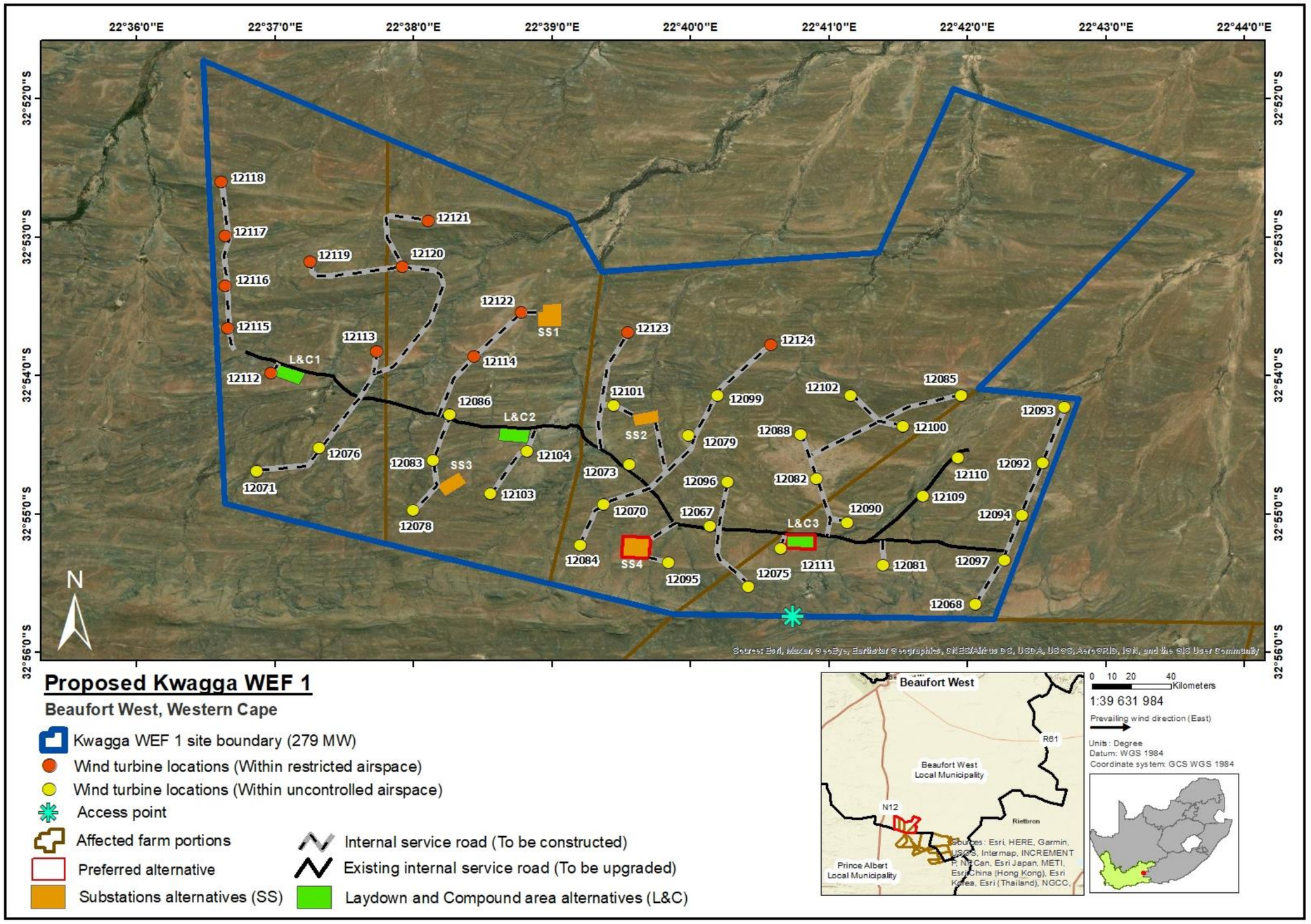
An operational monitoring report must be completed at the end of each year of operational monitoring. As a minimum, the report must attempt to answer the following questions:

- How has the habitat available to birds in and around the WEF changed?
- How has the number birds and species composition changed?
- How have the movements of priority species changed?
- How has the WEF affected priority species' breeding success?
- What are the likely drivers of any changes observed?
- How many, and which species of birds collided with the turbines and
- associated infrastructure? And are there any patterns to this?
- What is the significance of any impacts observed?
- What mitigation measures are required to reduce the impacts?

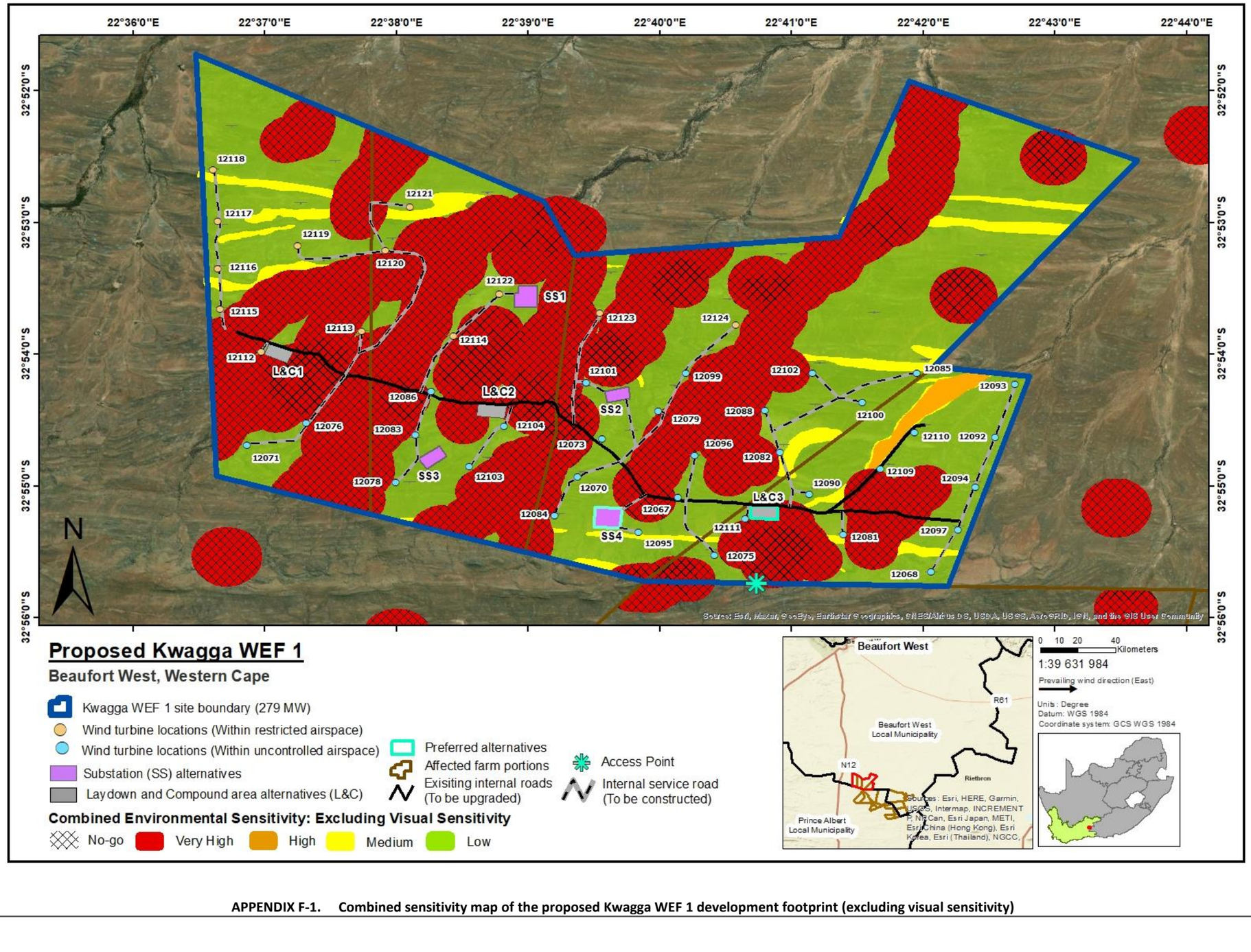
9.2 Quarterly reports

Concise quarterly reports must be provided with basic statistics and any issues that need to be red-flagged.

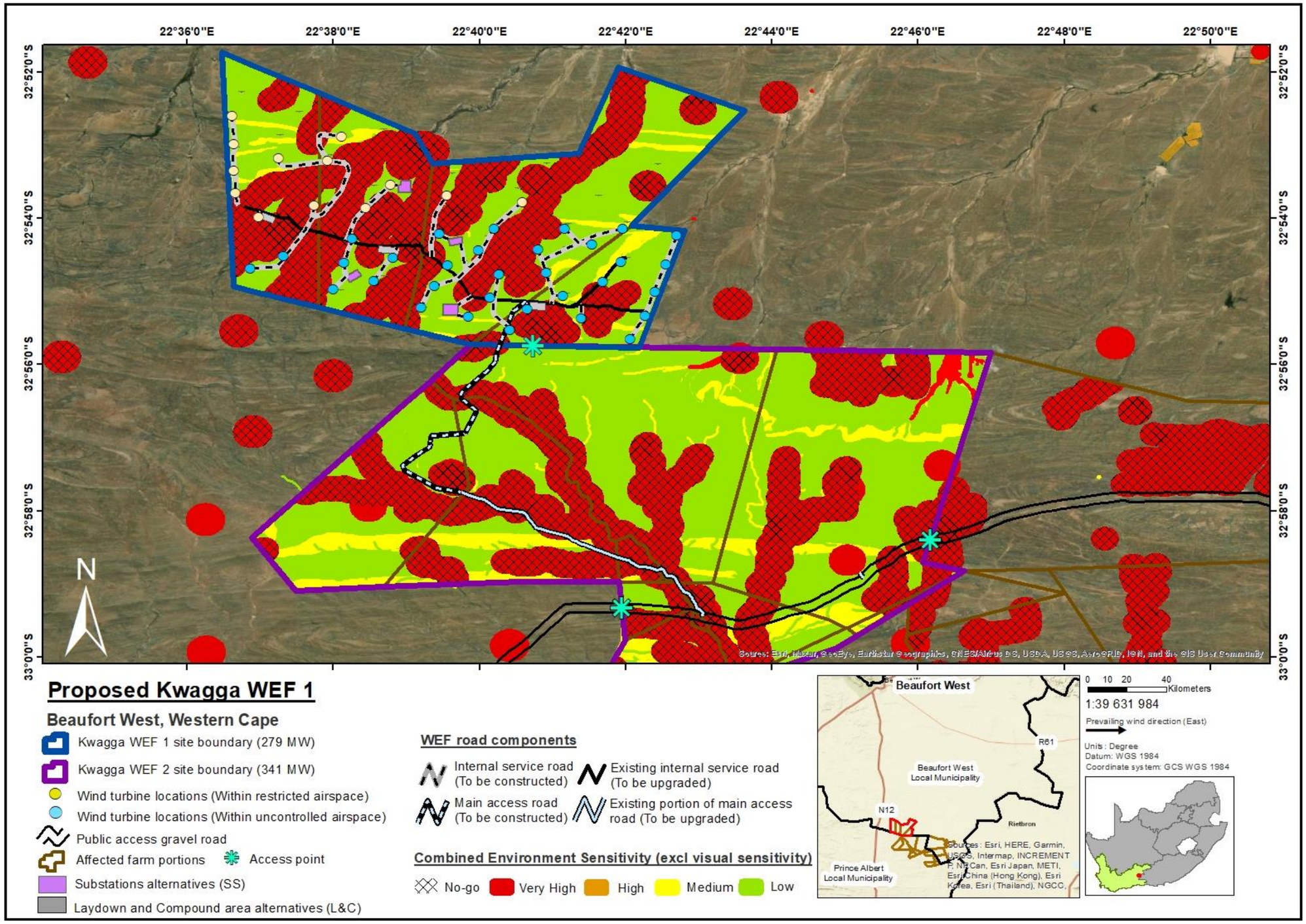
APPENDIX E – SITE LAYOUT MAP



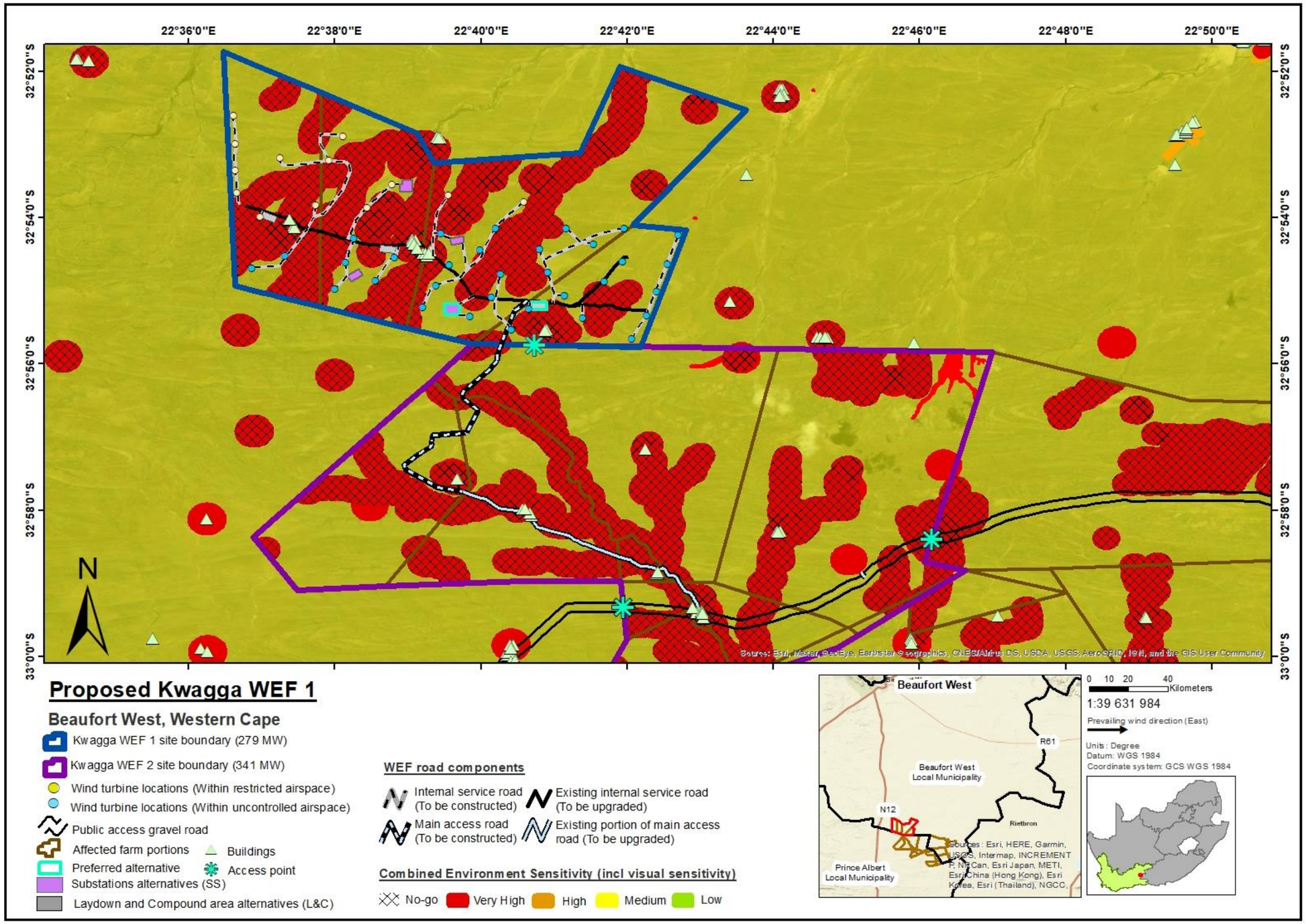
APPENDIX F – COMBINED LAYOUT AND SENSITIVITY MAP



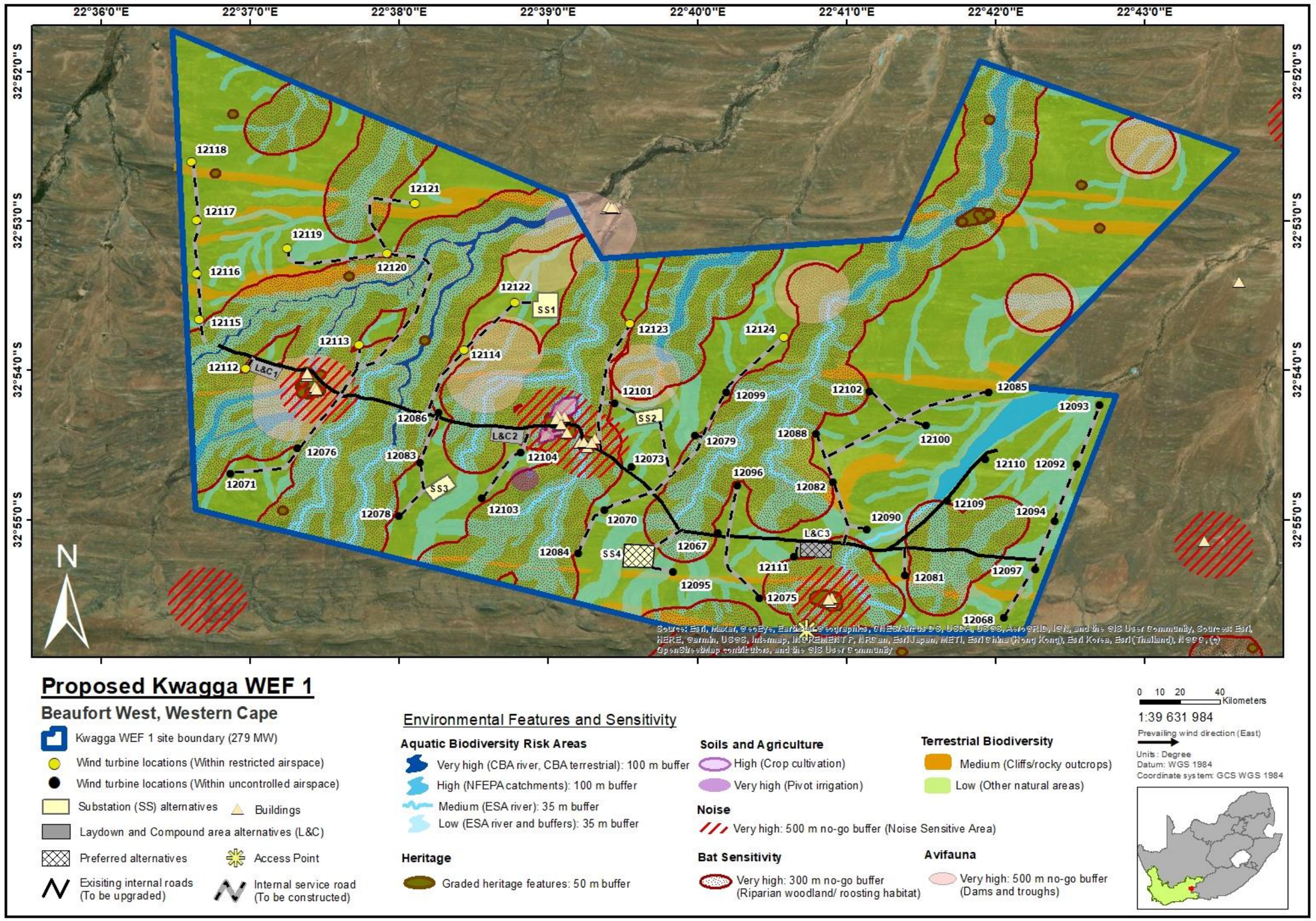
APPENDIX F-1. Combined sensitivity map of the proposed Kwagga WEF 1 development footprint (excluding visual sensitivity)



