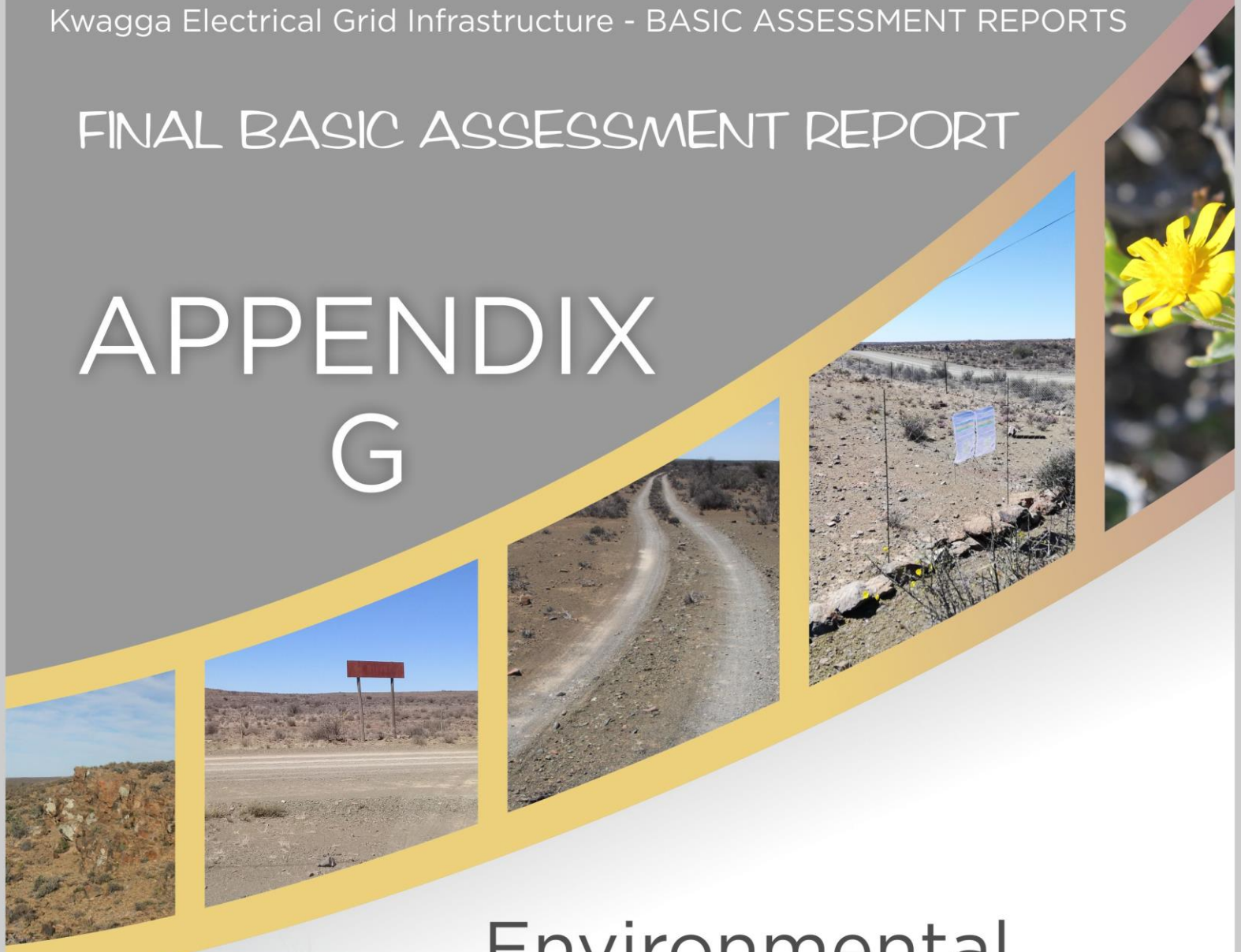
FINAL BASIC ASSESSMENT REPORT

APPENDIX G



Environmental Management Programme (EMPr) for the Powerlines

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1 INTRODUCTION

The National DFFE has granted Environmental Authorisation (EA) for the proposed Kwagga WEF 1 (DFFE Ref: 14-12-16-3-3-2-2070), Kwagga WEF 2 (DFFE Ref: 14-12-16-3-3-2-2071) and Kwagga WEF 3 (DFFE Ref: 14-12-16-3-3-2-2072) projects on 7 April 2022 i.e. one for each WEF and its associated infrastructure. The Scoping and EIA (S&EIA) processes that were undertaken for the abovementioned three WEFs extended from May 2021 to April 2022. The three Kwagga WEFs and its supporting electrical grid infrastructure is situated approximately 60 km south of Beaufort West in the Western Cape Province.

In order to facilitate the connection of the proposed authorised Kwagga WEF 1, Kwagga WEF 2 and Kwagga WEF 3 projects to the national electrical grid network, the Project Applicant, ABO Wind renewable energies (Pty) Ltd ("ABO Wind") is proposing the construction of seven 132 kilovolt (kV) overhead transmission powerlines and its associated electrical grid infrastructure between the proposed authorised Beaufort West 132 kV-400 kV Linking Station (DFFE Ref: 14-12-16-3-3-2-925-1) and the aforementioned WEFs, via the proposed authorised Eskom 132 kV Switching Substation (DFFE Ref: 14-12-16-3-3-1-2465/AM1). It is anticipated that the electricity generated by the proposed authorised Kwagga WEFs will be evacuated via these proposed 132 kV overhead transmission powerlines into the existing Droërivier–Proteus 400 kV overhead transmission powerline that runs parallel to the N12 in a north-south direction.

It is understood that the proposed authorised Eskom 132 kV Switching Substation and the proposed authorised Beaufort West 132 kV-400 kV Linking Station will be constructed by South Africa Mainstream Renewable Power Developments (Pty) Ltd ("Mainstream") in support of their proposed authorised Beaufort West WEF and Trakas WEF that are to be located on land directly adjacent to the proposed authorised Kwagga WEFs 1-3 (refer to Figure 1 below).

The Project Applicant has discussed a servitude agreement and obtained relevant powers of attorney with the landowner of the relevant Beaufort West and Trakas WEFs affected land portions and obtained agreement with Mainstream to facilitate the connection of the proposed authorised Kwagga WEFs 1-3 via 132 kV overhead transmission powerlines, via the aforementioned Eskom 132 kV Switching Substation and the Beaufort West 132 kV-400 kV Linking Station, to the existing Droërivier–Proteus 400 kV overhead transmission powerline that is located westwardly of the N12.

The electrical grid infrastructure (EGI) component i.e. the application for these proposed 132 kV overhead transmission powerlines required for the three proposed authorised Kwagga WEF projects did not form part of the S&EIA processes that were undertaken for each of the three WEFs during 2021. Therefore, in order to facilitate the connection of the Kwagga WEFs 1-3 to the Droërivier–Proteus 400 kV, the following **seven** 132 kV overhead transmission powerline projects and associated infrastructure are being proposed and assessed (Also referred to as Section 1 to 7 of the proposed Kwagga EGI corridor):

- Project 1 - 132 kV overhead transmission powerline between the proposed authorised Beaufort West 132 kV-400 kV Linking Station and the proposed authorised Eskom 132 kV Switching Station (i.e., **Kwagga EGI Section 1**) – this powerline facilitates connection of Kwagga WEF 1, Kwagga WEF 2 and Kwagga WEF 3;
- Project 2 - 132 kV overhead transmission powerline between the proposed authorised Beaufort West 132 kV-400 kV Linking Station and the Kwagga WEF 1 (i.e., **Kwagga EGI Section 2**) – this

powerline facilitates connection of Kwagga WEF 1, as well as Kwagga WEF 2 and Kwagga WEF 3 (where Kwagga WEF 1 on-site substation is used as collector)[1];

- Project 3 - 132 kV overhead transmission powerline between the proposed authorised Beaufort West 132 kV-400 kV Linking Station and the Kwagga WEF 2 (i.e., **Kwagga EGI Section 3**) – this powerline facilitates connection of Kwagga WEF 2, as well as Kwagga WEF 3 (where Kwagga WEF 2 on-site substation is used as a collector)[1];
- Project 4 - 132 kV overhead transmission powerline between the proposed authorised Beaufort West 132 kV-400 kV Linking Station and the Kwagga WEF 3 (i.e., **Kwagga EGI Section 4**) – this powerline facilitates connection of Kwagga WEF 3[1];
- Project 5 - 132 kV overhead transmission powerline between the proposed authorised Kwagga WEF 1 and the proposed authorised Kwagga WEF 2 (i.e., **Kwagga EGI Section 5**) - this powerline facilitates connection of Kwagga WEF 2;
- Project 6 - 132 kV overhead transmission powerline between the proposed authorised Kwagga WEF 1 and the proposed authorised Kwagga WEF 3 (i.e., **Kwagga EGI Section 6**) - this powerline facilitates connection Kwagga WEF 3; and
- Project 7 - 132 kV overhead transmission powerline between the proposed authorised Kwagga WEF 2 and the proposed authorised Kwagga WEF 3 (i.e., **Kwagga EGI Section 7**) – this powerline facilitates connection Kwagga WEF 3.

It is proposed that each of the three Kwagga WEFs will have a dedicated 132 kV overhead powerline that will connect each WEF to the Droërivier–Proteus 400 kV line via the Eskom Switching Substation and the Beaufort West 132 kV-400 kV Linking Station. Overhead powerlines between each of the Kwagga WEFs have also been proposed. This will ensure that each WEF is a viable stand-alone project. The above approach also ensures that any two of the three proposed Kwagga WEFs can connect to the Droërivier–Proteus 400 kV powerline, as this approach accommodates for the potential scenario in the event that only one or two of the three proposed authorised Kwagga WEFs receive preferred bidder status in terms of the REIPPPP or other private or government-run tender process, and therefore will materialise from a construction perspective. This approach is based on the worst-case scenario (i.e. assessment of seven separate 132 kV overhead transmission powerlines). It has also been structured accordingly to meet the requirements of the REIPPPP which requires separate EAs.

The seven proposed Kwagga 132 kV overhead transmission powerlines (i.e., Kwagga EGI Sections 1 to 7) projects will be located approximately 60 km south of the Beaufort West town in the Western Cape Province. The entire powerline corridor traverses both the Prince Albert Local Municipality and the Beaufort West Local Municipality, with the exception of the Kwagga EGI Section 1, which is only located in the Prince Albert Local Municipality. The locality of the Kwagga EGI corridor and the proposed 132 kV powerline projects is depicted in Figure 1 below.

[1] Following receipt of comments from Mainstream Renewable Power South Africa during the 30-day public comment period on the Draft Basic Assessment Reports for the proposed Kwagga EGI Section 2 DFFE Ref: 14/12/16/3/3/1/2579, Kwagga EGI Section 3 (DFFE Ref: 14/12/16/3/3/1/2580) and Kwagga EGI Section 4 (DFFE Ref: 14/12/16/3/3/1/2581), the Project Applicant was requested to re-align the proposed powerline route within the already assessed corridor i.e., to connect the proposed authorised Kwagga WEF 1 (DFFE Ref: 14-12-16-3-3-2-2070), Kwagga WEF 2 (DFFE Ref: 14-12-16-3-3-2-2071) and Kwagga WEF 3 (DFFE Ref: 14-12-16-3-3-2-2072) projects directly to the authorised Beaufort West 132 kV-400 kV Linking Station ("MTS") (DFFE Ref: 14-12-16-3-3-2-925-1). Following from liaison with DFFE on 4 October 2022 regarding these changes, written notification was submitted in terms of Regulation 19(1)(b) of the 2014 NEMA EIA Regulations (as amended) that these revised Draft BA Reports, inclusive of specialist reports and the EMPr will be subjected to another public participation process of 30 days after which the Final BA Reports will be submitted to DFFE for decision-making within 140 days of receipt of the application by the DFFE.

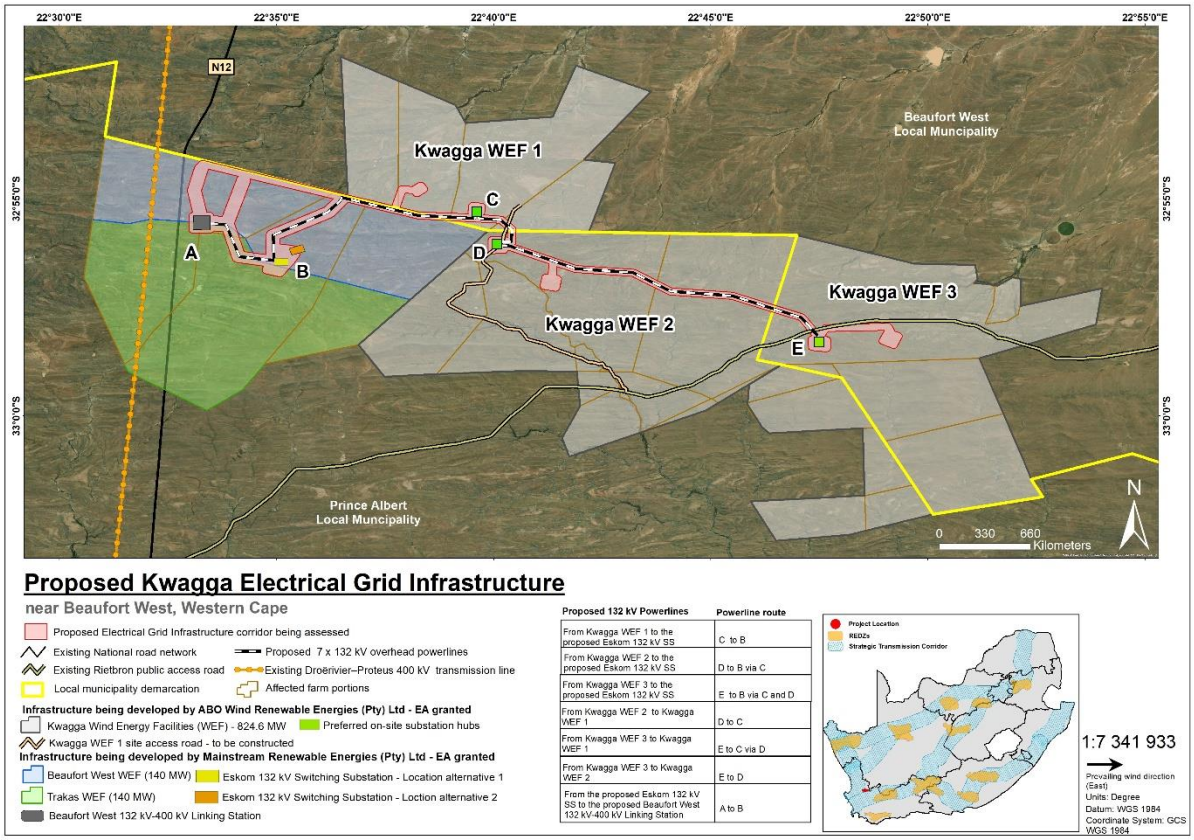

Figure 1: Locality of the seven proposed 132 kV overhead transmission powerline projects situated south of Beaufort West in the Western Cape