APPENDIX F-2. Combined sensitivity map of the proposed Kwagga WEF 1 site (including visual sensitivity)



APPENDIX F-3. **Combined sensitivity map of the proposed Kwagga WEF 1 site and main site access road (including visual sensitivity)**



Proposed Kwagga WEF 1

Beaufort West, Western Cape

- Kwagga WEF 1 site boundary (279 MW)
- Wind turbine locations (Within restricted airspace)
- Wind turbine locations (Within uncontrolled airspace)
- Substation (SS) alternatives
- Buildings
- Laydown and Compound area alternatives (L&C)
- Preferred alternatives
- Access Point
- Exisiting internal roads (To be upgraded)
- Internal service road (To be constructed)

Environmental Features and Sensitivity

Aquatic Biodiversity Risk Areas
- Very high (CBA river, CBA terrestrial): 100 m buffer
- High (NFEPA catchments): 100 m buffer
- Medium (ESA river): 35 m buffer
- Low (ESA river and buffers): 35 m buffer

Heritage
- Graded heritage features: 50 m buffer

Soils and Agriculture
- High (Crop cultivation)
- Very high (Pivot irrigation)

Noise
- Very high: 500 m no-go buffer (Noise Sensitive Area)

Bat Sensitivity
- Very high: 300 m no-go buffer (Riparian woodland/ roosting habitat)

Terrestrial Biodiversity
- Medium (Cliffs/rocky outcrops)
- Low (Other natural areas)

Avifauna
- Very high: 500 m no-go buffer (Dams and troughs)

0 10 20 40 Kilometers

1:39 631 984

Prevailing wind direction (East)

Units: Degree
Datum: WGS 1984
Coordinate system: GCS WGS 1984

APPENDIX F-4. Environmental features and sensitivity map of the proposed Kwagga WEF 1 site.

Scoping and Environmental Impact Assessment for the Proposed Development of the 279 MW Wind Energy Facility and associated Infrastructure (i.e. Kwagga WEF 1), near Beaufort West, Western Cape

PART C.2

Environmental Management Programme (EMPr) for the On-Site Substation Hub for the Kwagga WEF 1

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1 INTRODUCTION

The Project Developer, ABO Wind renewable energies (Pty) Ltd (hereafter "ABO Wind") is proposing the construction of three Wind Energy Facilities (WEFs), namely Kwagga WEF 1, Kwagga WEF 2, and Kwagga WEF 3, and its supporting electrical infrastructure, in the Central Karoo District Municipality, situated approximately 57 km south from the town of Beaufort West in the Western Cape Province (see Figure 1.1). The proposed Kwagga WEF 1 will be located in the Beaufort West Local Municipality, with the new access road to be constructed linking the proposed Kwagga WEF 1 project site with the R308 Rietbron bound public access road to the south of the site will be located in the Prince Albert Local Municipality, whereas the proposed Kwagga WEF 2 will be entirely located in the Prince Albert Local Municipality, and the Kwagga WEF 3 will be located in both these local municipalities. The project details are provided in Table A below. It must be noted that this Environmental Management Programme (EMPr) only covers the proposed Kwagga Wind Energy Facility 1 ('Kwagga WEF 1'), as detailed below. Separate EMPr's are provided for the remaining WEF projects.

Table C.2-1. Project Names, Applicants and the main Affected Farm Portions

Project Name	Project Applicant	Capacity	Affected Farm Portions
Kwagga WEF 1 (facility)	Kwagga Wind Energy Facility 1 (Pty) Ltd	279 MW	• Tyger Poort 376 / 3 • Dwaalfontein Wes 377 / RE • Dwaalfontein Wes 377 / 1 • Dwaalfontein 379 / RE
Kwagga WEF 1 (access road)			• Wolve Kraal 17 / RE • Wolve Kraal 17 / 7, 8, 10, 11 and 12
Kwagga WEF 2	Kwagga Wind Energy Facility 2 (Pty) Ltd	341 MW	• Wolve Kraal 17 / RE • Wolve Kraal 17 / 1, 3, 6, 7, 8, 9, 10, 11, and 12 • Annex Wolve Kraal 18 / RE • Annex Welbedacht 19 / RE
Kwagga WEF 3	Kwagga Wind Energy Facility 3 (Pty) Ltd	204.6 MW	• Arthurs Kraal 386 / 1, 2, 3 • Annex Taaibos 21 / RE • Cyferfontein 115 / 4, 5, 6, 8 • Muis Kraal 373 / 5, 7

The proposed Kwagga WEF 1 will comprise of up to 45 Wind Turbine Generators (WTGs), each with a generation capacity of at least 6.2 MW. Note however that should wind turbines with a larger generation capacity of up to 10 MW be available at the time of construction (post EA, should this WEF project be granted EA), a fewer number of turbines with an increased generation capacity will be selected for constructed. The proposed project will also include one temporary compound and laydown are and one on-site substation hub incorporating the facility substation, switchyard, BESS, collector infrastructure and associated O&M buildings. Each substation location will have a maximum development footprint of 9 ha and built infrastructure will not exceed 10 m in height. Four site alternatives for the on-site and three site alternatives for the temporary construction compound and laydown area were identified for assessment during the EIA Phase (Figure 1). The Kwagga WEF site is approximately 5 136 ha, of which the infrastructure for the wind farm will cover approximately 250 ha, excluding access roads.

It is proposed that a 132 kV overhead transmission line, which will be constructed for the proposed Kwagga WEF 1 at a later stage, will extend between the proposed on-site collector substation at the Kwagga WEF 1 and the existing Droërivier–Proteus 400 kV line that runs parallel to the N12 in a north-south direction and connects Beaufort West with the George/Mossel Bay area further south. Eskom's Droërivier Substation is located approximately 55 km north of the proposed Kwagga WEF 1, within the Northern Central Corridor of the Strategic Transmission Corridors (as gazetted on 16 February 2018, GN R113).

Note that the Project Developer is still investigating options for possible grid connection, from the proposed Kwagga WEF 1 to a proposed on-site collector substation, and/or a third party major transmission station (MTS) to be constructed nearby, and therefore a separate Environmental Assessment Process will be undertaken at a later stage once the grid connection and the power line routing has been confirmed.

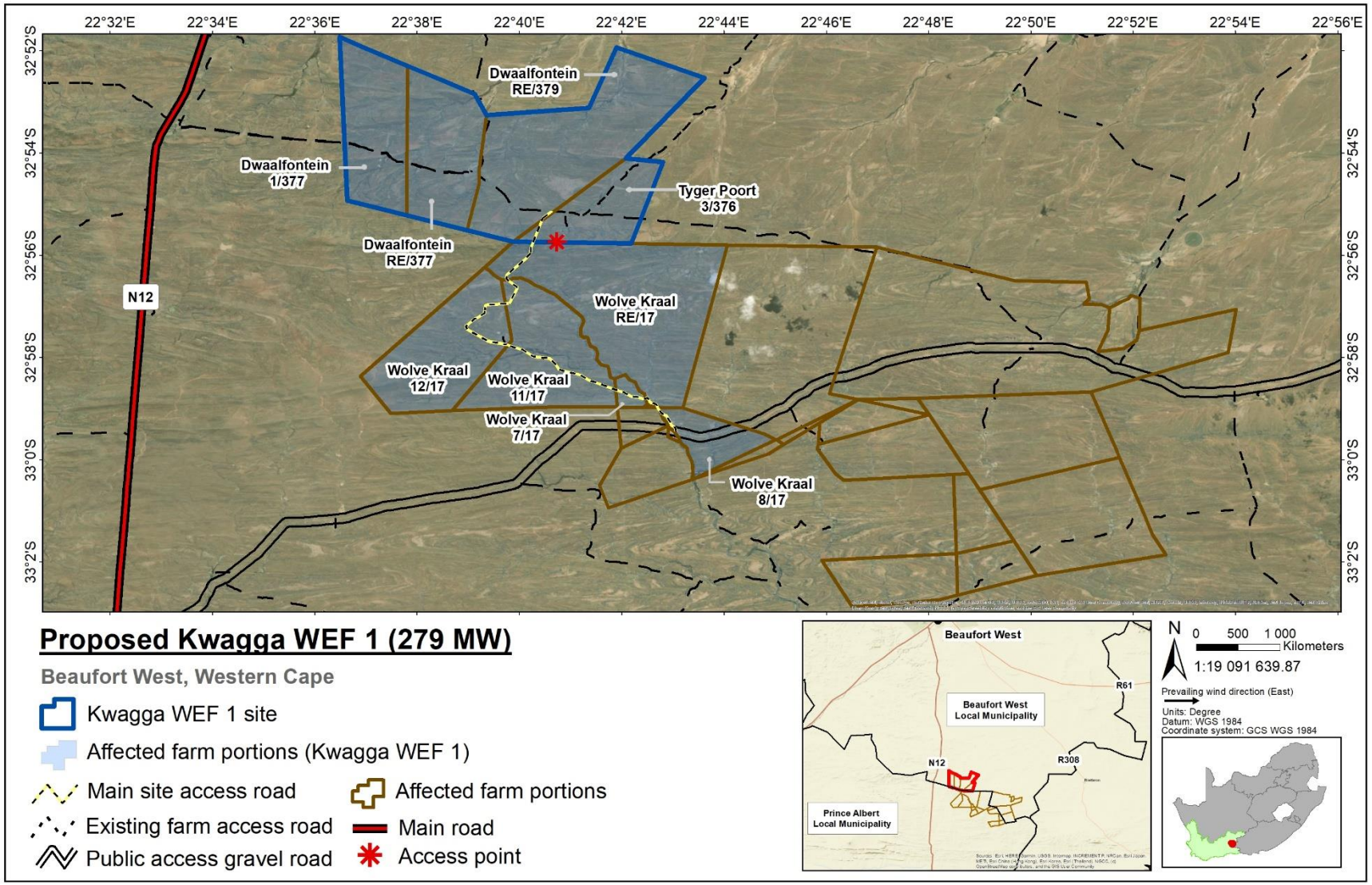


Figure C.2-1: Locality of the proposed Kwagga WEF 1 site and associated infrastructure

The proposed project is not located within any of the Renewable Energy Development Zones (REDZs) gazetted in Gazette 41445, GN R114 on 16 February 2018; and Gazette 44191, GN R144 on 26 February 2021. The proposed Kwagga WEFs are also not located within any of the strategic power corridors gazetted in Gazette 41445, GN R113 on 16 February 2018. Therefore, a full Scoping and EIA Process is being undertaken for each of the proposed three WEFs with a 107-day decision-making timeframe, as opposed to a BA Process and 57-day decision-making timeframe allowed for in the REDZs and strategic power corridors.

The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

"*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure*".

The Competent Authority for the proposed WEF project is the national Department of Forestry, Fisheries and the Environment (DFFE), previously first operating as the national Department of Environmental Affairs (DEA. As mentioned above, the proposed Kwagga WEF 1, Kwagga WEF 2 and Kwagga WEF 3 are not located within any of the Renewable Energy Development Zones (REDZs) gazetted in Gazette 41445, GN R114 on 16 February 2018; and Gazette 44191, GN R144 on 26 February 2021. The proposed Kwagga WEFs are also not located within any of the strategic power corridors gazetted in Gazette 41445, GN R113 on 16 February 2018.

The proposed Kwagga WEF 1 project was identified and selected prior to the gazetting of the Phase 2 REDZs; however, it is nevertheless located approximately 2.3 km away (at its closest point) from the Beaufort West REDZ. In addition, the proposed Kwagga WEF 1 project site is located approximately 4.4 km away (at its closest point) from the Central Strategic Transmission Corridor (as gazetted on 16 February 2018, GN R113). Therefore, its proximity to the Beaufort West REDZ and the Central Strategic Transmission Corridor supports the development of a large-scale renewable energy project at the proposed location. The proposed project is therefore linked to the national planning vision for wind and solar development in South Africa.

This final EMPr has been prepared as part of the requirements of the 2014 NEMA EIA Regulations, as amended, and is being submitted to the DFFE as part of the Application for EA for the proposed project.

This final EMPr was made available to Interested and Affected Parties (I&APs), stakeholders and Organs of State, as part of the EIA Report, for a 30-day review period which extended to 22 November 2021. Comments received from stakeholders during this aforementioned review period have been incorporated into this final EMPr, where applicable. Following the incorporation of comments from I&APs, stakeholders and Organs of State, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed.

1.1 AUTHORS OF THE EMPr

This EMPr has been compiled by the Environmental Assessment Practitioners (Paul Lochner, Lizande Kellerman and Dhiveshni Moodley) and informed with inputs from the various specialists on the EIA project team (as indicated in Table C.2-2). The details and expertise of the Environmental Assessment Practitioners and the specialists are provided in –Appendix B of the EIA Report. The Curriculum Vitae of Lizande Kellerman is also included in Appendix A of this EMPr.

Paul Lochner has more than 28 years of experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and Environmental Management Plans. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). Paul has extensive experience in conducting environmental assessment and management processes throughout South Africa.

Lizande Kellerman has more than 10 years of experience in environmental impact studies, primarily in the planning, preparation and management of BAs, EIAs, and SEAs, as well as EMPrs, Screening/Fatal Flaw Studies, Biodiversity Risk Assessments, Biodiversity Resource Assessments and license applications for agriculture, atmospheric emissions, water use, waste management, mining, bioprospecting and biodiversity permitting, for numerous projects in the agricultural (including aquaculture), construction, conservation, mining and renewable energy sectors.. Lizande holds a BSc degree in Zoology and Entomology, with an Honours and Masters in Botany both at the University of Pretoria. She is currently working towards completing her PhD in Conservation Ecology. She is currently working towards completing her PhD in Conservation Ecology. Lizande is a registered Professional Natural Scientist (400046/10) with the South African Council for Natural Scientific Professions (SACNASP).

Dhiveshni Moodley has a Masters degree in Environmental Science and is a registered Candidate
Candidate Natural Scientist (1472997/19) with the South African Council for Natural Scientific Professions (SACNASP). She has experience in conducting flood risk, hydropedological and wetland functional assessment specialist studies, as well as conducting BAs and Scoping/EIAs in the Renewable Energy sector.

Table C.2-2: Details of the EIA Project Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Environmental Management Services (CSIR)		
Paul Lochner *(Registered EAP (2019/745))*	CSIR	Technical Advisor and Quality Assurance
Rohaida Abed (*Pr.Sci.Nat.)*	CSIR	Project Review
Lizande Kellerman (*Pr.Sci.Nat.)*	CSIR	Project Lead
Dhiveshni Moodley *(Cand.Sci.Nat.)*	CSIR	Project Manager
Specialists		
Johann Lanz (*Pr.Sci.Nat.)*	Private	Agriculture and Soils Compliance Statement
Dr Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology, Palaeontology and Cultural Landscape)
Dr John Almond	Natura Viva cc	
Chris van Rooyen, Albert Froneman (*Pr.Sci.Nat.)*	Chris van Rooyen Consulting	Avifauna Impact Assessment
Ashlin Bodasing, Michael Brits	ARCUS Consultancy Services Ltd	Bat Impact Assessment
Toni Belcher *(Pr.Sci.Nat.)*	Private	Aquatic Biodiversity and Species Impact Assessment
Dr Noel van Rooyen *(Pr.Sci.Nat.)*	Ekotrust cc	Terrestrial Biodiversity and Species Impact Assessment
Dr Brett Williams	Safetrain cc T/A Safetech	Noise Impact Assessment
Menno Klapwijk	Bapela Cave Klapwijk cc	Visual Impact Assessment
Iris Wink, Adrian Johnson	JG Afrika (Pty) Ltd	Traffic Impact Assessment
Sue Reuther	SRK Consulting (Pty) Ltd	Socio-Economic Impact Assessment

Lizande Kellerman *(Pr.Sci.Nat.)*	CSIR	Civil Aviation Compliance Statement
Lizande Kellerman *(Pr.Sci.Nat.)*	CSIR	Defence Site Sensitivity Verification

1.2 PROJECT DESCRIPTION

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EA should it be granted for the proposed project).