The EAs received for each of the three Kwagga WEFs included the authorised location of the preferred on-site substation hub (represented by solid green squares in Figure 1). The authorised on-site substation hub at Point C, Point D and Point E in Figure 1 have been authorised under the EAs received for Kwagga WEF 1, Kwagga WEF 2 and Kwagga WEF 3, respectively. Therefore, Section 1 of the Kwagga EGI corridor comprises the proposed 132 kV overhead transmission powerline that connects between the authorised Beaufort West 132 kV-400 kV Linking Station (i.e., Point A) and the Eskom 132 kV Switching Substation (i.e., Point B).

The seven proposed Kwagga 132 kV overhead transmission powerline projects 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 powerlines are also not located within any of the strategic transmission corridors gazetted in Gazette 41445, GN R113 on 16 February 2018. However, the need for the Basic Assessment process is triggered by, amongst others, the inclusion of Activity 11 (i) listed in GN R327 (Listing Notice 1):

"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts".

Therefore, separate Basic Assessment processes are being undertaken for each of the seven proposed 132 kV overhead transmission powerlines with a 107-day decision-making timeframe, as opposed to a 57-day decision-making timeframe as allowed for in the REDZs and strategic transmission corridors.
This Environmental Management Programme (EMPr) is being submitted to the National Department of Forestry, Fisheries and the Environment (DFFE) as part of the Application for EA

for the proposed Section 1 of the Kwagga EGI corridor which comprises the proposed 132 kV overhead transmission powerline that connects between the authorised Beaufort West 132 kV-400 kV Linking Station and the authorised Eskom 132 kV Switching Substation.

This final EMPr was made available to Interested and Affected Parties (I&APs), stakeholders and Organs of State, as part of the Draft BA Report, for a 30-day review period which extended to 11 August 2022, excluding public holidays. 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 Section A as well as Appendix A and D of this BA Report. The Curriculum Vitae of Paul Lochner and Lizande Kellerman is also included in Appendix A of this EMPr.

Paul Lochner is an environmental assessment practitioner (EAP) at the CSIR in Stellenbosch, with more than 28 years of experience in a wide range of environmental assessment and management studies. Paul commenced work at CSIR in 1992, after completing a B.Sc. degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at focused on wetlands and estuarine management; environmental engineering in the coastal zone; and coastal zone management plans. Since 2008, Paul has been the leader and manager of the Environmental Management Services (EMS) group within CSIR that has been at the forefront of advancing environmental assessment in South Africa. This group currently consists of approximately 10 to 20 environmental scientists, planners and engineers, with offices in Stellenbosch, Cape Town and Durban. Paul's particular experience is in environmental planning and assessment for renewable energy, electricity grid infrastructure, desalination, oil & gas, wetlands & coastal zone management, and industrial & port development. He has been closely involvement in the research and application of Strategic Environmental Assessment (SEA) in South Africa, and also has wide experience in Environmental & Social Impact Assessment, Environmental Management Programmes (EMPRs) and Environmental Screening Studies. He has been the project leader for over 40 SEAs and EIAs over the past 28 years. He also served as project leader for a suite of SEAs commissioned by the DFFE from 2014 to 2020.

Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

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 1: Details of the BA Project Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Paul Lochner (*Registered EAP (2019/745)*)	CSIR	EAP and Project Leader
Lizande Kellerman (*Pr.Sci.Nat*.)	CSIR	Project Manager
Dhiveshni Moodley (*Cand.Sci.Nat.*)	CSIR	Project Officer and Project Mapping
Specialists		
Johann Lanz (*Pr.Sci.Nat.*)	Private	Agricultural and Soils Compliance Statement
Menno Klapwijk	Bapela Cave Klapwijk cc	Visual Impact Assessment
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology)
Dr. John Almond	Natura Viva cc	
Dr Noel van Rooyen and Prof. Gretel van Rooyen (*Pr.Sci.Nat.*)	Ekotrust cc	Terrestrial Biodiversity and Species Impact Assessment
Toni Belcher (*Pr.Sci.Nat.*)	Private	Aquatic Biodiversity Impact Assessment
Chris van Rooyen (*Pr.Sci.Nat.*)	Chris van Rooyen Consulting	Avifauna Impact Assessment
Lizande Kellerman (*Pr.Sci.Nat.*)	CSIR	Civil Aviation Site Sensitivity Verification
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 EAs, should they be granted for the proposed powerline projects).

As noted above, the Project Applicant is proposing the construction of seven 132 kV overhead transmission powerlines to support the connection of the proposed authorised Kwagga WEF 1 (DFFE Ref: 14-12-16-3-3-2-2070), Kwagga WEF 2 (DFFE Ref: 14-12-16-3-3-2-2071) and Kwagga WEF 3 (DFFE Ref: 14-12-16-3-3-2-2072) projects into the national electrical grid network. Seven separate BA Reports have been compiled for the proposed Kwagga powerline corridor, one for each of the seven separate 132 kV overhead powerlines (i.e. referred to as Section 1 – 7 as described in Figure 1 above). The proposed powerlines will enable connection of the proposed authorised Kwagga WEFs to the existing Droërivier–Proteus 400 kV overhead transmission powerline via the proposed authorised Eskom 132 kV Switching Substation (DFFE Ref: 14-12-16-3-3-1-2465/AM1) and the proposed authorised Beaufort West 132 kV-400 kV Linking Station (DFFE Ref: 14-12-16-3-3-2-925-1).

Note that this BA Report specifically addresses Section 1 of the 132 kV overhead powerline corridor, which extends between the proposed authorised Beaufort West 132 kV-400 kV Linking Station (i.e.,

Point A) and the Eskom 132 kV Switching Substation (Figure 2). A description of the key components of the proposed project are described below (Table 2).