The preferred site for the proposed WEF project includes approximately 5 136 ha of land (as shown in Figure 1, Figure 2 and Figure 3), however only approximately 250 ha (about 4.8% of the total available assessed area) will be required for the proposed development footprint of the WEF and its associated infrastructure. The area specified here excludes access roads leading to the site. All infrastructure including access roads have been assessed as part of the S&EIA Process. The specialists assessed larger areas on the affected farm portions in order to avoid environmental constraints and sensitivities (highlighted by the specialists), during the siting and final design of the facilities and associated infrastructure.

The EMPR covers the following spatial domains:

1) **Kwagga WEF 1 site** of approximately 5136 ha
2) **Project footprint area** of approximately 250 ha that includes the turbine sites, laydown areas, compound and the on-site substation hub (which includes the facility substation, switchyard, collector infrastructure, BESS and associated O&M buildings)
3) **Access roads on site** (either using existing roads or new roads)
4) **Access road to site**, i.e. from the R308 road to the WEF facility.

The actions in the EMPR apply to the Project footprint area and the access roads on site, unless otherwise specified.

The proposed project will make use of wind technology to generate electricity from wind energy. Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The construction phase for each proposed project is expected to extend 18 to 24 months.

A summary of the key components of the proposed Kwagga WEF 1 project is provided in Table C below.

Table C.2-3. Description of the proposed Kwagga WEF 1 project components and associated infrastructure

Infrastructure	Description
Number of turbines:	45 (maximum)
Turbine Capacity:	At least 6.2 MW (up to maximum of 10 MW)
Hub Height:	Up to 180 m
Rotor (Blade) Diameter:	Up to 200 m
Blade length:	Up to 100 m

Infrastructure	Description
WEF Project Size / Generation Capacity:	Approximately 279 MW
On-site substation hub:	The proposed project will include one on-site substation hub incorporating the facility substation, switchyard, collector infrastructure, BESS and associated O&M buildings. Four possible locations or placement alternatives for the on-site substation hub have been identified and were assessed during the EIA Phase.
Area of on-site substation hub alternatives:	
Alternative 1	8.56 ha
Alternative 2	4.65 ha
Alternative 3	7.59 ha
Alternative 4	5.21 ha (*preferred*)
Height of substation hub:	Maximum 10 m
Capacity of on-site substation:	33/132 kV
Area occupied by construction compound and lay down area:	Size = Six (6) ha (i.e. 300 m x 200 m) Three possible locations or placement alternatives for the construction compound and laydown area have been identified and were assessed during the EIA Phase. Construction Compound and Laydown Area No. 3 has been selected as the preferred alternative.
Internal service roads:	There are a number of existing gravel farm roads (some just jeep tracks) with widths ranging between 4 m and 6 m located around and within the proposed Kwagga WEF 1 project site boundary. The width of the existing internal service roads will be extended to a maximum width of 10 m, where necessary. The length of the internal service road network for the proposed Kwagga WEF 1 is approximately 45 km. The existing internal service road network in addition to all additional internal service roads that are to be constructed on the project site have been confirmed by the Project Developer following the outcome of the Scoping Phase, and were subjected to detailed specialist assessment during the EIA Phase.
Concrete batching plant:	50 m x 50 m (on-site batching) (0.25 ha)
Operational and Maintenance (O&M) Building:	1 ha

Infrastructure	Description
General temporary Hardstand Area (boom erection, storage, and assembly area):	1 ha
Battery Energy Storage System (BESS):	The BESS will cover an area of approximately five (5) ha, have a maximum height of 8 m (as recommended) and have a storage capacity of up to 500 MW/500 MWh. The BESS technologies that were considered include: - Lead Acid and Advanced Lead Acid - Lithium ion, NiCd, NiMH-based Batteries (*preferred*) - High Temperature (NaS, Na-$NiCl_2$, Mg/PB-Sb) - Flow Batteries (VRFB, Zn-Fe, Zn-Br)
Site Access:	The proposed Kwagga WEF 1 project site can be accessed via the N12 main road, which is situated to the west of the site, via the R308 Rietbron bound public access gravel road that is located to the south of the site (Figure 3). The N12 is a surfaced national road that connects Beaufort West and the N1 main road in the north with Klaarstroom, De Rust, Oudtshoorn and other Garden Route towns to the south. The R308 Rietbron bound public access road is a well-maintained gravel road with widths ranging between 6 m and 8 m, and will be widened to a maximum width of 10 m, where necessary. A new access road, which will serve as the main access point to the Kwagga WEF 1 with a maximum width of 10 m will be constructed to facilitate the connection between the Kwagga WEF 1 project site, across the Kwagga WEF 2 site, and the existing R308 Rietbron bound public access gravel road located to the south. The affected farm portions that were assessed for purposes of this access road are: • Wolve Kraal 17 / RE, 7, 8, 10, 11 and 12
Proximity to grid connection:	Eskom's Droërivier Substation is ideally located within the Central Strategic Transmission Corridors (as gazetted on 16 February 2018, GN R113) and approximately 55 km north of the proposed Kwagga WEF 1. It is proposed that a 132kV overhead transmission line, which will be constructed for the proposed Kwagga WEF 1 at a later stage, will extend between the proposed on-site collector substation at the Kwagga WEF 1 and the existing Droërivier–Proteus 400 kV line that runs parallel to the N12 in a north-south direction and connects Beaufort West with the George/Mossel Bay area further south.

Infrastructure	Description
	Note from the CSIR: *A separate Environmental Assessment Process will be undertaken at a later stage once the grid connection and the 132 kV power line routing for the proposed Kwagga WEF 1 has been confirmed, and hence does not form part of this S&EIA Process.*
Fencing:	For various reasons such as security, public protection and lawful requirements, the proposed built infrastructure on site will be secured via the installation of appropriate fencing. Existing livestock fencing on the affected farms portions may be upgraded in places where deemed insufficiently secure, whereas permanent fencing will be required around the O&M area and on-site substation hub. Access points will be managed and monitored by an appointed security service provider. The type and height of fencing to be installed will be confirmed during the detailed design phase prior to construction.

Based on the above, the following final EMPRs have been compiled and are provided in this EIA Report:

- Final EMPr for the proposed WEF and all associated infrastructure, excluding the 132 kV on-site substation. **This final EMPr comprises Part C.1 of this EIA Report**
- Final EMPr for the proposed on-site Substation to be located at the proposed WEF. **This final EMPr comprises Part C.2 of this EIA Report. It complies with the Generic EMPr published for Substation development (Government Gazette 42323, GN 435, dated 22 March 2019).**

This final EMPr (i.e. Part C.2) has been compiled for the proposed on-site SS to be located at the proposed Kwagga WEF 1. It is required to comply with the Generic EMPr published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019).

A separate EMPr has been compiled for the proposed Kwagga WEF 1 and associated infrastructure. This EMPr is included in Part C.1 of this EIA Report and it complies with Appendix 4 of the 2014 NEMA EIA Regulations, as amended.

The proposed project can be divided into the following four main phases:

- Design and Planning Phase (Pre-construction phase);
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has been assessed in the specialist studies (included in Chapters 6 -16 of this EIA Report (Part A)). Management and mitigation measures required to address all the impacts are included within this final EMPr.

The construction phase will take place subsequent to the issuing of the EA from the DFFE and a successful BID in terms of the Renewable Energy Independent Power Producer Programme (REIPPPP) (i.e. the issuing of a PPA).

The main activities that will form part of the construction phase of the project are:

- Removal of vegetation for the proposed infrastructure, where necessary;
- Excavations for the wind turbine foundations at each turbine location and excavations for other infrastructure;
- Construction and/or erection of the WTGs and additional infrastructure;
- Establishment of a temporary laydown area to enable the storage of construction equipment and machinery and will include the establishment of the construction site camp (including site offices and other temporary facilities for the appointed contractors);
- Stockpiling of topsoil and cleared vegetation, where necessary;
- Creation of employment opportunities; and
- Transportation of material and equipment to site, and personnel to and from site.

The following activities will occur during the operational phase of the project:

- The generation of electricity from the proposed WEF; and
- Maintenance of the WTGs and associated infrastructure.

During the life span of the proposed project (approximately 20 years), on-going maintenance will be required on a scheduled basis.

Should it be decided not to extend the operational lifespan of the project beyond 20 years, the project will be decommissioned. The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedure will involve removing the WTGs and associated infrastructure, and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation. Whether all components of the WEF will be removed still needs to be agreed upon with the landowners (some components may be useful for the landowners and therefore it could be decided that those remain on site). Any other supporting infrastructure no longer in use will be removed from the site and either disposed of at a registered disposal facility or recycled if possible.

It should be noted that a detailed project description (based on the conceptual design) is provided in Chapter 2 of the EIA Report (Part A).

1.3 ENVIRONMENTAL SENSITIVITIES

Chapters 6 to 18 of the EIA Report provides a detailed description of the environmental features and sensitive areas that were identified and assessed in detail by the specialists for consideration in the layout and location of the proposed project.

The preferred site for the proposed WEF project includes approximately 5 136 ha of land (as shown in Figure 1), however only approximately 250 ha (about 4.8% of the total available assessed area) will be required for the proposed WEF and its associated infrastructure. The larger 5 136 ha areas and the preliminary project layout of the proposed Kwagga WEF 1 was assessed by the specialists during the Scoping Phase in order to ensure that

any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility.

Based on scoping level findings from the specialist assessments, the preliminary layout was refined to avoid (where possible) the most sensitive features that were identified by the specialists within the original assessed study area. This revised project layout with a maximum of 45 turbine sites was taken forward into the EIA Phase for further assessment by the specialist team (Figure 2 and Figure 3). The specialists have, based on their impact assessment of the proposed development footprint of the Kwagga WEF 1 refined their sensitivity mapping of the proposed project layout with recommendations regarding micro siting and selection of infrastructure location alternatives, as well as required mitigation measures and management actions. All existing access roads to be utilised for the proposed project have been assessed during the Scoping Phase; additionally the planned internal road network including all additional access service roads to be constructed has been confirmed as part of the project layout and has undergone detailed specialist assessments during the EIA Phase. As a result, the final siting of the proposed Kwagga WEF 1 on the preferred site is discussed in Chapter 20 of this EIA Report, whereby the sensitive features identified are avoided by the proposed layout, together with specialist recommendations.

A combined sensitivity map showing the revised project layout (assessed during the EIA Phase) and combined environmental sensitivity map has been produced and is included in Appendix H of this EIA Report and below as Figure 4 in Appendix E of this EMPr. Figure 4 shows the identified and assessed environmental sensitivities such as agricultural potential, terrestrial biodiversity, watercourse features, avifauna and bats 'no-go' areas, and sensitive heritage and noise features, present within the study area, but excluding the potential visual sensitivity that is associated with a typical wind farm development.

1.4 IMPACTS IDENTIFIED DURING THE EIA PROCESS

Based on the specialist assessments (as shown in Table C.2-2), the following main direct potential impacts, as indicated in Table C.2-4, were identified and appropriate management and mitigation measures included within the final EMPr (where required) to ensure the potential impacts are suitably addressed and managed during all phases of the project. Indirect and cumulative impacts are noted in Sections 4 to 10 of this Final EMPr.

It should be noted that other impacts for which specialist studies were not undertaken but where mitigation or management actions may be required, are also included in the final EMPr.

Table C.2-4: Impacts identified in the S&EIA Process

Specialist Assessment / Input	Impact Identified
Agriculture and Soils Compliance Statement	**Construction and Operational Phases:** ▪ Loss of agricultural land use; ▪ Soil degradation including erosion, topsoil loss and contamination; and ▪ Increased financial security for farming operations[1].

[1] This potential issue is considered to have a positive impact because of the proposed development.

Specialist Assessment / Input	Impact Identified
Aquatic Biodiversity and Species	**Construction Phase:** ▪ Disturbance and possible loss of aquatic habitats within the watercourses with the associated impact to sensitive aquatic biota; ▪ The removal of indigenous riparian and instream vegetation that has the potential to reduce the ecological integrity and functionality of the watercourses; ▪ Water demand for construction could place stress on the existing available water resources should external water sources not be utilised; ▪ Road crossing structures if not adequately designed could impede flow in the watercourses; ▪ Alien vegetation infestation within the aquatic features due to disturbance; and ▪ Increased sedimentation and risks of contamination of surface water runoff during construction. **Operational Phase:** ▪ Ongoing disturbance of aquatic features and associated vegetation along access roads or adjacent to the infrastructure that needs to be maintained; ▪ Modified runoff characteristics from hardened surfaces at the turbines and the substations, as well as along the access roads that have the potential to result in erosion of hillslopes and watercourses; and ▪ Possible increased potential for water quality impacts such as contamination from sewage generated on site because of the operation on site. **Decommissioning Phase:** ▪ An increased disturbance of aquatic habitat due to the increased activity on the site; and ▪ Increased sedimentation and risks of contamination of surface water runoff.
Terrestrial Biodiversity and Species	**Construction Phase:** ▪ The clearing of natural vegetation and resultant loss of faunal habitat; ▪ The loss of endangered, threatened, protected and endemic plants/animals; ▪ Direct faunal mortalities due to construction activities and increased vehicle traffic; ▪ Increased human activity, noise and light levels; and ▪ Increased dust deposition. ▪ Establishment of alien vegetation as a result of the clearing of the vegetation; ▪ Increased stormwater run-off and erosion; and ▪ Changes in animal behaviour. **Operational Phase:** ▪ Direct faunal mortalities; and ▪ Increased human activity, light and noise levels. ▪ Establishment of alien vegetation will continue; and ▪ Increased erosion and water run-off and **Decommissioning Phase:** ▪ Increased dust deposition; and ▪ Direct faunal mortalities ▪ Establishment of alien invasive vegetation; and ▪ Increased erosion and stormwater run-off.
Avifauna Impact Assessment	**Construction Phase:** ▪ Total or partial displacement of avifauna due to habitat transformation associated with the presence of the wind turbines and associated infrastructure;

Specialist Assessment / Input	Impact Identified
	▪ The noise and movement associated with the construction activities at the project footprint will be a source of disturbance, which would lead to the displacement of avifauna from the area. **Operational Phase:** ▪ Avifauna mortality and injury through collisions with the wind turbines; and ▪ Electrocution of priority species on the internal electrical grid network. **Decommissioning Phase:** ▪ The noise and movement associated with the activities at the study area will be a source of disturbance, which would lead to the displacement of avifauna from the area.
Bat Impact Assessment	**Construction Phase (Direct Impacts):** ▪ Displacement of bats due to habitat loss / habitat transformation; ▪ Roost disturbance; and ▪ Roost destruction. **Operational Phase:** ▪ Mortality of bats due to turbine collisions while commuting/foraging and/or due to barotrauma; ▪ Mortality of bats due to turbine collisions during migrations; and ▪ Light pollution associated risks including loss of insect prey and increased collision risks for bats foraging closer to turbines. **Decommissioning Phase:** ▪ Displacement of bats due to disturbance associated with the decommissioning activities.
Heritage Impact Assessment (including Archaeology and Cultural Landscape)	**Construction Phase:** ▪ The damage or destruction or disturbance of archaeological artefacts or sites; ▪ The damage or destruction or disturbance of graves or burial sites; ▪ The damage or disturbance of historic built infrastructure; and ▪ Visual intrusion of visually sensitive heritage resources and/or cultural landscape features, which might erode its association with intangible heritage. **Operational Phase:** ▪ Visual intrusion of the WEF into the landscape. **Decommissioning Phase:** ▪ Visual intrusion of the WEF into the landscape.
Palaeontology Impact Assessment	**Construction and Operational Phases:** ▪ Damage and/or destruction of scientifically valuable fossils preserved at o beneath the ground due to surface clearance or excavations
Noise Impact Assessment	**Construction and Decommissioning Phases:** ▪ Noise pollution due to construction activities i.e. increase in ambient sound levels due to construction activities (e.g. equipment and vehicle noise). **Operational Phase:** ▪ Mechanical and aerodynamic noise from the operation of the wind turbine components.

Specialist Assessment / Input	Impact Identified
	Decommissioning Phase: ▪ Mechanical and aerodynamic noise from the operation of the wind turbine components.
Socio-Economic Assessment	**Construction Phase:** ▪ Capital investment and the contribution to the national, regional and local economy[1]; ▪ Generation of employment, income and skills[1]; and ▪ Social disruption and change in social dynamics **Operational Phase:** ▪ Lower national CO_2 emissions per unit of energy generated[1]; ▪ Investment and the contribution to the national, regional and local economy[1]; ▪ Generation of employment, income and skills[1]; and ▪ Increased community prosperity through contributions and income from the WEF ▪ Increased South African power generation reducing the probability of load shedding **Decommissioning Phase:** ▪ Loss of employment due to decommissioning of the facility.
Traffic Impact Assessment	**Construction and Decommissioning Phases:** ▪ Increase in vehicle traffic due to construction activities – Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution.
Visual Impact Assessment	**Construction and Operational Phases:** ▪ Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors; ▪ Visual intrusion by wind turbines and associated structures and infrastructure on landscape receptors; ▪ Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors **Decommissioning Phase:** ▪ Visual intrusion and increased dust emissions due to decommissioning activities including disassembly of project components, heavy machinery, increased vehicle traffic and rehabilitation; and ▪ Potential visual impact of security and construction lighting on the nightscape of the region.

2 APPROACH TO PREPARING THE EMPr

2.1 COMPLIANCE WITH RELEVANT LEGISLATION

As noted in the Gazetted EMPr noted above (dated March 2019), the NEMA requires that an EMPr be submitted where a BA or EIA is being undertaken for an Application for EA. The content of an EMPr must either contain the

information set out in Appendix 4 of the NEMA EIA Regulations, 2014, as amended, promulgated in GG 40772 and GN R326 on 7 April 2017, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a GN. As part of the 2016 EGI SEA, a generic EMPr was compiled for the development and expansion of SS infrastructure for the transmission and distribution of electricity. On 2 March 2018, a Generic EMPr for SS development was gazetted in GG 41473, GN 163, for public comment for a period of 45 days. **On 22 March 2019, a Generic EMPr was gazetted for implementation in GG 42323, GN 435**. It is therefore understood that this gazetted EMPr must be applied by all parties involved in the EA Process. This EMPr therefore subscribes to the requirements of the gazetted EMPr (Gazette 42323, GN 435).