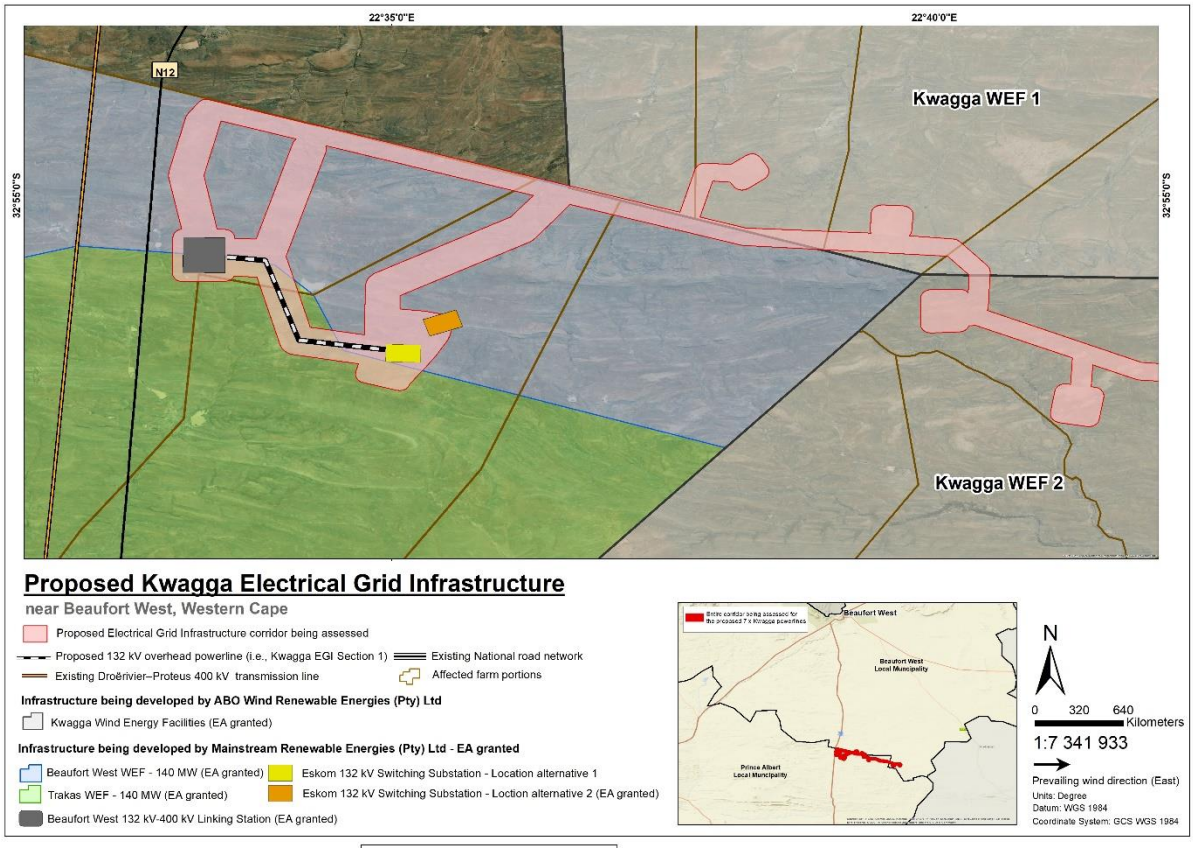

Figure 2: The proposed Kwagga EGI Section 1 of the 132 kV overhead powerline corridor, which extends between the proposed authorised Beaufort West 132 kV-400 kV Linking Station (i.e., Point A) and the Eskom 132 kV Switching Substation

In order to identity and avoid environmental constraints and sensitivities during the siting and final design of the powerline, specialists were required to assess an approximately 300 m wide corridor for the portion of the proposed powerline route that traverses the proposed authorised Kwagga WEFs 1-3 project sites, and an approximately 500 m wide corridor for the proposed powerline route that traverses the neighbouring Mainstream Beaufort West and Trakas WEF project sites. However, the registered servitude will be up to 50 m wide, or where multiple adjacent powerlines occur, in line with guideline and requirements for 132 kV powerlines stipulated in the 2011 Eskom Distribution Guide Part 19.

Table 2: Infrastructure assessed in the BA Process

Component	Description
Line/pylon height	Up to 30 m
Line Capacity	Up to 132 kV
Pylon type	Self-supporting suspension structures or guyed monopoles. Insulators will be used to connect the conductors to the towers
Servitude length	3 km
Servitude width	The registered servitude will be up to 50 m wide, or where multiple adjacent powerlines occur, in line with guideline and requirements for 132 kV powerlines stipulated in the 2011 Eskom Distribution Guide Part 19.

Component	Description
	Note that the entire servitude will not be cleared of vegetation. Vegetation clearance within the servitude will be undertaken in compliance with relevant standards and specifications.
Associated Infrastructure	
Associated electrical infrastructure including but not limited to feeder bays, busbars, new transformer bays (up to 500 MVA) and possible extension to the existing footprint at the proposed authorised Eskom 132 kV Switching Substation.	The following substations are relevant to this BA project: o Proposed authorised Eskom 132 kV Switching Station (Footprint: approximately 20 ha) o Centroid: 32° 56' 27.1464" S (Latitude); 22° 35' 6.2376" E (Longitude) o Proposed authorised Beaufort West 132 kV- 400 kV Linking Station (Footprint: approximately 35 ha) o Centroid: 32° 55' 32.9232" S (Latitude); 22° 33' 16.0488" E (Longitude)
Service roads	There are a number of existing gravel farm roads (some just jeep tracks) with widths ranging between 4 m and 5 m located around and within the proposed Kwagga powerline corridor. It is anticipated that a service road of approximately 4 m wide (usually only jeep tracks) will be required below the powerline.
External site access	The proposed powerline corridor can be accessed via the N12 main road, which is situated to the west of the Kwagga Wind Energy Facility (WEF) 1 site, as well as from the R308 Rietbron bound public access gravel road that is located to the south of the Kwagga WEF 1 site. The R308 Rietbron bound public access road is a well-maintained gravel road that will be widened where necessary, for purposes of constructing the WEFs. A new access road will be constructed to facilitate the connection between the Kwagga WEF 1 project site and the existing R308 Rietbron bound public access gravel road located to the south. Note that this proposed new access road as well as the potential widening/upgrade of the existing R308 gravel road were assessed as part of the S&EIA processes undertaken for the Kwagga WEFs, which received EA on 7 April 2022, and therefore does not form part of this BA process. The coordinates for the abovementioned proposed authorised external access road that will be constructed are as follows: • Start: 32° 59' 26.8008" S (Latitude); 22° 43' 3.4248" E (Longitude) • Middle: 32° 57' 39.7296" S (Latitude); 22° 39' 21.9276" E (Longitude) • End: 32° 55' 8.184" S (Latitude); 22° 40' 37.218" E (Longitude)
Proximity to grid connection	As mentioned in Section A.1 of the BA Report, this proposed 132 kV overhead powerline will facilitate the connection of the proposed authorised Kwagga WEF 1, as well as the proposed authorised Kwagga WEF 2 and proposed authorised Kwagga WEF 3 to the existing Droërivier–Proteus 400 kV overhead transmission powerline, via the proposed authorised Eskom 132 kV Switching Station and the proposed authorised Beaufort West 132 kV-400 kV Linking Station. The proposed 132 kV powerline is located approximately 1 km east of the existing Droërivier–Proteus 400 kV overhead transmission powerline.

The proposed powerline project will facilitate the connection of the proposed authorised Kwagga WEF 1, as well as the proposed authorised Kwagga WEF 2 and proposed authorised Kwagga WEF 3 to the existing Droërivier–Proteus 400 kV overhead transmission powerline.

It is proposed that Section 1 of the 132 kV Kwagga powerline corridor (the subject of this BA Report) will connect at the proposed authorised Eskom 132 kV Switching Station and extends approximately 3 km in a westerly direction to connect at the proposed authorised Beaufort West 132 kV-400 kV Linking Station.

Based on the above, the following EMPr is provided in the BA Report:

- EMPr for the 132 kV overhead transmission powerline that connects between the authorised Eskom 132 kV Switching Station and the Beaufort West 132 kV-400 kV Linking Station. **This EMPr is in Appendix G of this BA Report (i.e. this report), and it complies with the Generic EMPr published for powerline development (Government Gazette 42323, GN 435, dated 22 March 2019).**

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

- 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 Appendix D of this BA Report). Management and mitigation measures required to address all the impacts are included within this EMPr.