Since the Generic EMPr has been gazetted and is applicable to the proposed project, the following has been undertaken:

- Section 1 of Part B of the gazetted Generic EMPr contains a pre-approved template with aspects that are common to the development of SS infrastructure. This section will be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. This section will not be submitted to the DFFE as it has already been pre-approved in the gazetted Generic EMPr. To allow I&APs access to the pre-approved EMPr template for consideration through the decision-making process, the template was released with the Draft EIA Report for a 30-day commenting period. It is included in Appendix F of this EMPr.
- Section 2 of Part B of the gazetted Generic EMPr has been completed to include site specific information, a preliminary infrastructure layout and development footprint site map, and a declaration that the Applicant will comply with the pre-approved template provided in Part B: Section 1 of the gazetted EMPr. This will be submitted to the DFFE for review and decision-making and has been included in Section 4 (site specific information), Section 5 (preliminary infrastructure layout) and Section 6 (declaration of the Applicant) of this EMPr.
- Part C of the gazetted Generic EMPr has been compiled and included in Section 7 of this EMPr. It includes site specific impact management outcomes and impact management actions that are not included in the pre-approved generic EMPr. It will be submitted to the DFFE together with the final EIA Report, for comment. This section was prepared by the EAP, with input from relevant specialists on the project team (Table 2). This section of the EMPr is a supplement to the gazetted EMPr and provides site specific mitigation measures identified in the specialist studies contained in Chapter 6 to 18 of the Final EIA Report. It was confirmed with the DFFE Interpretation Query (IQ) Unit in February 2020 (on a separate renewable energy project) that if Part C of the gazetted Generic EMPr is required, the impact management outcomes and impact management actions must be provided; whilst the columns under the headings, “Implementation” and “Monitoring” can only be completed by the relevant parties after the EA is issued (as per Part B – Section 1).

2.2 STRUCTURE AND CONTENTS OF THE EMPr

This Site Specific EMPr includes the following:

- Section 4: Site specific information;
- Section 5: Preliminary infrastructure layout and development footprint site map;
- Section 6: Declaration that the Applicant will comply with the pre-approved template provided in Part B: Section 1 of the gazetted EMPr (which is included in Appendix F of this EMPr);
- Section 7: Site-Specific EMPr as required by Part C of the gazetted EMPr.

The Site-Specific EMPr follows the same template as that of Part B – Section 1 of the gazetted EMPr, as recommended. Where applicable, each section of the Site-Specific EMPr is divided into the following four phases of the project cycle:

- Planning and Design Phase (Pre-construction phase);
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

The overall goal for environmental management for the proposed project is to plan, design, construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna and flora;
- Facilitates harmonious co-existence between the project and other land uses in the area;
- Enhances the socio-economic benefits in the local area; and
- Contributes to the environmental baseline and understanding of environmental impacts of EGI in a South African context.

In this EMPr, the following spatial parameters apply to the management actions, unless where specified differently:

- The study area is referred to as the larger assessed area (i.e. 5 136 ha and greater);
- The site as the as the development footprint of the proposed WEF (i.e. approximately 250 ha); and
- **The on-site substation hub (up to 9 ha) incorporating the facility substation, switchyard, collector infrastructure, a BESS and associated O&M buildings.**

3 ROLES AND RESPONSIBILITIES

Since the Generic EMPr is applicable for the on-site substation, it is best to adopt the definitions of the roles and responsibilities as captured in the gazetted EMPr of GN 435. This will allow consistency of the management of the project from an environmental perspective and will avoid any contradiction in terms of the roles and responsibilities.
The generic roles and responsibilities required for key role players are those of the:

- Project Developer / Developer's Project Manager (DPM);
- Developer Site Supervisor (DSS);
- Environmental Control Officer (ECO);
- Developer's Environmental Officer (DEO);
- Contractor; and
- Contractor's Environmental Officer (CEO).

The definitions of the roles and responsibilities are included in Appendix B of this EMPr.

4 SITE SPECIFIC INFORMATION

4.1 CONTACT DETAILS AND DESCRIPTION OF THE PROJECT

4.1.1 Details of the Applicant

Kwagga WEF 1– On-Site Substation Hub

Name of Applicant	Kwagga Wind Energy Facility 1 (Pty) Ltd
Name of Applicant Representative	Rob Invernizzi
Telephone Number:	073 265 8575
Fax Number:	086 595 4668
Postal Address:	Unit B1, Mayfair Square, Century Way, Century City, Cape Town, 7441
Physical Address:	Unit B1, Mayfair Square, Century Way, Century City, Cape Town

4.1.2 Details and Expertise of the EAP

Company of the EAP	Council for Scientific and Industrial Research (CSIR)
Name of EAP	Lizande Kellerman
Telephone Number:	021 888 2400 or 083 799 0949
Fax Number:	021 888 2693
Email Address:	lkellerman@csir.co.za
Expertise of the EAP (Curriculum Vitae included):	**Qualifications:** ▪ BSc Zoology & Entomology ▪ BSc Hons Botany ▪ MSc Botany **Experience:** ▪ Lizande has more than 10 years of experience in undertaking environmental assessments (including compiling EMPrs). **Professional Registration and Affiliations:** ▪ Professional Natural Scientist (Pr.Sci.Nat. Number 400076/10 – Botanical Sciences) with the SACNASP ▪ International Association of Impact Assessment South Africa (IAIAsa) – Registration number: 343955 ▪ Botanical Society of South Africa (BotSoc) – Registration Number: S01/58657 **Curriculum Vitae of Minnelise Levendal is included in Appendix A of this EMPr.**

4.1.3 Project Name

Project Name	Scoping and Environmental Impact Assessment for the proposed development of the 279 MW Kwagga Wind Energy Facility 1 near Beaufort West in the Western Cape.

4.1.4 Description of the Project

Refer to Section 1.2 of this EMPr for a detailed description of the proposed project.

4.1.5 Project Location

The preferred on-site substation will be constructed on the Remainder of Dwaalfontein No. 379.The proposed coordinates of the mid-point of the proposed Kwagga WEF 1 project and mid-point of the preferred on-site substation hub area (SS 4) are provided below.

Point	Degrees , minutes, seconds	
	Latitude (Y)	Longitude (X)
Mid-point of project area	32° 53’ 51.108’’ S	22° 39’ 53.150’’ E
Mid-point of preferred on-site substation (SS 4)	32° 55’ 14.588’’ S	22° 39’ 36.310’’ E

5 LAYOUT AND DEVELOPMENT FOOTPRINT SITE MAP

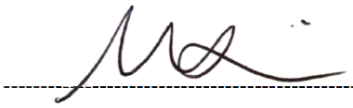
This section includes maps of sensitivities, as well as the preliminary infrastructure layout. As noted above, the sensitivity map was prepared based on specialist feedback and existing databases. Individual feature and sensitivity maps are included in the specialist assessments (Chapter 6 to 18 of the EIA Report). A feature map illustrating each specialist theme, where relevant, are also included in Chapter 20 of the EIA Report. Refer to Appendix E of this EMPr for the combined sensitivity and layout map for the proposed WEF project.

6 APPLICANT DECLARATION

7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 day prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/ holder of EA



Date:

21 October 2021

7 PROJECT SPECIFIC EMPR

The project specific EMPr is presented below per specialist theme.

7.1 TERRESTRIAL BIODIVERSITY

- **Impact Management Outcomes: To confine vegetation clearance to footprint and minimise disturbance of adjacent areas. To avoid or minimise impacts that could potentially affect animal behaviour. Avoid or minimise increased dust levels. Determine whether the riverine rabbit (*Bunolagus monticularis*) is present on the site.**

Impact Management Actions (these apply to the Project footprint area and the access roads on site)	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
DESIGN PHASE						
▪ No development of WEF infrastructure, including the on-site SS, must take place within identified no-go areas as per the Terrestrial Biodiversity Assessment (Chapter 8 of the EIA Report). All no-go areas should be demarcated at construction by a suitably qualified person able to identify the SCC present at the site. Refer to Appendix E of this EMPr for the combined sensitivity maps. ▪ To avoid or minimise impacts on terrestrial biodiversity and species on site regarding the placement of the infrastructure. Avoiding ridges, cliffs and rocky sheets will reduce the chances of loss of protected species. ▪ Ecologist to review the final layout plan in relation to existing drainage patterns and comment accordingly on storm water management across the site. ▪ Ensure the necessary permits or licences are identified and applied for as applicable. Await response and provision of permit. Undertake plant rescue if and where required. ▪ Ensure compliance with relevant Environmental Specifications for the control and removal of alien invasive plant species. Appoint a specialist or contact relevant authorities to seek guidance on the removal of the alien vegetation on site. Compile and finalise invasive alien plant management programme. ▪ Where vegetation is cleared, measures to counteract aeolian (wind-blown) transport in the short and long term should be implemented, where necessary. Use of drift fence and	To be completed post EA by relevant parties.					

▪ **Impact Management Outcomes: To confine vegetation clearance to footprint and minimise disturbance of adjacent areas. To avoid or minimise impacts that could potentially affect animal behaviour. Avoid or minimise increased dust levels. Determine whether the riverine rabbit (*Bunolagus monticularis*) is present on the site.**						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
related measures, where required. Appoint an Ecologist to advise on clearance and planting, where required.						
CONSTRUCTION PHASE						
▪ Demarcate all infrastructure sites clearly to avoid unnecessary clearance of the vegetation ▪ Permits have to be obtained for the removal of WCNECO protected species within the footprint of the development. ▪ Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. ▪ Holes and trenches should not be left open for long periods of time. These should be regularly inspected for the presence of trapped animals. ▪ Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site. ▪ Speed limits should be strictly adhered to. (40km/h for cars and 30km/h for trucks) and if areas are identified with higher occurrence of crossing by animals then signage should erected to alert drivers to be cautious. ▪ Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns. ▪ No construction activity should be allowed on site at night ▪ Dust control measures should be implemented ▪ Favorable habitat for the riverine rabbit does not appear to be present on any of the proposed Kwagga project sites due to intensive grazing by livestock, exacerbated by the current drought, the vegetation on site and along the majority of drainage lines was extremely degraded. Note however that based on specialist communication with the EWT Drylands Programme regarding the neighbouring proposed Trakas and Beaufort West WEF sites, it was indicated that monitoring for the presence of this species at those sites was unnecessary. Furthermore, the camera trap monitoring that was employed at these	To be completed post EA by relevant parties.					

▪ **Impact Management Outcomes: To confine vegetation clearance to footprint and minimise disturbance of adjacent areas. To avoid or minimise impacts that could potentially affect animal behaviour. Avoid or minimise increased dust levels. Determine whether the riverine rabbit (*Bunolagus monticularis*) is present on the site.**						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
neighbouring sites did not find any evidence of the presence of riverine rabbit in the area. Currently,it is therefore deemed unnecessary for camera trapping or other monitoring for riverine rabbit to be conducted during construction. However, this is being confirmed with If therefore deemed necessary by EWT, a riverine rabbit monitoring programme could be initiated to determine whether the species is present at the proposed Kwagga project sites.						
OPERATIONAL PHASE						
▪ Proper waste management procedures should be put in place. ▪ Appropriate lighting should be installed to minimise negative effects on nocturnal animals ▪ Fences are to be erected around the substations and laydown areas. The jackal-proof fencing on the farm boundaries is considered adequate ▪ Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species. the farm boundaries is considered adequate. ▪ Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species.	To be completed post EA by relevant parties.					
DECOMMISSIONING PHASE						
▪ Unnecessary clearance of natural vegetation should be avoided. ▪ Proper waste management procedures should be put in place ▪ Implement a monitoring program for the early detection of alien invasive plant species and employ a control program to combat declared alien invasive plant species.	To be completed post EA by relevant parties.					

7.2 AVIFAUNA

Impact Management Outcome: Prevent unnecessary displacement of priority avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.) and that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study. Prevention of electrocution and collision mortality on the overhead sections of the 33kV internal cable network and the wind turbines.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ The results of the pre-construction monitoring must guide the lay-out of the turbines, especially as far as proposed no-turbine zones are concerned. No turbines must be constructed in the buffer zones which were identified based on the results of the pre-construction monitoring, with a specific view to limiting the risk of collisions to a variety of birds, including several Red Data species. ▪ Use underground cabling as much as is practically possible. Where the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted to ensure that a raptor friendly pole design is used, and that appropriate mitigation is implemented pro-actively for complicated pole structures e.g. insulation of live components to prevent electrocutions on terminal structures and pole transformers	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						
▪ A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: o No off-road driving. o Maximum use of existing roads. o Measures to control noise and dust according to latest best practice. o Restricted access to the rest of the property. o Strict application of all recommendations in the botanical specialist report pertaining to the limitation and rehabilitation of the footprint.	To be completed post EA by relevant parties.					

Impact Management Outcome: Prevent unnecessary displacement of priority avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.) and that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study. Prevention of electrocution and collision mortality on the overhead sections of the 33kV internal cable network and the wind turbines.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
OPERATIONAL PHASE						
▪ Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. ▪ Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance. ▪ Once operational, vehicle and pedestrian access to the site should be controlled and restricted to the facility footprint as much as possible to prevent unnecessary destruction of vegetation. ▪ Formal live-bird monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the Best Practice Guidelines (Jenkins et al. 2015). The purpose of this would be to establish if displacement of priority species has occurred and to what extent. The exact time when operational monitoring should commence, will depend on the construction schedule, and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute minimum, operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter for the operational lifetime of the facility. If estimated annual collision rates indicate unacceptable mortality levels of priority species, i.e., if it exceeds the pre-determined threshold determined by the avifaunal specialist in consultation with BirdLife South Africa, additional measures will have to be implemented which could include shut down on demand or other proven measures. ▪ Conduct regular inspections of the overhead sections of the internal reticulation network to look for carcasses.	To be completed post EA by relevant parties.					
DECOMMISSIONING PHASE						
○ Maximum use of existing roads during the decommissioning phase; ○ Measures to control noise and dust according to latest best practice; ○ Habitat can be rehabilitated to its former attractiveness (from a prey point of view) for the raptors); and	To be completed post EA by relevant parties.					

Impact Management Outcome: Prevent unnecessary displacement of priority avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.) and that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study. Prevention of electrocution and collision mortality on the overhead sections of the 33kV internal cable network and the wind turbines.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ Strict application of all recommendations in the Terrestrial Biodiversity Impact Assessment Report pertaining to rehabilitation of disturbed areas and erosion control measures. ▪ A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: ○ No off-road driving. ○ Maximum use of existing roads. ○ Measures to control noise and dust according to latest best practice. ○ Restricted access to the rest of the property. ○ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint						

7.3 BATS

Impact Management Outcomes: Mitigate impacts on bat habitat caused by destruction, disturbance and displacement. Avoid habitat loss and destruction caused by clearing vegetation for the working areas, construction and landscape modifications. Minimise impacts on bats (active and potential bat roost destruction and habitat loss) during construction, operation and decommissioning activities. Mitigate mortality of bats due to turbine collisions while commuting/foraging. To mitigate mortality of bats due to turbine collisions during migrations.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ The final layout of the WEF must be designed and constructed in such a way as to avoid the destruction of potential and actual roosts, particularly large mature trees, buildings, rocky crevices (if blasting is required). ▪ Limit the removal of vegetation, particularly large mature trees within 50 m of turbine positions.	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						
▪ Avoid construction activities near roosts to limit roost abandonment. ▪ Large mature trees within 50 m of the turbine positions should be inspected for roosting bats. ▪ It is recommended that potential roosts, specifically buildings and rocky crevices, are buffered by 200 m, inside which no turbine infrastructure may be placed. No turbines should be installed within 50 m of large mature trees.	To be completed post EA by relevant parties.					
OPERATIONAL PHASE						
▪ The height of the lower blade swept area must be maximised, and should not be lower than 30 m. If the minimum blade sweep is lower than 30 m, fatality thresholds would need to be evaluated every 3 – 4 months against the South African Bat Assessment Association fatality threshold guidelines (i.e. if they exceed an estimated 101 bat fatalities per year). Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints. ▪ Operational monitoring should be done according to the guidelines for the first 2 years and every 5 years thereafter	To be completed post EA by relevant parties.					