The construction phase for the proposed powerline will take place subsequent to the issuing of an EA from the Competent Authority (i.e. National DFFE) and once a power purchase agreement (PPA) with a suitable energy off-taker, which could be either the national government or private investors, is signed for the proposed authorised Kwagga WEF 1, Kwagga WEF 2 or Kwagga WEF 3. The construction phase for the proposed 132 kV overhead powerline project is expected to extend approximately 12-18 months.

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

- Site preparations, construction of servitude access and detailed geotechnical investigations of the powerline servitude and grid corridor footprint;
- Preparation of a detailed layout of the grid connection infrastructure as per the Eskom grid connection requirements;
- Removal of vegetation within the powerline servitude for the placement of pylon infrastructure, where necessary;
- Stockpiling of topsoil and cleared vegetation, where possible;
- Establishment of a temporary laydown area for storage of construction equipment and machinery;
- Excavations of pylon infrastructure and associated anchorage, as well as busbar foundations;
- On site assembly and erection of pylon tower sections and stringing of the powerline cables;
- Rehabilitation of disturbed areas and removal of equipment and machinery following completion of powerline construction.

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

- The transmission of electricity generated by the authorized Kwagga WEF (when it is operational) to the existing Droërivier–Proteus 400 kV overhead powerline, via the proposed Eskom 132 kV

Switching Substation (DFFE Ref: 14-12-16-3-3-1-2465/AM1) and the proposed Beaufort West 132 kV-400 kV Linking Station (DFFE Ref: 14-12-16-3-3-2-925-1);
- On-going maintenance of the grid connection infrastructure; and
- Bush clearing within the powerline servitude in accordance with Eskom's safety requirements.

During the life span of the proposed project (approximately 20 years each), 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, where possible.

A detailed project description (based on the conceptual design) is provided in Section A of the Draft BA Report.

1.3 ENVIRONMENTAL SENSITIVITIES

Section D of the BA Report provides a description of the environmental features and sensitive areas that were identified by the specialists for consideration in the layout and location of the proposed project. Refer to the specialist studies in Appendix D of the BA Report for details on the environmental sensitivities identified.

As noted above, specialists were required to assess an approximately 300 m wide corridor for the portion of the proposed powerline route that traverses the proposed authorised Kwagga WEFs 1-3 project sites, and an approximately 500 m wide corridor for the proposed powerline route that traverses the neighbouring Mainstream Beaufort West and Trakas WEF project sites; in order to identity and avoid environmental constraints and sensitivities during the siting and final design of the powerline. However the registered servitude will be up to 50 m wide, or where multiple adjacent powerlines occur, in line with guideline and requirements for 132 kV powerlines stipulated in the 2011 Eskom Distribution Guide Part 19.

Based on the findings of the specialist studies, an environmental sensitivity map has been produced. This map shows the sensitivities on site (e.g. terrestrial, aquatic, avifaunal, visual, agricultural, paleontological and heritage features) within the larger assessed area that was identified. Based on these specialist findings, the preferred location of the powerline route within the assessed corridor will avoid the sensitive features that were identified by the specialists as far as possible. Based on the boundaries of the assessed area and the constraints of the environmental sensitivities, a preliminarily site layout has also been determined for this project (Appendix C of this EMPr).

Appendix D of this EMPr includes the environmental sensitivity map which indicates the environmental sensitive areas and features identified during the BA process (as described above), including the powerline corridor.

1.4 IMPACTS IDENTIFIED DURING THE BA PROCESS

Based on the specialist studies (as shown in Table 3), the following main direct potential impacts, as indicated in Table 5, were identified and appropriate management and mitigation measures

included within the EMPr (where required) to ensure the potential impacts are suitably addressed and managed during all phases of the project.

Table 3: Impacts identified in the BA Process

KEY IMPACT	IMPACTS IDENTIFIED
Agriculture	**Construction and Decommissioning Phase** ▪ Minimal disturbance to agricultural land (such as erosion and topsoil loss) ▪ Some nuisance disturbance to agricultural activities
Visual	**Construction Phase** ▪ Potential effect of dust and noise from construction machinery during the construction of pylons and stringing of electrical cabling, and the effect of this on residents and visitors to the area. ▪ Potential visual effect of access roads, stockpiles and construction camps in the exposed landscape. **Operational Phase** ▪ Visual intrusion by 132 kV overhead transmission powerline and its associated electrical grid infrastructure on visual and landscape receptors **Decommissioning Phase** ▪ Visual intrusion by 132 kV overhead transmission powerline and its associated electrical grid infrastructure on visual and landscape receptors
Heritage and Cultural Landscape	**Construction Phase** ▪ Potential impacts to archaeological resources and graves ▪ Potential impacts to the cultural landscape **Operational and Decommissioning Phase** ▪ Potential impacts to the cultural landscape
Palaeontology	**Construction Phase** ▪ Disturbance, damage or destruction of fossils preserved at or beneath ground surface within EGI development footprint due to excavations and surface clearance
Terrestrial Biodiversity and Species	**Construction Phase** ▪ Direct Impacts: o Potential impact 1: The clearing of natural vegetation o Potential impact 2: The loss of threatened, protected and endemic plants/animals o Potential impact 3: Loss of faunal habitat o Potential impact 4: Direct faunal mortalities due to construction and increased traffic o Potential impact 5: Increased dust deposition o Potential impact 6: Increased human activity and associated increased noise levels ▪ Indirect Impacts: o Potential impact 1: Establishment of alien vegetation o Potential impact 2: Increased water run-off and erosion **Operational Phase** ▪ Direct Impacts: o Potential impact 1: Direct faunal mortalities ▪ Indirect Impacts: o Potential impact 1: Establishment of alien vegetation o Potential impact 2: Increased erosion and water run-off **Decommissioning Phase** ▪ Direct Impacts: o Potential impact 1: Direct faunal mortalities o Potential impact 2: Increased dust deposition ▪ Indirect Impacts: o Potential impact 1: Establishment of alien vegetation o Potential impact 2: Increased water run-off and erosion
Aquatic Biodiversity	**Construction Phase** ▪ Direct Impacts: o Disturbance or modification of aquatic habitat; increased water use and water quality impacts. ▪ Indirect Impacts: o Degradation of aquatic ecosystem integrity. **Operational Phase**

KEY IMPACT	IMPACTS IDENTIFIED

	▪ Direct Impacts:
	  o Aquatic habitat disturbance.
	▪ Indirect Impacts:
	  o Degradation of the ecological condition of aquatic ecosystems.
	  o Soil erosion.
	  o Alien vegetation invasion in aquatic features.
	
	Decommissioning Phase
	▪ Direct Impacts:
	  o Disturbance of aquatic habitats and water quality impacts.

Avifauna	**Construction Phase** ▪ Displacement due to disturbance associated with the construction of the 132 kV grid connection and substations. ▪ Displacement due to habitat transformation associated with the construction of the 132 kV grid connection and substations. **Operational Phase** ▪ Mortality of powerline sensitive avifauna through electrocution in the proposed substations. ▪ Mortality of powerline sensitive species due to collisions with the 132 kV grid connection. **Decommissioning Phase** ▪ Displacement due to disturbance associated with the decommissioning of 132 kV grid connections and associated substations.

2 APPROACH TO PREPARING THE EMPr

2.1 COMPLIANCE WITH RELEVANT LEGISLATION

As noted in the Gazetted EMPrs 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 2014 NEMA EIA Regulations (as amended) promulgated in Government Gazette 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 government notice. As part of the 2016 EGI SEA, a generic EMPr was also compiled for the development and expansion of (a) overhead electricity transmission and distribution infrastructure; and (b) substation infrastructure for the transmission and distribution of electricity. On 2 March 2018, these two Generic EMPrs were gazetted in Government Gazette 41473, GN 162 and GN 163, for public comment for a period of 45 days. **On 22 March 2019, these two Generic EMPrs were gazetted for implementation in Government Gazette 42323, GN 435**. It is therefore understood that these gazetted EMPrs must be applied by all parties involved in the EA Process. This EMPr therefore subscribes to the requirements of the gazetted EMPrs (Gazette 42323, GN 435).

Since the Generic EMPrs have been gazetted and are 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 power line 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 is not being submitted to the DFFE as it has already been pre-approved gazetted. 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 BA Report. It is included in Appendix E 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 is being 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 is being submitted to the DFFE together with the Final BA Report, for consideration of, and decision on, the Applications for EA. This section has been prepared by the EAP, with input from relevant specialists. 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 Appendix C of the Final BA Report. It was confirmed with the DFFE Interpretation Query Unit in February 2020 that if Part C 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 E 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;
- 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, 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 electrical grid infrastructure in a South African context.

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

- The study site demarcated as the proposed Kwagga powerline corridor that was assessed (i.e. approximately 300 m wide corridor).

3 ROLES AND RESPONSIBILITIES

Since the Generic EMPrs are applicable for the on-site substations and power lines, it is best to adopt the definitions of the roles and responsibilities as captured in the gazetted EMPrs 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

Name of Applicant	ABO Wind renewable energies (PTY) LTD
Name of Applicant Representative	Robert 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, 7441

4.1.2 Details and Expertise of the EAP

Company of the EAP	Council for Scientific and Industrial Research (CSIR)
Name of EAP	Paul Lochner
Telephone Number:	021 888 2489 or 083 799 0949 or 084 442 3646
Fax Number:	021 888 2693
Email Address:	PLochner@csir.co.za LKellerman@csir.co.za DMoodley1@csir.co.za

Expertise of the EAP (Curriculum Vitae included):	**Qualifications:** ▪ B.Sc. Civil Engineering (awarded with Honours), University of Cape Town ▪ M. Phil. Environmental Science, University of Cape Town **Experience:** ▪ Paul has more than 28 years of experience in environmental assessment. **Professional Registration and Affiliations:** ▪ International Association for Impact Assessment, South African Affiliate. ▪ Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA ▪ **Curriculum Vitae of Paul Lochner is included in Appendix A of this EMPr.**

4.1.3 Project Name

Project Name	Basic Assessment for the proposed construction of a 132 kV Overhead Powerline between the proposed Beaufort West 132kV-400kV Linking Station and the proposed Eskom 132 kV Switching Substation, near Beaufort West in the Western Cape Province

4.1.4 Description of the Project

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

4.1.5 Project Location

NUMBER	FARM NAME	FARM NUMBER	PORTION NAME	PORTION NUMBER	LATITUDE (Y) (Farm Centroid)	LONGITUDE (X) (Farm Centroid)
1	Portion 1 of the Farm Witpoortje No. 16	16	PORTION	1	22.621868	-32.946614
2	Remainder of the Farm Trakas Kuilen No. 15	15	REMAINDER	0	22.571324	-32.956355

Co-ordinates of the proposed infrastructure are provided in Section A and Appendix A of the BA Report.

4.1.6 Preliminary Technical Specification of the Overhead Powerlines

The information provided below is based on conceptual design. Detailed design will only be available, post-EA, prior to construction, should the Project Applicant reach preferred bidder status.

Length	3 km
Tower Parameters – 132 kV Powerline	
Types of Towers	Monopole pylon structures or self-supporting suspension structures
Tower Spacing (mean and maximum)	The span lengths are anticipated to range between approximately 200 m and 300 m, or as specified by Eskom
Tower Height (lowest, mean and height)	Up to 30 m
Conductor Attachment Height (mean)	Approximately 14 - 17 m, or as specified by Eskom
Minimum Ground Clearance	Approximately 6.4 m (road clearance 7.5 m), or as specified by Eskom

5 LAYOUT AND DEVELOPMENT FOOTPRINT SITE MAP

This section includes maps of sensitivities, as well as the preliminary infrastructure layout. As noted above, the feature and sensitivity map were prepared based on specialist findings and existing databases. Individual feature and sensitivity maps are included in the specialist studies (Appendix D of the BA Report). Individual feature maps for each specialist theme, where relevant, are also included in Part D of the BA Report. Refer to Appendix D for the combined sensitivity and layout map for the proposed projects.

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:

8 July 2022

7 PROJECT SPECIFIC EMPR

The project specific EMPr is presented below per specialist theme.

7.1 SOILS AND AGRICULTURE

Important Note: The Agricultural Compliance Statement has concluded that there are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019. Please refer to Appendix D.1 of the Draft BA Report for the Agricultural Compliance Statement.

7.2 VISUAL IMPACTS

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Appoint a suitably qualified person, such as a landscape architect, is appointed to give attention to the concept and design of the aesthetic aspects of the project during the detailed design phase of the project prior to construction to integrate the design with the surrounding landscape to ensure that the project blends in physically and aesthetically with the environment. ▪ Sculpturing or shaping the slopes and access roads to angles and forms that are reflected in the adjacent landscape can reduce the visual impact. By blending the edges with the	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
existing land-forms the visual impression made, is that the project component has followed the natural shape of the landscape, rather than been "engineered" through the landscape. ▪ Ensure that the construction camps and stockpiles and other facilities are located in in areas already impacted such as existing farmyards, visually unobtrusive areas, away from public roads. ▪ Limit the area of disturbance for construction camp or sites and lay-down areas. ▪ Keep maintenance and access roads as narrow as possible, and use existing roads or tracks as far as possible. ▪ Avoid the placement of power lines on hillcrests and ridge skylines where possible. ▪ Use monopoles in preference to lattice pylons.						
CONSTRUCTION PHASE						
▪ Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld. ▪ It is essential that all slopes, as well as all areas disturbed by construction activity, are suitably topsoiled and vegetated as soon as is possible after final shaping. ▪ All areas that will be affected by construction activities and where dust will be generated will require dust suppression by regular wetting, possibly by means of a water bowser or by means of an environmental friendly soil binding compound. ▪ All existing large trees (if any) that fall outside the earthworks area must be retained. ▪ All areas affected by the construction works will need to be rehabilitated and re-vegetated. The rehabilitation and stabilisation of vegetation of all rehabilitated areas, buffer strips and new landforms must be done as soon as the forms are complete. The monitoring and	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
management of the vegetation programme is important to ensure that problems (erosion, die back, lack of grass cover) are identified early so that corrective measures can be taken ▪ Avoid up-lighting of structures but rather direct the light downwards and focused on the object to be illuminated. Avoid directing the light towards the direction from where it would be most experienced/visible. Light spill, particularly upwards, must be minimised. This can be achieved by implementing the following recommendations ▪ As night lighting during both construction and operation is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp is developed. For instance, reduce the height from which floodlights are fixed and identify zones of high and low lighting requirements with the focus of the lights being inward, rather than outward ▪ It is recommended that lighting is designed by a lighting engineer in collaboration with the landscape architect for the project. The aspects of the lighting solution should include the following: o Light fittings should have shields to eliminate sight of the light source o Down lighting of areas is preferred to up lighting; o Any perimeter lights are to be directed downwards and inwards; o Emitted light colour should be a softer light than sodium (yellow) or mercury halide (blue-white). The light colour should also be chosen with knowledge of what colour will attract insects. It is important that a colour type and spread of light will not cause insects to be attracted to it and in so doing deplete the insect diversity of the region. For this purpose an entomologist familiar with the effect of light frequencies on insects should be consulted. o Florescent lights attract insects although they provide a softer illumination effect; o The use of flood lights to illuminate structures, large areas or features should not be considered. Rather incorporate concealed lights to shine downwards. Darker areas on the building elevations will provide a less visually noticeable structure;						