Impact Management Outcomes: Mitigate impacts on bat habitat caused by destruction, disturbance and displacement. Avoid habitat loss and destruction caused by clearing vegetation for the working areas, construction and landscape modifications. Minimise impacts on bats (active and potential bat roost destruction and habitat loss) during construction, operation and decommissioning activities. Mitigate mortality of bats due to turbine collisions while commuting/foraging. To mitigate mortality of bats due to turbine collisions during migrations.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Blade feathering should be implemented at the start of operation. ▪ Apply curtailment during spring, summer and autumn based on the below table if mortality occurs beyond threshold levels as determined based on applicable guidance (MacEwan et al. 2018). The threshold calculations must be done at a minimum of once a quarter (i.e. not only after the first year of operational monitoring) so that mitigation can be applied as quickly as possible should thresholds be reached. ○ 1 September – 30 November (Spring): 19h00 – 00h00 (Time Period); Between 13°C and 23°C (Temperature); Below 4.5 m/s (Cut in Wind Speed) ○ 1 December – 29 February (Summer): 20h00 – 01h00 (Time Period); Between 14 °C and 21°C (Temperature); Below 6.5 m/s (Cut in Wind Speed) ○ 1 March – 31 May (Autumn): 20h00 – 01h00 (Time Period); Between 13.5 °C and 22.5°C (Temperature); Below 4.5 m/s (Cut in Wind Speed) ▪ The height of the lower blade swept area must be maximised, and should not be lower than 30 m. If the minimum blade sweep is lower than 30 m, fatality thresholds would need to be evaluated every 3 – 4 months against the South African Bat Assessment Association fatality threshold guidelines (i.e. if they exceed an estimated 101 bat fatalities per year). Lighting of WEF should be kept to a minimum and directed downwards. ▪ Operational monitoring should be done according to the guidelines for the first 2 years and every 5 years thereafter. ▪ Blade feathering should be implemented at the start of operation. ▪ Apply curtailment during spring, summer and autumn based on the below table if mortality occurs beyond threshold levels as determined based on applicable guidance (MacEwan et al. 2018). The threshold calculations must be done at a minimum of once a quarter (i.e. not only after the first year of operational monitoring) so that mitigation can be applied as quickly as possible should thresholds be reached. ○ 1 September – 30 November (Spring): 19h00 – 00h00 (Time Period); Between 13°C and 23°C (Temperature); Below 4.5 m/s (Cut in Wind Speed)						

Impact Management Outcomes: Mitigate impacts on bat habitat caused by destruction, disturbance and displacement. Avoid habitat loss and destruction caused by clearing vegetation for the working areas, construction and landscape modifications. Minimise impacts on bats (active and potential bat roost destruction and habitat loss) during construction, operation and decommissioning activities. Mitigate mortality of bats due to turbine collisions while commuting/foraging. To mitigate mortality of bats due to turbine collisions during migrations.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ 1 December – 29 February (Summer): 20h00 – 01h00 (Time Period); Between 14 °C and 21°C (Temperature); Below 6.5 m/s (Cut in Wind Speed) ○ 1 March – 31 May (Autumn): 20h00 – 01h00 (Time Period); Between 13.5 °C and 22.5°C (Temperature); Below 4.5 m/s (Cut in Wind Speed) ▪ This impact can be mitigated by using as little lighting as possible, and only where essential for operation of the facility. ▪ Where lights need to be used such as at the collector substation and switching station and elsewhere, these should have low attractiveness for insects such as low pressure sodium and warm white LED lights (Rydell 1992; Stone 2012). High pressure sodium and white mercury lighting is attractive to insects (Blake et al. 1994; Rydell 1992; Svensson & Rydell 1998) and should not be used as far as possible. ▪ Lighting should be fitted with movement sensors to limit illumination and light spill, and the overall lit time. In addition, the upward spread of light near to and above the horizontal plane should be restricted and directed to minimise light trespass and sky glow. ▪ Increasing the spacing between lights, and the height of light units can reduce the intensity and volume of the light to minimise the area illuminated and give bats an opportunity to fly in relatively dark areas between and over lights.						
DECOMMISSIONING PHASE						
▪ The impacts to bat during this phase are likely to be restricted to disturbance. Provided decommissioning activities are restricted to daylight hours, the impact to bats are predicted to be negligible. Nightly decommissioning activities should be avoided, or if necessary, minimised to the shortest period possible.	To be completed post EA by relevant parties.					

7.4 VISUAL IMPACTS

Impact Management Outcomes: To avoid or minimise construction impacts on existing visual resources and potentially sensitive receptor locations in the proposed WEF development.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ In areas of 'Very High' and 'High Sensitivity', the number of turbines should be limited, where possible. Ensure that that the design of the WEF takes the sensitivity mapping of the visual specialist into account. Refer to Appendix E of this EMPr for the combined sensitivity maps. ▪ Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors ▪ Place site turbines at least 500 m from any occupied farmstead within the proposed site and at least 2 km from occupied farmstead outside of the proposed site. ▪ Limit area of disturbance for access roads, substations and construction camp sites. ▪ Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors ▪ Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld. ▪ Blend edges of road and platforms with surrounding landscape. ▪ Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape ▪ Limit need for security lighting and uUse non-reflective materials ▪ Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour ▪ Avoid bright colour/patterns and logos.	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						

Impact Management Outcomes: To avoid or minimise construction impacts on existing visual resources and potentially sensitive receptor locations in the proposed WEF development.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Limit area of disturbance for turbine footprint, access roads and construction camp or sites. ▪ Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors ▪ Suppress dust during construction. ▪ Place site turbines at least 500 m from any occupied farmstead within the proposed site and at least 2 km from occupied farmstead outside of the proposed site. ▪ Limit area of disturbance for access roads, substations and construction camp sites. ▪ Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors. ▪ Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld. ▪ Blend edges of road and platforms with surrounding landscape. ▪ Rehabilitate exposed disturbed areas. ▪ Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape ▪ Limit need for security lighting ▪ Use non-reflective materials ▪ Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour ▪ Avoid bright colour/patterns and logos.	To be completed post EA by relevant parties.					
OPERATIONAL PHASE						
▪ Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors	To be completed post EA by relevant parties..					

Impact Management Outcomes: To avoid or minimise construction impacts on existing visual resources and potentially sensitive receptor locations in the proposed WEF development.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Manage need for top of turbine red hazard lighting to only when a plane enters the affected airspace rather than be permanently lit. ▪ Use non-reflective materials ▪ Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour ▪ Avoid bright colour/patterns and logos ▪ Limit need for security lighting. ▪ Maintain rehabilitated disturbed areas						
DECOMMISSIONING PHASE						
▪ Remove all project components from site ▪ Rip all compacted hard surfaces such as platforms, words areas, access and service roads etc. and reshape to blend with the surrounding landscape ▪ Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting ▪ Ensure that the SS structures are removed and that building structures are demolished or recycled for new uses. ▪ Carefully plan to reduce the decommissioning period. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. ▪ Landscape scarring must be kept to an absolute minimum.	To be completed post EA by relevant parties..					

7.5 HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)

Impact Management Outcomes: Achieve a layout that avoids or minimises the potential impacts to archaeological resources and/or graves. Minimise damage to graves discovered accidentally. Reduce the degree of visual contrast in the landscape. Minimise landscape scarring. To rescue information, artefacts or burials before extensive damage occurs.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ Commission a pre-construction archaeological survey of the approved layout in order to confirm the micrositing of infrastructure and to check for archaeological sites or features that might have been missed during the original survey and could potentially be rescued or protected. Mitigation to be suggested if required. The survey should be done well in advance of construction. ▪ Ensure that the pre-construction survey findings are taken into consideration during the planning and design phase, as necessary. ▪ Avoidance of the historical rubbish midden at Waypoint 419. If this rubbish midden cannot be avoided, then the rubbish midden should be excavated prior to construction. ▪ Slight rerouting of the access road northwards, at Waypoint 327 to reduce the chances of impacts to the buildings situated there. ▪ Slight rerouting of the access road (in the vicinity of Waypoint 309), so as to pass between the structures at waypoint 309 in such a way that the distance between road and structures is maximized.	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						
▪ Reporting chance finds as early as possible, protect in situ and stop work in immediate area. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. ▪ Landscape scarring must be kept to an absolute minimum. ▪ Fully rehabilitate temporary laydown areas once the Construction Phase concludes	To be completed post EA by relevant parties.					

Impact Management Outcomes: Achieve a layout that avoids or minimises the potential impacts to archaeological resources and/or graves. Minimise damage to graves discovered accidentally. Reduce the degree of visual contrast in the landscape. Minimise landscape scarring. To rescue information, artefacts or burials before extensive damage occurs.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DECOMMISSIONING PHASE						
▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. ▪ Landscape scarring must be kept to an absolute minimum.	To be completed post EA by relevant parties.					

7.6 HERITAGE IMPACTS (PALAEONTOLOGY)

Impact Management Outcomes: To notice and rescue fossil material that may be exposed in the excavations during the construction of the WEF. Reduce or avoid direct destruction of fossil resources as a result of all bulk earthworks, viz. substation foundation excavations.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PRE-CONSTRUCTION PHASE						
▪ Inform staff of the need to monitor and watch for potential fossil occurrences. ▪ Inform staff of the Fossil Finds Procedures to be followed in the event of fossil occurrences (please refer to Appendix C of this EMPr).	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						
▪ Monitor for the presence of fossils. Construction staff sighting potential objects of palaeontological significance are to cease construction at sighted location and report to the field supervisor who, in turn, must report to the ECO. The ECO must inform the developer and contact the contracted palaeontologist to be on standby in the case of potential fossil finds. The latter will liaise with SAHRA on the nature of the find and consequent actions (permitting and collection of find). ▪ Liaise with palaeontologist on the nature of potential finds and appropriate actions. ▪ ECO to conduct inspections of open excavations whenever on site. ▪ Obtain a permit from SAHRA for the fossil finds collection should resources be discovered. ▪ Excavate main finds, inspect pits and record and sample excavations. Only a professional palaeontologist may excavate uncovered fossils with a valid mitigation permit from SAHRA.	To be completed post EA by relevant parties.					

7.7 SOILS AND AGRICULTURE

Impact Management Outcomes: Ensuring that disturbance and existence of hard surfaces causes no erosion on or downstream of the site; ensuring that vegetation clearing does not pose a high erosion risk; ensuring that topsoil loss is minimised; and ensuring that denuded areas are re-vegetated to stabilise soil against erosion.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ Design an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion						
CONSTRUCTION PHASE						
▪ Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. ▪ Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. ▪ If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	To be completed post EA by relevant parties.					
OPERATIONAL PHASE						
▪ Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring. ▪ Facilitate re-vegetation of denuded areas throughout the site	To be completed post EA by relevant parties.					
DECOMMISSIONING PHASE						

Impact Management Outcomes: Ensuring that disturbance and existence of hard surfaces causes no erosion on or downstream of the site; ensuring that vegetation clearing does not pose a high erosion risk; ensuring that topsoil loss is minimised; and ensuring that denuded areas are re-vegetated to stabilise soil against erosion.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. ▪ Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. ▪ If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	To be completed post EA by relevant parties.					

7.8 AQUATIC ECOLOGY

Impact Management Outcomes: To limit the disturbance of aquatic habitat and minimise potential to modify flow/hydraulics related impacts and increase the potential for erosion. Control of invasive alien plants in riparian zones and wetland areas;						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ Ensure final layout of WEF avoids watercourses and recommended buffers as far as possible; utilisation should be made of existing disturbed areas where possible. Opportunities should also be sought to rationalise the number of road crossings and in particular, avoid the number of crossings over the very high sensitivity Swartbakens and Leeu Rivers.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To limit the disturbance of aquatic habitat and minimise potential to modify flow/hydraulics related impacts and increase the potential for erosion. Control of invasive alien plants in riparian zones and wetland areas;						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ A comprehensive stormwater management plan should be compiled for the compacted surfaces within the site by the project engineer with input from the freshwater specialist. The plan should aim to reduce the intensity of runoff particularly on the steeper slopes and reduce the intensity of the discharge into the adjacent drainage lines. Where necessary measures to dissipate flow intensity or protect erosion should be included in the plan. The plan should encourage infiltration rather than runoff and should prevent the impedance of surface or sub-surface flows. The plan should also mitigate any contaminated runoff from the construction and operation activities from being discharged into any of the aquatic features within the site ▪ Adequate and erosion mitigation measures should be incorporated into designs ▪ For any new infrastructure placed within the watercourses: ▪ The structure should not impede or concentrate the flow in the watercourse. It is recommended that low water crossings should be utilised. ▪ Any rubble or waste associated with the construction works within the aquatic features should be removed once construction is complete ▪ Water consumption requirements for the site for the construction and operation of the site if not obtained from an authorised water user within the area, must be authorised by the DWS. ▪ No liquid waste should be discharged into any of the aquatic features within the site without the approval of the DWS. ▪ Wastewater should be properly contained on-site and removed to a licensed wastewater treatment facility that can treat the wastewater						
CONSTRUCTION PHASE						
▪ For all project-related components within the site, the aquatic features of high sensitivity should be treated as no-go areas during the construction phase.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To limit the disturbance of aquatic habitat and minimise potential to modify flow/hydraulics related impacts and increase the potential for erosion. Control of invasive alien plants in riparian zones and wetland areas;						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Any activities that require construction within the delineated aquatic features and the recommended buffers should be described in method statements that are approved by the ECO. ▪ Rehabilitation of any the disturbed areas within the aquatic features and the recommended buffer areas should be undertaken immediately following completion of the disturbance activity according to rehabilitation measures as included in a method statement for that specific activity as described above; ▪ Ablution facilities should not be placed within 100m of any of the aquatic features delineated within the site; ▪ Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc.) must have drip trays beneath them/beneath the nozzle fixtures. Material safety data sheets (MSDS) must be available on site (if required) where products are stored so that in the event of an incident, the correct action can be taken. Depending on the types of materials stored on-site during the maintenance activities, suitable product recovery materials (such as Spillsorb or Drizit products) must be readily available. Vehicles should ideally be washed at their storage yard as opposed to on-site. ▪ Proper waste management should be undertaken within the site with facilities provided for the on-site disposal of waste and the removal of stored waste to the nearest registered solid waste disposal facility.						
OPERATIONAL PHASE						
▪ Ongoing control of invasive alien plants within the site should be undertaken according to an approved plan. The plan should make use of alien clearing methods as provided by the Working for Water Programme. Monitoring and control measures should take place at least biannually for the first 3 years of the project ▪ Invasive alien plant material that has been cleared should be removed from the riparian zones and not left on the river banks or burnt within the riparian zone and buffer area; ▪ Ongoing monitoring of the structures, in particular before the rainfall period, should be undertaken to ensure that the integrity of the structures is intact and that they are not	To be completed post EA by relevant parties.					

Impact Management Outcomes: To limit the disturbance of aquatic habitat and minimise potential to modify flow/hydraulics related impacts and increase the potential for erosion. Control of invasive alien plants in riparian zones and wetland areas;						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
blocked with sediment or debris. Ongoing monitoring post large rainfall events should also be undertaken to identify and address any erosion occurring within the watercourses.						
DECOMMISSIONING PHASE						
▪ For all project-related components within the site, the aquatic features of high sensitivity should be demarcated by the appointed ECO before the commencement of the decommissioning activities and treated as no-go areas during the decommissioning phase. ▪ Any activities that require decommission activities within the delineated aquatic features and the recommended buffers should be described in method statements that are approved by the ECO. ▪ Rehabilitation of any disturbed areas within the aquatic features and the recommended buffer areas should be undertaken immediately following completion of the disturbance activity according to rehabilitation measures as included in a method statement for that specific activity. ▪ Control of invasive alien plants within the site should be undertaken according to the approved plan.	To be completed post EA by relevant parties.					

7.9 CIVIL AVIATION

Impact Management Outcomes: To minimise the impact on nearby landing strips and other civil aviation installations.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						

Impact Management Outcomes: To minimise the impact on nearby landing strips and other civil aviation installations.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Ensure that feedback is obtained from the South African Civil Aviation Authority and relevant permits obtained, if necessary, and that recommendations are incorporated into the design, as necessary	To be completed post EA by relevant parties.					
OPERATIONAL PHASE						
▪ Ensure that the mitigation and management measures recommended by the South African Civil Aviation Authority are adhered to during the operational phase	To be completed post EA by relevant parties.					
DECOMMISSIONING PHASE						
▪ Ensure that the mitigation and management measures recommended by the South African Civil Aviation Authority are adhered to during the decommissioning phase	To be completed post EA by relevant parties.					

7.10 SOCIO-ECONOMIC IMPACTS

Impact Management Outcomes: To promote contributions to the national, regional and local economy. To promote a transparent labour and recruitment policy. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Realize opportunity to enhance growth of national, regional and local economy. Enhance benefits of long-term employment particularly for Beaufort West residents. Benefits to be provided to the local community derived from the establishment of the proposed WEF.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
CONSTRUCTION PHASE						
▪ Source as many goods and services as far as possible from the local and regional economy (e.g., use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). ▪ Provide suitable training to service providers, where possible and practicable. ▪ Develop and implement a fair and transparent procurement policy. ▪ Consult with existing IPP projects that successfully procure from local SMMEs to share learnings, where possible. ▪ Maximise use of local skills and resources through preferential employment of locals where practicable and transparent labour and recruitment policy. ▪ Ensure gender equality in recruitment, as far as possible ▪ Provide training to staff and service providers on how to position themselves for other employment opportunities once construction ends. ▪ Clearly publicise and implement a recruitment policy. ▪ Work together with impartial local representatives to identify local people during the recruitment process. ▪ Provide transport to site and other incentives to reduce the number of workers accommodated in EPC accommodation to an absolute minimum. ▪ Consult with the municipality regarding the capacity of existing services and infrastructure (e.g. provision of water, electricity, waste removal, sanitation and housing) to cope with additional workers brought into the area during the construction period. ▪ Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To promote contributions to the national, regional and local economy. To promote a transparent labour and recruitment policy. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Realize opportunity to enhance growth of national, regional and local economy. Enhance benefits of long-term employment particularly for Beaufort West residents. Benefits to be provided to the local community derived from the establishment of the proposed WEF.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
OPERATIONAL PHASE						
▪ Source as many goods and services as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally). ▪ Provide suitable training to service providers, where possible and practicable. ▪ Develop and implement a fair and transparent procurement policy. ▪ Maximise use of local skills and resources through preferential employment of locals where practicable. ▪ Develop and implement a fair and transparent labour and recruitment policy. ▪ Ensure gender equality in recruitment, as far as possible. ▪ Provide suitable training. ▪ Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme. ▪ Regularly engage with community stakeholders to develop meaningful strategies for community development. ▪ Define vision for economic development in consultation with communities. ▪ Develop a Governance Plan with clear governance rules for the Community Trust, including administration and trustee and beneficiary selection. ▪ Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable. ▪ Set clear goals for each project and phase out funding once these goals are achieved. ▪ Ensure regular external auditing of the Community Trust as well as supported projects.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To promote contributions to the national, regional and local economy. To promote a transparent labour and recruitment policy. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Realize opportunity to enhance growth of national, regional and local economy. Enhance benefits of long-term employment particularly for Beaufort West residents. Benefits to be provided to the local community derived from the establishment of the proposed WEF.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.						
DECOMMISSIONING PHASE						
▪ Clearly communicate project duration to staff and communities. ▪ Assist with recommendations and referrals where possible. ▪ Assist with the sustainable administration of funds throughout the project lifetime. ▪ The developer should comply with relevant South African labour legislation when retrenching employees. ▪ The developer should implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning.	To be completed post EA by relevant parties.					