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ The lighting plan should strive to maximise the light energy use. This should include a hierarchy of lights that differentiates their function so that the best type is used. Some may be switched on only when needed; ○ Security lights should not flood the area with light continuously but should be activated by a motion sensor; ○ It is now accepted that lighting of new projects should be subdued and energy efficient. ▪ Tones and tints of selected complementary colours that fit the setting should be considered ▪ Vivid primary or bright or reflective colours or surfaces will accentuate the visual presence of the development and should be avoided.						
OPERATIONAL PHASE						
▪ The mitigation measures during operation will need to focus on effective rehabilitation of the construction area. These specifications must be explicit and detailed and included in the contract documentation (Environmental Management Plan) so that the tasks can be costed and monitored for compliance and result. ▪ Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage and wastes on the site by the appointed Environmental Manager.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ Ensure that procedures for the removal of structures and stockpiles during the decommissioning phase are implemented, including recycling of materials and rehabilitation of the site to a visually acceptable standard as prescribed in a rehabilitation plan, and signed off by the delegated authority. ▪ Ensure that the pylon structures are removed and the material recycled.	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Rip and regrade access roads that are no longer required. ▪ Exposed or disturbed areas must be revegetated or returned to grazing or pasture to blend with the surroundings.						

7.3 HERITAGE IMPACTS (ARCHAEOLOGY, PALAEONTOLOGY, AND CULTURAL LANDSCAPE)

Impact Management Outcomes: Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance. Rescue information, artefacts or burials before extensive damage occurs. Minimise landscape scarring						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Appoint archaeologist to conduct a pre-construction survey, and inform the micrositing of infrastructure to avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. ▪ Ensure a specialist palaeontological survey or "walk down" of the corridor (including substation footprints) is undertaken by a qualified palaeontologist. o The walk down would focus on potentially-sensitive, previously unsurveyed sectors of the footprint, such as areas of extensive mudrock exposure along drainage lines, erosion gullies and bedrock ridges, Previously recorded as well as any new fossil sites of scientific or conservation value within the corridor should be mitigated through recording and collection / sampling of fossil material and associated geological data. o The palaeontologist responsible will need to submit beforehand a Work Plan for approval by Heritage Western Cape. The ensuing mitigation report should make	To be completed post EA by relevant parties					

Impact Management Outcomes: Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance. Rescue information, artefacts or burials before extensive damage occurs. Minimise landscape scarring						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
recommendations for any further palaeontological input (if any) in the Pre-construction and Construction Phases. ▪ The fossil material collected must be curated in an approved repository (museum / university collection). Standards for palaeontological reporting and mitigation have been established by Heritage Western Cape (2016, 2021) and SAHRA (2013).						
CONSTRUCTION PHASE						
▪ Reporting chance finds as early as possible, protect in situ and stop work in immediate area. Staff must be informed to be vigilant and carry out inspections of new excavations to rescue information, artefacts or burials before extensive damage occurs. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. ▪ A standard Chance Fossil Finds Protocol must be implemented by the ECO / ESO and, where necessary, a palaeontological specialist (refer to Appendix E of this EMPr). o The ECO/ESO responsible for the development should be made aware of the possibility of important fossil remains (vertebrate bones, teeth, petrified wood, plant-rich horizons etc.) being found or unearthed during the construction phase of the development. o Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the ESO on an on-going basis during the construction phase is therefore recommended. ▪ Significant fossil finds should be safeguarded and reported at the earliest opportunity to Heritage Western Cape for recording and sampling by a professional palaeontologist (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).	To be completed post EA by relevant parties					
OPERATIONAL PHASE						

Impact Management Outcomes: Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance. Rescue information, artefacts or burials before extensive damage occurs. Minimise landscape scarring						
Impact Management Actions	**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 operation phase. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements ▪ A standard Chance Fossil Finds Protocol must be implemented by the ECO / ESO and, where necessary, a palaeontological specialist (refer to Appendix E of this EMPr). o The ECO/ESO responsible for the development should be made aware of the possibility of important fossil remains (vertebrate bones, teeth, petrified wood, plant-rich horizons etc.) being found or unearthed during the construction phase of the development. o Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the ESO on an on-going basis during the construction phase is therefore recommended. ▪ Significant fossil finds should be safeguarded and reported at the earliest opportunity to Heritage Western Cape for recording and sampling by a professional palaeontologist (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)..	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. ▪ Ensure disturbance is kept to a minimum and does not exceed project requirements. ▪ A standard Chance Fossil Finds Protocol must be implemented by the ECO / ESO and, where necessary, a palaeontological specialist (refer to Appendix E of this EMPr). o The ECO/ESO responsible for the development should be made aware of the possibility of important fossil remains (vertebrate bones, teeth, petrified wood, plant-	To be completed post EA by relevant parties					

Impact Management Outcomes: Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance. Rescue information, artefacts or burials before extensive damage occurs. Minimise landscape scarring						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
rich horizons etc.) being found or unearthed during the construction phase of the development. ○ Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the ESO on an on-going basis during the construction phase is therefore recommended. ▪ Significant fossil finds should be safeguarded and reported at the earliest opportunity to Heritage Western Cape for recording and sampling by a professional palaeontologist (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).						

7.4 TERRESTRIAL ECOLOGY

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Project Developer and Appointed Ecological Specialist to 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. ▪ 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 related measures, where required. Appoint an Ecologist to advise on clearance and planting, where required.	To be completed post EA by relevant parties					
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 before filling.	To be completed post EA by relevant parties					

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site. The stored waste may not cause nuisance conditions such as odours from putrescible waste ▪ The frequency of waste removal and the number of skips required must be determined by the amount of waste generated and stored. ▪ 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. ▪ No activity should be allowed on site at night. ▪ The removal of alien vegetation through mechanical mechanisms or application of a herbicide is likely to be required in order to curtail proliferation. The appointed ECO of the project is to be consulted prior to application of the herbicide. Appoint a specialist or contractor to undertake a sweep and survey of the final development footprint site, with an alien invasive plant management team to remove exotic vegetation prior to the commencement of construction. ▪ Implement a monitoring program for the early detection of alien invasive plant species. ▪ Employ a control program to combat declared alien invasive plant species. ▪ Ensure construction activities are limited to the development footprint in order to minimise the extent of impact ▪ Clearance activities are to be strictly confined to the development footprint. Clearance is to be carried out where needed to accommodate infrastructure. ▪ Impose a speed limit on construction vehicles operating within the construction site. ▪ To advise construction staff of the requirements in respect of management of flora and fauna on site during the construction phase. Limit pedestrian/labour movement to within the confines of the site.						