7.11 NOISE IMPACTS

Impact Management Outcomes: To avoid or reduce the impact of noise on noise sensitive receptors.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
CONSTRUCTION PHASE						
▪ Conduct noise sensitivity training for all construction staff. No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions. ▪ Ambient noise monitoring to be conducted. ▪ All machinery that may cause a significant noise nuisance during the construction phase may only be utilised during the daytime hours. ▪ All directly affected parties should be notified of any activities on site that will cause a significant noise disturbance prior to activities taking place. ▪ All blasting must be conducted during the daytime hours and all affected parties be notified prior to commencement. ▪ Regularly service equipment to ensure no unnecessary noise is emitted	To be completed post EA by relevant parties..					
OPERATIONAL PHASE						
▪ Ambient noise monitoring to be conducted at NSA 6,7 & 8 when operations commence to verify the noise emissions meet the night time noise rating limit. Mitigation measures to be implemented if the noise impact exceeds the 35dB(A) night noise rating limit such as running the turbines in low power mode at certain wind speeds at night.	To be completed post EA by relevant parties..					
DECOMMISSIONING PHASE						
▪ Staff to receive training on noise sensitivity. ▪ Monitoring of noise during the construction phase to confirm noise levels are within limits. ▪ Limit construction to daytime in order to take advantage of unstable weather conditions. ▪ Regularly service equipment to ensure no unnecessary noise is emitted	To be completed post EA by relevant parties..					

7.12 TRAFFIC IMPACTS

Impact Management Outcomes: To ensure that no more than normal deterioration and additional maintenance costs are experienced by the Road Authority during the construction and operating phases. It is required that any design affecting any Proclaimed Provincial Road must carry The Western Cape Government Transport and Public Works - Roads Department Branch's Chief Directorate Road Design's approval before implementation thereof may commence. Avoid or minimise impacts that additional traffic generation will have on the road network. Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ If abnormal loads need to be transported by road to the site, a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections (if necessary). ▪ Ensure that the requirements for use of the gravel access farm road leading to the site are addressed and considered in the design, as and where applicable. ▪ Commission a geotechnical and geometric design report, including improvement proposals, to ensure that all the roads (on the entire road network) that will be affected by this development are adequately improved and maintained before any other construction activity may commence on any of the farm portions. ▪ Confirmation that a similar geotechnical proposal (as mentioned above) will be compiled and approval obtained prior to commencing with any major upgrade or decommissioning phase; whenever that may be.	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						
▪ Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods. ▪ Stagger the construction of the turbines. ▪ The use of quarries in close proximity to the site would decrease the impact on the surrounding road network. ▪ Staff and general trips should occur outside of peak traffic periods. ▪ Design and maintenance of internal roads.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To ensure that no more than normal deterioration and additional maintenance costs are experienced by the Road Authority during the construction and operating phases. It is required that any design affecting any Proclaimed Provincial Road must carry The Western Cape Government Transport and Public Works - Roads Department Branch's Chief Directorate Road Design's approval before implementation thereof may commence. Avoid or minimise impacts that additional traffic generation will have on the road network. Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Dust generated must comply with the National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).						
OPERATIONAL PHASE						
▪ Ensure that the relevant construction mitigation and management measures are adhered to during the operation phase.	To be completed post EA by relevant parties.					
DECOMMISSIONING PHASE						
▪ Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase ▪ Stagger turbine component removal from site. ▪ Stagger the deconstruction of the turbines. ▪ The use of quarries in close proximity to the site would decrease the impact on the surrounding road network. ▪ Staff and general trips should occur outside of peak traffic periods ▪ Maintenance of haulage routes and internal roads. ▪ Fill any excavations or flatten any slopes that may form due to and during the removal of infrastructure during the decommissioning phase.	To be completed post EA by relevant parties.					

7.13 GEOHYDROLOGY

Impact Management Outcomes: To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases). To reduce the potential groundwater pollution.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ If abnormal loads need to be transported by road to the site, a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections (if necessary). ▪ Ensure that the requirements for use of the gravel access farm road leading to the site are addressed and considered in the design, as and where applicable.	To be completed post EA by relevant parties.					
CONSTRUCTION PHASE						
▪ The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be determined. This includes a Step Test, Constant Discharge Test and recovery monitoring. ▪ The boreholes should also be sampled and chemically and microbiologically analysed by a SANAS accredited laboratory. ▪ Once the boreholes are in use they should be equipped with: ▪ Observation pipes - so that the water levels can be measured (either manually or by data loggers); ▪ Flow meters – to assess how much water is used and thereby all authorisations in place for use of the water are adhered to; and ▪ Sampling tap – to enable annual sampling to ensure the groundwater is safe for continued use – especially if it is to be used as drinking water. ▪ Adhere to the borehole's safe yield and to monitor water levels and flow.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases). To reduce the potential groundwater pollution.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Avoid using damaged construction equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. ▪ Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. ▪ Vehicles should be refueled on paved (impervious) areas, optimally off-site. If off-site refueling is not possible, a designated area and impermeable surface should be established at the construction site camp for this purpose. If liquid product is being transported it must be ensured this does not spill during transit. ▪ If spillages occur during refueling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. ▪ Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage. ▪ Vehicle and washing areas must also be on paved surfaces and the by-products removed to an evaporative storage area or a hazardous waste disposal site (if the material is hazardous).						
OPERATIONAL PHASE						
▪ The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be determined. This includes a Step Test, Constant Discharge Test and recovery monitoring. ▪ Adhere to the borehole's safe yield and to monitor water levels and flow. ▪ Environmentally safe cleaning agents that breakdown naturally must be used for cleaning the panels. No chemicals that that could cause adverse effects to the natural environment should be allowed.	To be completed post EA by relevant parties.					

Impact Management Outcomes: To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases). To reduce the potential groundwater pollution.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Avoid using damaged equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. ▪ Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. ▪ Vehicles should be refueled on paved (impervious) areas, optimally off-site. If off-site refueling is not possible, a designated area and impermeable surface should be established at the facility for this purpose. If liquid product is being transported it must be ensured this does not spill during transit. ▪ If spillages occur during refueling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. ▪ Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage. ▪ Vehicle and washing areas must also be on paved surfaces and the by-products removed to a hazardous waste disposal site (if the material is hazardous).						
DECOMMISSIONING PHASE						
▪ Ensure that the relevant construction mitigation and management measures are adhered to during the decommissioning phase.	To be completed post EA by relevant parties.					

7.14 GENERIC MANAGEMENT ACTIONS TO SUPPLEMENT APPENDIX F OF THIS EMPR

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
CONSTRUCTION PHASE						
▪ The sensitivities captured in the sensitivity maps included in Appendix E of this EMPr must also be considered when placing the temporary site camp and ablution facilities. ▪ Ensure that adequate containment structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bund areas must be provided for the storage of these materials at the site camp. Leak detection monitoring systems must be implemented. ▪ Record and report all significant fuel, oil, hydraulic fluid or electrolyte spills or leaks so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle. ▪ The National Department of Environment, Forestry and Fisheries[2] and the Directorate: Pollution and Chemicals Management is to be immediately duly notified of any incident in terms of Section 30 of the National Environmental Management Act, 1998 (Act 107 of 1998), as amended (NEMA). In terms of Section 30 of NEMA, an "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property. ▪ Project Developer to register as a member of the Southern Cape Fire Protection Association (SCFPA) Consult with the Forestry: Fire Advisor Paul Gerber (044 302 6920; PaulGe@daff.gov.za) under the National Veld and Forest Fire Act (NVFFA) ▪ The Department of Human Settlements, Water and Sanitation must be immediately notified of any pollution to surface water or groundwater resources due to the proposed project activities.	To be completed post EA by relevant parties.					

[2] Now operating as the Department of Forestry, Fisheries and the Environment (DFFE)

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Portable chemical toilet/s (ablution facilities) at the construction camp, must be serviced weekly for the duration of the construction phase. ▪ A conservancy tank system at the O&M buildings should be carefully managed to limit the risk of health, aesthetic and environmental problems during operation. The following mitigation actions must be adhered to: o Care should be taken with the installation of conservancy tanks to prevent cracks that could lead to leaks over time. Proper and regular servicing must be scheduled to prevent possible groundwater contamination. o The tank must be provided with a fresh air inlet and an intercepting grease tap; o The tank must have an airtight manhole cover to allow access to the tank for the removal and safe disposal of the tank contents; o The conservancy tank must be located out of the 1:100 year flood line of any water resources of alternatively, more than 100 meters from the edge of a water resource or a borehole which is utilized for drinking water or stock watering, whichever is further. o The tank must have an airtight manhole cover to allow access to the tank for the removal and safe disposal of the tank contents. o No industrial waste or refuse may be discharged into the conservancy tank except by written agreement with the relevant authorities. o The size of the conservancy tank must be determined by both the frequency of removal of its contents to the local Wastewater Treatment Works and by the quantity of sewage anticipated from the proposed Kwagga WEF project. Written confirmation must be obtained from the local municipality stating that it will provide the service of removal of the tank contents. o The content of the tank must be removed by a vacuum tanker ad conveyed to a local Wastewater Treatment Works that is capable of processing the volume and contents of the conservancy tank. On-going written confirmation must also be obtained from the local municipality and retained as proof that the contents of the conservancy tank has been received for the proper treatment at the said wastewater treatment works.						

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ A contingency plan must be draw up to protect against overflow of the conservancy tank. A sump or lined pond can be designed below the conservancy tank to contain any overflows. ○ Ingress of stormwater into the conservancy tank must be prevented. ○ A detailed geotechnical Investigation must be done to determine the most appropriate location of the conservancy tank. ▪ Ensure that regular audits (i.e. twice weekly) of water systems and all water-related infrastructure (e.g. pipes, pumps, reservoirs, toilets, taps, etc.) are conducted to identify possible water leakages. Such infrastructure must be immediately repaired ▪ Suitable emergency and safety signage is to be provided on-site, and any areas which may pose a safety risk (including hazardous substances), clearly demarcated. Emergency numbers for the local police, fire department, Eskom and the local municipality must be placed in a prominent clearly visible area on-site. ▪ Ensure that the contact details of the local municipality, Eskom and emergency response officials, such as the police and fire department are kept on file and clearly sign-posted on site. ▪ Ensure staff onsite are trained on how to deal with the clean-up of a hazardous substance ▪ Ensure that an open communication strategy is created and maintained between the Project Developer, Contractor and owners (or managers) of the adjacent farms. Portable chemical toilet/s (ablution facilities) at the construction camp, must be serviced. ▪ Dust generated must comply with the National Dust Control Regulations (Government Notice No. R. 827 of 1 November 2013) promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004						
OPERATIONAL PHASE						
▪ Ensure that the relevant construction mitigation and management measures are adhered to during the operation phase.	To be completed post EA by relevant parties.					
DECOMMISSIONING PHASE						

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions (these apply to the Project footprint area and the access roads on site)	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Ensure that the relevant construction mitigation and management measures are adhered to during the decommissioning phase.	To be completed post EA by relevant parties.					

APPENDIX A – CV OF THE EAP

CV OF LIZANDE KELLERMAN

Full Name:	Millicent Johanna Susanna (Lizande) Kellerman
Firm	Council for Scientific and Industrial Research (CSIR)
Profession:	Principal Environmental Assessment Practitioner
Years' experience:	12 years
Nationality:	South African
Languages:	Afrikaans and English
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BIO-SKETCH:

Lizande Kellerman is a Principal EAP and scientist at the CSIR in Stellenbosch, with more than 10 years of experience in environmental impact studies, primarily in the planning, preparation and management of BAs, EIAs, and SEAs, as well as EMPrs, Screening/Fatal Flaw Studies, Biodiversity Risk Assessments, Biodiversity Resource Assessments and license applications for agriculture, atmospheric emissions, water use, waste management, mining, bioprospecting and biodiversity permitting, for numerous projects in the agricultural (including aquaculture), construction, conservation, mining and renewable energy sectors.

Lizande holds a BSc degree in Zoology and Entomology, with an Honours and Masters in Botany both at the University of Pretoria. She is currently working towards completing her PhD in Conservation Ecology. She commenced work at the CSIR in 2012 after spending three years working as an environmental scientist in the private sector. She has published several articles, both peer reviewed scientific and popular, and presented at five international conferences. She has also lectured on biodiversity, ecological and EIA at various universities in South Africa. Her training and experience as a qualified terrestrial ecologist has enabled her to provide expert input into ecological impact assessments and to perform specialist reviews of various terrestrial biodiversity and ecology impact assessments as part of BAs, EIAs and SEA.

Lizande is a registered Professional Natural Scientist (400046/10) with the South African Council for Natural Scientific Professions (SACNASP).

PROJECT EXPERIENCE RECORD

The following table presents a sample of key projects that Lizande Kellerman has undertaken to date:

Completion Date	Project description	Role	Client
2020 - 2021	Basic Assessments for the proposed development of the 810 MW Rinkhals Solar PV energy facilities 1-7 and associated infrastructure near Kimberley, Northern Cape and Free State	Project Leader and Environmental Assessment Practitioner	ABO Wind renewable energies (Pty) Ltd
2020 - 2021	Scoping and EIA for the proposed development of the 825 MW Kwagga Wind Energy Facilities 1-3 and associated infrastructure near Beaufort West in the Western Cape	Project Leader and Environmental Assessment Practitioner	ABO Wind renewable energies (Pty) Ltd
2021 - 2022	Landscaping and development of educational walkways with teaching materials at the CSIR Science Centre in Cofimvaba, Eastern Cape Province	Project Manager and Environmental Assessment Practitioner	Department of Science and Innovation (previously DST)
2020	A Desktop Fatal Flaw Assessment of the property affected by the proposed development of a solar photovoltaic (PV) energy facility near Windmeul, Western Cape (i.e. Project Suikerbekkie)	Project Manager and Principal Author	ABO Wind renewable energies (Pty) Ltd
2020	A Desktop Fatal Flaw Assessment of the properties affected by the proposed development of two solar photovoltaic (PV) energy facilities near Kimberley, Northern Cape (i.e. Project Rinkhals) and Vryburg in the North West (i.e. Project Skilpad)	Project Manager and Principal Author	ABO Wind renewable energies (Pty) Ltd
2020	A Desktop Fatal Flaw Assessment of the properties affected by the proposed development of two solar photovoltaic (PV) energy facilities near Kimberley, Free State Province (i.e. Project Rinkhals 1 and Project Rinkhals 2)	Project Manager and Principal Author	ABO Wind renewable energies (Pty) Ltd
2019 – 2020	Environmental compliance and performance improvement for the foundry industry of South Africa: Phase 1 – Status Quo Assessment	Project Manager and Principal author	National Cleaner Production Centre of South Africa
2016 – 2019	Strategic Environmental Assessment for Marine and Freshwater Aquaculture Development in South Africa	Project Manager, Principal Author and Report Editor	Department of Environmental Affairs and Department of Agriculture, Forestry and Fisheries
2019	Risk Assessment with Alien and Invasive Species Permit Application Process for the EA1TM Dust Suppressant	Environmental Assessment Practitioner	Earth Alive Clean Technologies Inc.
2019	Environmental Screening Study for the proposed Wool Scouring Facility on Erf 3476 at Mount Fletcher in the Elundini Local Municipality, Eastern Cape Province	Project Manager and Environmental Assessment Practitioner	CSIR Advanced Agriculture and Food Division
2019 - 2020	Water Use License Application Process for the Vryburg Solar 1 (Pty) Ltd Photovoltaic Energy Facility and Supporting Electrical Grid Infrastructure near Vryburg, North West Province	Project Manager and Environmental Assessment Practitioner	ABO Wind renewable energies (Pty) Ltd
2019 - 2020	Water Use License Application Processes for the Kuruman Phase 1 and Phase 2 Wind Energy Facilities and Supporting Electrical Grid Infrastructure near Kuruman, Northern Cape Province	Project Manager and Environmental Assessment Practitioner	Mulilo Renewable Project Developments (Pty) Ltd
2019	National Coastal Climate Change Vulnerability Index Assessment	Public Participation Practitioner	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
2018 – 2019	Strategic Environmental Assessment for the Identification of Energy Corridors, as well as Assessment and Management Measures for the Development of a Phased Gas Pipeline Network in South Africa: Biodiversity and Ecology Specialist Assessment including Terrestrial and Aquatic Ecosystems, and Species of the Desert, Nama Karoo & Succulent Karoo Biomes	Specialist Input and Principal Author	Department of Environmental Affairs, Eskom and iGas

Completion Date	Project description	Role	Client
2018	The Implementation of the Development of an Ecological Infrastructure Investment Framework (EIIF) and an Alien Invasive Species Strategy (AISS) for the Western Cape Province	Public Participation Practitioner	Western Cape Department of Environmental Affairs and Development Planning
2018	Basic Assessment for the proposed development of the 325 MW Kudusberg Wind Energy Facility and associated infrastructure between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces: Terrestrial Ecology Specialist Study	Specialist Input and Contributing Author	G7 Renewable Energies (Pty) Ltd
2018	Development of a Biodiversity Economy Transformation Strategy for the North West Province, South Africa	Specialist Input and Contributing Author	North West Rural, Environment and Agricultural Development
2018	Bioprospecting, biotrade and biodiversity permitting applications for Boscia albitrunca, as part of a Feasibility Study on Motlopi coffee, North West	Project Manager and Environmental Assessment Practitioner	North West Finance, Economy and Enterprise Development
2017 – 2018	Environmental Impact Assessment for Kuruman Wind Energy Facilities Phase 1 and Phase 2 near Kuruman, Northern Cape	Project Manager and Environmental Assessment Practitioner	Mulilo Renewable Project Developments (Pty) Ltd
2017 – 2018	Basic Assessment for supporting electrical infrastructure for the Kuruman Wind Energy Facilities Phase 1 and Phase 2 near Kuruman, Northern Cape	Project Manager and Environmental Assessment Practitioner	Mulilo Renewable Project Developments (Pty) Ltd
2012 – 2016	Bioprospecting beneficiation and implementation of the Nourivier Medicinal Plants Project at Nourivier, Northern Cape	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2012 – 2016	Bioprospecting beneficiation and implementation of the Witdraai Medicinal Plants Project at Andriesvale, Northern Cape	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2012 – 2016	Bioprospecting beneficiation and implementation of the Letsemeng Medicinal Plants Project at Petrusburg, Free State	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2013 – 2016	Bioprospecting beneficiation and implementation of the Abbey Medicinal Plants Project near Madibeng, Northern Cape	Project Manager, Environmental Scientist	Department of Science and Technology (DST)
2013 – 2016	Bioprospecting beneficiation and implementation of the Driekop Essential Oils and Moringa Project near Burgersfort, Limpopo	Project Manager, Environmental Scientist	Department of Rural Development and Land Reform (DRDLR)
2013 – 2014	Resource assessment, including bioprospecting, biotrade and biodiversity permitting applications for *Elephantorrhiza elephantina*, Northern Cape	Project Manager, Environmental Scientist	DST and CSIR Biosciences
2009 – 2010	Environmental screening and legal compliance of the Sidasoas Essential Oils (Rose Geranium) project near Onseepkans, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2010	Environmental screening and legal compliance of the Pelsan Essential Oils (Rose Geranium) project near Pella, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2010	Environmental screening and legal compliance of the Oppermans Essential Oils (Rose Geranium) project near Maubane, North West	Environmental Scientist	DST and CSIR ECD
2009 – 2010	Section 24G Rectification Application for the Sidasoas Essential Oils (Rose Geranium) project near Onseepkans, Northern Cape	Environmental Scientist	DST and CSIR ECD

Completion Date	Project description	Role	Client
2009 – 2011	Bioprospecting beneficiation, environmental screening and legal compliance of the Nourivier Medicinal Plants Project at Nourivier, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2011	Bioprospecting beneficiation, environmental screening and legal compliance of the Witdraai Medicinal Plants Project at Witdraai, Northern Cape	Environmental Scientist	DST and CSIR ECD
2009 – 2010	EIA and Waste Management License Application at the Kumba Iron Ore Mine at Sishen, Northern Cape	Project Manager and EAP	Anglo American / Kumba Iron Ore
2009 – 2010	EIA for the development of the new Veremo Magnetite Mine near Stoffberg, Mpumalanga	Project Manager and EAP	Veremo Holdings / Kermas Limited
2009 – 2010	EIA for the proposed construction and upgrades of roads on various properties east of Orange Farm and west of the R82, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the proposed establishment of the new head office complex for the National Department of Land Affairs (DLA) as part of a public private partnership process, Pretoria, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the proposed construction of the internal road network and associated storm water pipes at Flamingo Park X2, Welkom, Free State	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the proposed construction of an access road and a sewer pipeline for the use of the proposed Gautrain Visitors Centre, Midrand, Gauteng	Project Manager and EAP	Bombela Consortium
2009 – 2010	BA for the proposed residential development and associated infrastructure on Erf 7402 and Erf 19642, Mamelodi-West, City of Tshwane, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	BA for the MTN Fibre Optic Deployment along roads R21 and R101, Gauteng	Project Manager and EAP	MTN Group Limited
2009 – 2010	BA and Waste Management License Application for the establishment of Phase 1 of the proposed provision of Bulk Water Supply Infrastructure and Purified Water Supply, Jozini, Kwa-Zulu Natal	Project Manager and EAP	PD Naidoo and Associates
2009 – 2010	BA for the proposed housing development situated on Klipspruit Ext 11, a portion of the remaining extent of the Farm Freehold 389 IQ, Gauteng	Project Manager and EAP	Basil Read (Pty) Ltd
2009 – 2010	Environmental Management Plan for the Blouberg Local Municipality, Capricorn District, Limpopo	Project Manager and EAP	Capricorn District Municipality
2009 – 2010	Environmental Fatal Flaw Assessment for the proposed development of the Statistics South Africa Head Office Complex: Persequor Park, Gauteng	Project Manager and EAP	Eco-Agent CC
2009 – 2010	Environmental Fatal Flaw Assessment for the proposed development of the Statistics South Africa Head Office Complex: Salvokop, Gauteng	Project Manager and EAP	Eco-Agent CC

EMPLOYMENT RECORD

- CSIR Environmental Management Services (EMS) — Apr 2016 – present
- CSIR Enterprise Creation for Development (ECD) — Jan 2012 – Mar 2016
- Midrand Graduate Institute — Jan 2011 – Dec 2011
- Polygon Environmental Planning cc — Jan 2011 – Dec 2011
- The MSA Group (Environmental, Legal and Mining Services) — Apr 2009 – Dec 2010
- Department of Botany, University of Pretoria — Aug 2003 – Mar 2009

QUALIFICATIONS

- 2006 University of South Africa (Postgraduate Certificate for Higher Education and Further Training)
- 2004 University of Pretoria MSc *Cum Laude* (Botany)
- 2001 University of Pretoria BSc Honours (Botany)
- 2000 University of Pretoria BSc (Zoology and Entomology)

SHORT-COURSES / WORKSHOPS

- 2015 Finances for Non-Financial Managers, CSIR Innovation Leadership & Learning Academy, Pretoria.
- 2014 IWRM, the NWA, and Water Use Authorisations, focusing on Water Use License Applications – Procedures, Guidelines, IWWMP's and Monitoring, Carin Bosman Sustainable Solutions, Pretoria.

CONFERENCE PRESENTATIONS & PAPER PUBLICATIONS

INTERNATIONAL CONFERENCES

- **Kellerman, L.** Snyman-Van der Walt, L., Morant, P., Mashabela, K. & Lochner, P. (2017). Progress on the Strategic Environmental Assessment (SEA) for aquaculture development in South Africa. International Association for Impact Assessment – South Africa Conference 2017, Rawsonville, Western Cape Province.
- **Kellerman, L.** Snyman-Van der Walt, L., Morant, P., Mashabela, K. & Lochner, P. (2017). National Strategic Environmental Assessment (SEA) for aquaculture development in South Africa – A synopsis of the current marine and freshwater aquaculture environment and the need to promote sustainable growth and incentivisation. World Aquaculture Conference 2017, Cape Town, Western Cape Province.
- **Kellerman, L.** (2012). Success with Technology Transfer activities within the context of Enterprise Development that generate Social and Economic Development Opportunities. Conference on Innovation for Poverty Alleviation: South Africa - European Union Summit, Brussels, Belgium.
- **Kellerman, L.** (2012). New Medicinal Plants Demonstration Agronomy. European Union's Conference for Sector Budget Support. Department of Science and Technology, Roodevallei, Pretoria, Gauteng Province.
- **Kellerman, L.** (2012). Wild-harvesting for Commodity Beneficiation. European Union's Conference for Sector Budget Support. Department of Science and Technology, Roodevallei, Pretoria, Gauteng Province.

NATIONAL CONFERENCES

- **Kellerman, L.** & Moeng, E. (2013). Technology transfer to facilitate the sustainable cultivation harvesting and processing of arid zone indigenous plants. Annual Conference of the Indigenous Plant Use Forum, Agricultural Research Council, Nelspruit, Mpulamalanga Province.
- **Kellerman, L.** (2012). Capitalizing on South Africa's Indigenous Plants – Demonstration agro-processing for social impact. Annual Conference of the Indigenous Plant Use Forum, University of Venda, Thohoyandou, Limpopo Province.
- **Kellerman, M.J.S.**, Strobach, M. & Van Rooyen, M.W. (2008). Comparison of leaf trait spectra of two contrasting southern African environments. Annual Conference of South African Association for Botanists, Drakensville, Free State Province.
- Strobach, M, **Kellerman, M.J.S.** & Van Rooyen, M.W. (2008). Comparison of leaf functional types of two contrasting southern African environments. Annual Conference of South African Association for Botanists, Drakensville, Free State Province.
- **Kellerman, M.J.S.** & Grote, W. (2007). The Tswaing Crater… A blast from the past. 10th Annual Conference of the South African Association for Science and Technology Centres, Bayworld, Port Elizabeth, Eastern Cape Province.
- **Kellerman, M.J.S.** & Van Rooyen, M.W. (2006). Plant diversity in old fields of various ages in the Upland Succulent Karoo, South Africa. Arid Zone Ecology Forum, Kamieskroon, Northern Cape Province.
- **Kellerman, M.J.S.** & Van Rooyen, M.W. (2002). Seed bank dynamics of selected habitat types in the Tembe Elephant Park, Maputaland. Annual Conference of South African Association for Botanists, Rhodes University, Eastern Cape Province.

SCIENTIFIC BOOKS / JOURNAL PUBLICATIONS

- **Kellerman, L.** & Wild, S. (2015): A 'happy pill' to boost rural economies. – In: Wild, S. (Author), Fraser, S. [Editor]: Innovation – Shaping South Africa Through Science. Part 3: pp. 113-120, Pac Macmillan South Africa, in association with the Gordon Institute of Business Science, University of Pretoria.

- Wesuls, D., Strohbach, M., Horn, A., Kos, M., Zimmermann, J., Hoffmann, J., Geldenhuys, C., Dreber, N., **Kellerman, L.**, van Rooyen, M. W., Poschlod, P. (2010): Plant functional traits and types as a tool to analyse landuse impacts on vegetation. – In: Schmiedel, U., Jürgens, N. [Eds.]: Biodiversity in southern Africa. Volume 2: Patterns and processes at regional scale: pp. 222–232, Klaus Hess Publishers, Göttingen & Windhoek.
- **Kellerman, L** & Van Rooyen, G. (2009). Can time heal the old fields of the Kamiesberg? Veld & Flora 95(2): 78-81.
- **Kellerman, M.J.S.** & Van Rooyen, M.W. (2007). Seasonal variation in soil seed bank size and species composition of selected habitat types in Maputaland, South Africa. Bothalia 37,2: 249-258.
- Van Rooyen, M.W., Tosh, C.A., Van Rooyen, N., Matthews, W.S. & **Kellerman, M.J.S.** (2004). Impact of harvesting and fire on *Phragmites australis* reed quality in Tembe Elephant Park, Maputaland. Koedoe 47(1): 31-40.
- Steenkamp, Y., **Kellerman, M.J.S.** & Van Wyk, A.E. (2001). Fire, frost, waterlogged soil or something else: What selected for the Geoxylic Suffrutex growth form in Africa? Plantlife 25: 4-6.

MEDIA INTERVIEWS / PUBLICATIONS

- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published online at the Landbouweekblad on 26 May 2017. http://www.landbou.com/nuus/help-die-wnnr-met-nylkurper-opname/
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published in the Farmersweekly Magazine on 09 June 2017.
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published in the Stywe Lyne/Tight Lines Magazine, Issue 690 in August 2017.
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published online at the CSIR website on 26 June 2017. https://www.csir.co.za/csir-calls-public-participate-rapid-citizen-science-survey/
- **L Kellerman**, article on the Nile Tilapia Citizen Science Survey for the Aquaculture SEA published online at the DEA website in July 2017. https://www.environment.gov.za/projectsprogrammes/operationphakisa/oceanseconomy/
- **Kellerman, L**. (2015). Landbou – Kougoed. kykNet – Dagbreek television show.
- Interviewed by Wild, S. (2015). Bushmen cure – all's prospects hit a new high. Mail & Guardian Newspaper, pp: 26-27.
- Interviewed by Mostert, M. (2015). Kougoed-projek in Nourivier. Die Plattelander Newspaper, pp: Annexure.
- Interviewed by Smith, M. (2015). Geld te maak uit Kougoed, Jantjie-Bêrend. Landbouweekblad Magazine, pp: 28.
- **Kellerman, L**. (2014). Kougoed (*Sceletium tortuosum*) Medicinal Plants Project in Nourivier. SKEP eNews – www.skep.org.za
- Interviewed by Van Rooyen, B. (2014). Reaping rewards from South Africa's botanical riches. – In: Improving lives – Careers at the CSIR. ScienceScope, Volume 7(1), pp: 38-39. Publication of the Council for Scientific and Industrial Research, Pretoria.
- Interviewed by Van Rooyen, B. (2014). Successful cultivation of medicinal plants in the Kalahari generates work for hundreds. CSIR eNews – Enterprise Creation for Development.
- Interviewed by Van Rooyen, B. (2012). Local succulents yield natural, calmative agent. CSIR eNews – Enterprise Creation for Development.
- Interviewed by Van Rooyen, B. (2012). Mr Derek Hanekom visits DST-funded projects in the Northern Cape. CSIR eNews – Enterprise Creation for Development.

LANGUAGE CAPABILITY

	Speaking	**Reading**	**Writing**
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

PROFESSIONAL REGISTRATIONS / MEMBERSHIPS

- Professional Natural Scientist (Pr.Sci.Nat. Number 400076/10 – Botanical Sciences) with the SACNASP
- International Association of Impact Assessment South Africa (IAIAsa) – Registration number: 343955
- Botanical Society of South Africa (BotSoc) – Registration Number: S01/58657

APPENDIX B – ROLES AND RESPONSIBILITIES

Responsible Person(s)	Role and Responsibilities
Developer's Project Manager (DPM)	Role The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports

Responsible Person(s)	Role and Responsibilities
	submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; and

Responsible Person(s)	Role and Responsibilities
	- Communication of all modifications to the EMPr to the relevant stakeholders.

developer Environmental Officer (dEO)	Role
	The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.
	
	Responsibilities
	- Be fully conversant with the EMPr;
	- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
	- Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s);
	- Confine the development site to the demarcated area;
	- Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO);
	- Assist the contractors in addressing environmental challenges on site;
	- Assist in incident management:
	  - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared;
	  - Assist the contractor in investigating environmental incidents and compile investigation reports;
	  - Follow-up on pre-warnings, defects, non-conformance reports;
	  - Measure and communicate environmental performance to the Contractor;
	  - Conduct environmental awareness training on site together with ECO and cEO;
	  - Ensure that the necessary legal permits and / or licenses are in place and up to date; and
	  - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor.

Contractor	Role The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones;

Responsible Person(s)	Role and Responsibilities
	- ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: Responsibilities - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

APPENDIX C – CHANCE FIND PROCEDURE FOR PALAEONTOLOGICAL RESOURCES

- **MONITORING**

A constant monitoring presence over the period during which excavations for developments are made, by either an archaeologist or palaeontologist, is generally not practical.

The field supervisor/foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossil and buried archaeological material. Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the ECO. The ECO will inform the archaeologist and/or palaeontologist contracted to be on standby in the case of fossil finds.

To this end, responsible persons must be designated. This will include hierarchically:

- The field supervisor/foreman, who is going to be most often in the field.
- The Environmental Control Officer (ECO) for the project.
- The Project Manager/Site Agent.

- **RESPONSE BY PERSONNEL IN THE EVENT OF FOSSIL FINDS**

In the process of excavation fossils may be spotted in the hole sides or bottom, or as they appear in excavated material on the spoil heap.

- Stop work at fossil find. The site foreman and ECO must be informed.
- Protect the find site from further disturbance and safeguard all fossil material in danger of being lost such as in the excavator bucket and scattered in the spoil heap.
- The ECO or site agent must immediately inform the SAHRA and/or the contracted standby palaeontologist of the find and provide via email the information about the find, as detailed below.
    - Date.
    - Position of the excavation (GPS) and depth.
    - A description of the nature of the find.
    - Digital images of the excavation showing vertical sections (sides) and the position of the find showing its depth/location in the excavation.
    - A reference scale must be included in the images (tape measure, ranging rod, or object of recorded dimensions).
    - Close-up, detailed images of the find (with scale included).

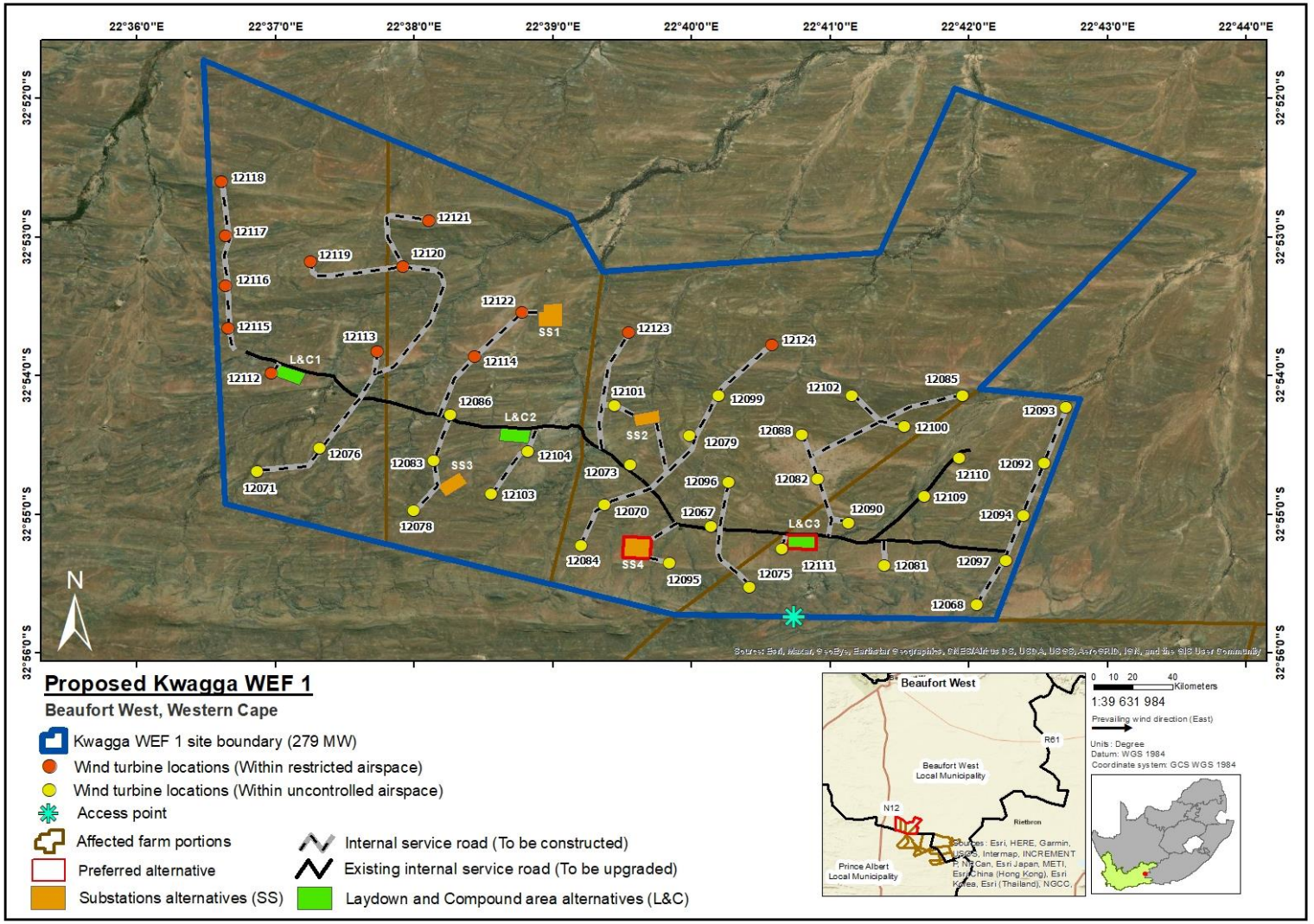
The SAHRA and/or the contracted standby palaeontologist will assess the information and a suitable response will be established which will be reported to the developer and the ECO, such as whether rescue excavation or rescue collection by a palaeontologist is necessary or not. The response time/scheduling of the rescue fieldwork is to be decided in consultation with developer/owner and the ECO. It will probably be feasible to “leapfrog” the find and proceed to the next excavation, or continue a trench excavation farther along, so that the work schedule and machine time is minimally disrupted. The strategy is to rescue the material as quickly as possible.

- **APPLICATION FOR A PERMIT TO COLLECT FOSSILS**

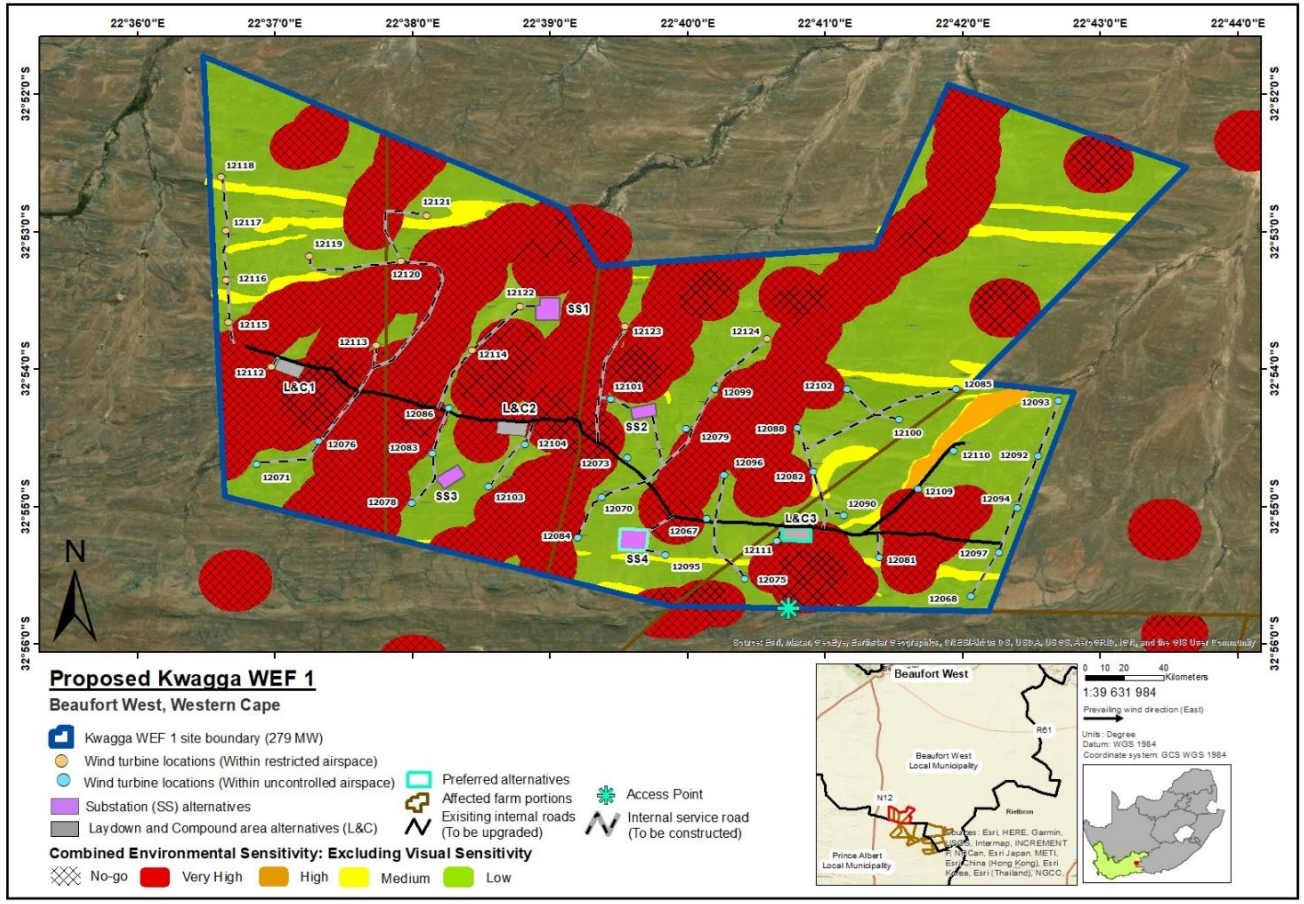
A permit from SAHRA is required to excavate fossils. The applicant should be the qualified specialist responsible for assessment, collection and reporting (palaeontologist). Should fossils be found that require rapid collecting, application for a palaeontological permit must immediately be made to SAHRA. All fossils must be deposited at a SAHRA-approved institution. In addition to the information and images of the find, the application requires details of the registered owners of the sites, their permission and a site-plan map.

<table>
<tr><td colspan="3">KWAGGA WIND ENERGY FACILITIES 1-3 located south of Beaufort West</td></tr>
<tr><td>Province & region:</td><td colspan="2">Western Cape (Central Karoo District): Beaufort West and Prince Albert Local Municipalities</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">Heritage Western Cape (Contact details: Heritage Western Cape. 3rd Floor Protea Assurance Building, 142 Longmarket Street, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 021 483 5959 Email: ceoheritage@westerncape.gov.za)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Abrahamskraal & Teekloof Formations (Lower Beaufort Group), Late Caenozoic alluvium</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Fossil vertebrate bones, teeth, trace fossils, trackways, petrified wood, plant-rich beds in the Lower Beaufort Group bedrocks.
Fossil mammal bones, teeth, horn cores, freshwater molluscs, plant material in Late Caenozoic alluvium.</td></tr>
<tr><td rowspan="4">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>

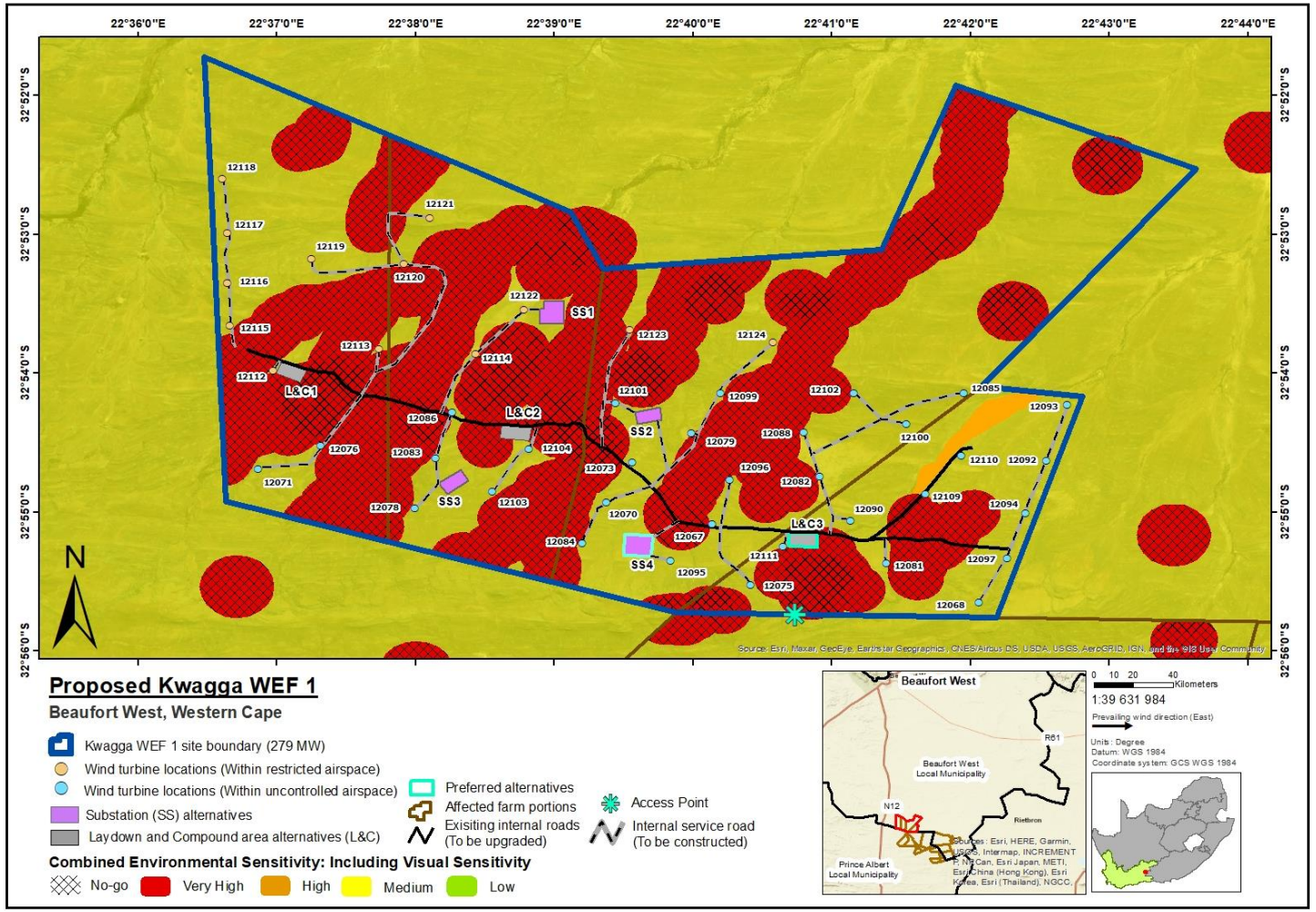
APPENDIX D – SITE LAYOUT



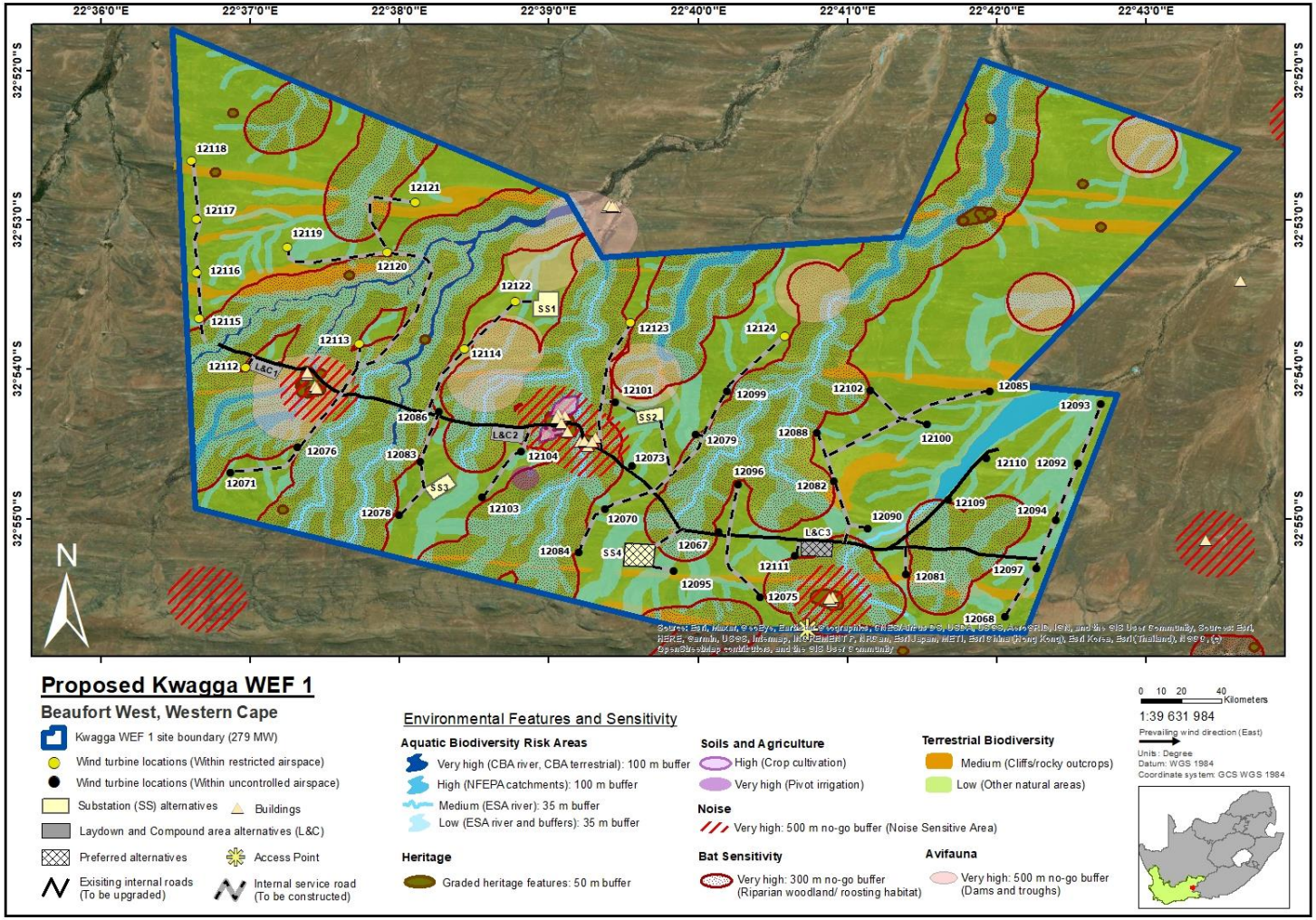
APPENDIX E –COMBINED LAYOUT AND SENSITIVITY MAP



APPENDIX E-1. Combined sensitivity map of the proposed Kwagga WEF 1 site (excluding visual sensitivity)



APPENDIX E-3. Combined sensitivity map of the proposed Kwagga WEF 1 site (including visual sensitivity)



APPENDIX E-3. Environmental features and sensitivity map of the proposed Kwagga WEF 1 site.

APPENDIX F – PRE-APPROVED GAZETTED EMPR FOR SUBSTATION DEVELOPMENT (GN 435

PRE-APPROVED GENERIC EMPR TEMPLATE FOR SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY GOVERNMENT GAZETTE 42323, GOVERNMENT NOTICE 435

SECTION 5: IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1. Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following:						

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available; – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2. *Site Establishment development*

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas;						

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.						

5.3. Access restricted areas

Impact management outcome: Access to restricted areas prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.						

5.4. Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition; – All contractors must be made aware of all these access routes; – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimise further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor;						

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands; – Access roads must only be developed on a pre-planned and approved roads.						

5.5. Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities. – Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable; – Any temporary fencing to restrict the movement of livestock must only be erected with the permission of the landowner; – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6. Water Supply Management

Impact management outcome: Undertake responsible water usage**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it an does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction o water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of th downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; c. Including a discussion on water usage and conservation durin environmental awareness training; and d. The use of grey water is encouraged.						

5.7. Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.						

5.8. Solid and hazardous waste management

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site.						

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Certificates of safe disposal for general, hazardous and recycled waste must be maintained.						

5.9. Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland; – No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access); – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; b) No altering of the bed, banks, course or characteristics of a watercourse; c) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; d) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and e) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10. Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; – Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.						

5.11. Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.						

5.12. Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.						

5.13. Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.;						

– All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.						

5.14. Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: – Toilets are located no closer than 100 m to any watercourse or water body; – Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; – No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; – Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; – Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; and – Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards. – A copy of the waste disposal certificates must be maintained.						

5.15. Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area;						

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.						

5.16. Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).						

5.17. Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements;						

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner. – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; – The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall); – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; – An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning						

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
storm and wastewater management and **5.*8*** for ***solid and hazardous waste management.***						

5.18. Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance Section ***5.7: Storm and wastewater management***.						

5.19. Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water;						

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Dirty water from the batching plant must be contained to prevent soil and groundwater contamination; – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***); – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20. Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;						

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21. Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and – Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.						

5.22. Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.						

5.23. Fire prevention

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site. – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two-way swop of contact details between ECO and FPA.						

5.24. Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.						

5.25. Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards.						

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.						

5.26. Excavation of foundation, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.						

5.27. Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and						

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be disposed of in accordance with **Section *5.8: Solid waste and hazardous management***.						

5.28. Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section **5*.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and – Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.29. Steelwork Assembly and Erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – Emergency repairs due to breakages of equipment must be managed in accordance with ***Section 5. 18: Workshop, equipment maintenance and storage*** and ***Section 5.16: Emergency procedures***.						

5.30. Cabling and Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section *5.8: Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section 5*.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.						

5.31. Testing and Commissioning (all equipment testing, earthing system, system integration)

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.32. Socio-economic

Impact management outcome: enhanced socio-economic development.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents – Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.33. Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.34. Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays; – All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and						

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Disposal of unusable material must be at a licensed waste disposal site.						

5.35. Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled;						

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil; – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area.						

6. ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.