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Appropriate signage and environmental induction are to be carried out in order to convey this point to onsite labourers (i.e. convey acceptable areas in which to traverse within the subject site).						
OPERATIONAL PHASE						
▪ 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					
DECOMMISSIONING PHASE						
▪ Ensure that there is appropriate disposal of materials and waste during decommissioning activities. ▪ Unnecessary clearance of natural vegetation should be avoided. ▪ Manage stabilisation and reinstatement of the land. ▪ Provide adequate stormwater controls to ensure attenuation of stormwater runoff emanating from hard panned surfaces. ▪ 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					

7.5 AQUATIC ECOLOGY

Impact Management Outcomes: Limit the disturbance of aquatic habitat; minimise potential for erosion. Limit the potential for contamination/pollution of aquatic ecosystems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ 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 ▪ The stormwater drainage network system must be kept separate from the sewage effluent system; ▪ Ensure final layout of powerline avoids watercourses and recommended buffers as far as possible; utilisation should be made of existing disturbed areas where possible. ▪ 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. ▪ 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. ▪ Waste and wastewater should be properly contained on-site and removed to a licensed facility that can treat/dispose of the waste. ▪ The position of the footings of the towers should be built to accommodate significant flooding and high-level flows. Access to all parts of the route during construction should be carefully demarcated with only a single access route being driven. Where turning circles are required, these should be in previously disturbed areas only. ▪ Ensure reduced security lighting, downward lighting and restriction on lumens employed ▪ Ensure that the Department of Human Settlements, Water and Sanitation are consulted with to confirm the need and requirements of a Water Use Licence, as noted in the Aquatic Biodiversity and Species Assessment. The relevant requirements of the National Water Act (Act 36 of 1998, as amended) regarding water use and pollution management must be adhered to at all times.	To be completed post EA by relevant parties					
CONSTRUCTION PHASE						

Impact Management Outcomes: Limit the disturbance of aquatic habitat; minimise potential for erosion. Limit the potential for contamination/pollution of aquatic ecosystems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ 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. ▪ 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	To be completed post EA by relevant parties					
OPERATIONAL PHASE						

Impact Management Outcomes: Limit the disturbance of aquatic habitat; minimise potential for erosion. Limit the potential for contamination/pollution of aquatic ecosystems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ 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 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.	To be completed post EA by relevant parties					
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.	To be completed post EA by relevant parties					

Impact Management Outcomes: Limit the disturbance of aquatic habitat; minimise potential for erosion. Limit the potential for contamination/pollution of aquatic ecosystems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Control of invasive alien plants within the site should be undertaken according to the approved plan ▪ Ensure that there is appropriate disposal of materials and waste. ▪ Manage stabilisation and reinstatement of the land.						

7.6 AVIFAUNA IMPACTS

Impact Management Outcomes: Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.) Prevent bird collisions with the 132 kV power lines						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
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, where possible; o Measures to control noise and dust according to latest best practice; o Restricted access to the rest of the property;	To be completed post EA by relevant parties					

Impact Management Outcomes: Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.) Prevent bird collisions with the 132 kV power lines						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ Strict application of all recommendations in the biodiversity specialist report pertaining to the limitation of the footprint. ▪ OHL to be marked with Eskom approved Bird Flight Diverters (BFDs).						
OPERATIONAL PHASE						
▪ Appointment of rehabilitation specialist to develop a Habitat Restoration Plan (HRP) and ensure that it is approved. ▪ Monitor rehabilitation yearly via site audits and site inspections to ensure compliance. Record and report any non-compliance. ▪ Implement adaptive management to ensure HRP goals are met. ▪ Ensure that appropriate measures, such as marking of the earthwire with BFDs on high risk spans, are maintained throughout the operational phase. ▪ Monitor the electrocution mortality in the substations and apply mitigation when and if required.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ A site-specific Decommissioning EMPr (DEMPr) must be implemented, which gives appropriate and detailed description of how activities must be conducted. All contractors are to adhere to the DEMPr and should apply good environmental practice during decommissioning. The DEMPr must specifically include the following: ○ No off-road driving and ensure that decommissioning personnel are made aware of the impacts relating to off-road driving;	To be completed post EA by relevant parties					

Impact Management Outcomes: Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.) Prevent bird collisions with the 132 kV power lines						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ Maximum use of existing roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical. Access roads must be demarcated clearly and monthly site inspections must be undertaken to verify; ○ Measures to control noise and dust according to latest best practice. Monitor the implementation of noise control mechanisms via monthly site inspections and record and report non-compliance; ○ Restricted access to the rest of the property. Decommissioning area must be demarcated clearly and personnel must be made aware of these demarcations. Monitor via monthly site inspections and report non-compliance; ○ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.						

7.7 GENERIC MANAGEMENT ACTIONS TO SUPPLEMENT APPENDIX E OF THIS EMPR

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
CONSTRUCTION PHASE						
▪						
CONSTRUCTION PHASE						

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Ensure that the temporary site camp and ablution facilities are established at least 32 m away from the banks of the major drainage lines. The sensitivities captured in the sensitivity map included in Appendix D of this EMPr must also be considered when placing the site camp (the buffers assigned to water courses should also be avoided, where possible in this regard). ▪ Ensure that there is no ad-hoc and indiscriminate crossing of watercourses and channels 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. Watercourses where no construction activities are proposed must be considered as no-go areas. ▪ 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 and the Western Cape Department of Environmental Affairs and Development Planning (DEADP) Pollution and Chemicals Management Directorate 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. ▪ 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. ▪ Portable chemical toilet/s (ablution facilities) at the construction camp, must be serviced weekly for the duration of the construction phase.	To be completed post EA by relevant parties					

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ 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. ▪ 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. ▪ 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 (and, where possible, at key locations along the EGI corridor). ▪ Ensure that an open communication strategy is created and maintained between the Project Developer, Contractor and owners (or managers) of the adjacent farms where hunting takes place in order to ensure that the Project Developer and Contractor are made aware of planned hunts. ▪ Ensure that construction personnel are made aware of the planned hunts and are trained on the necessary protocols to be taken. ▪ A suitably qualified bat specialist must be consulted with prior to the commencement of construction (post Environmental Authorisation, should such authorisation be granted) to verify the need for a bat monitoring programme, and if such a programme is required then it must be undertaken. ▪ Any signs of bird collisions / fatalities are to be recorded during the construction phase. ▪ Care must be taken to prevent the scavenging of waste from storage skips, from birds and animals such as baboons and badgers. ▪ Waste may not be burned or buried without approval. ▪ No discharge of effluents or the wash water from cement batching areas must enter nearby watercourses. Runoff must be strictly managed and controlled from any cement batching area						
OPERATIONAL PHASE						

Impact Management Outcomes: Ensure overall best practice is achieved.						
Impact Management Actions	**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 operation phase.	To be completed post EA by relevant parties					
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					

8 APPENDIX A – CV OF THE EAP

CURRICULUM VITAE – PAUL LOCHNER

Name of firm:	CSIR
Name of staff:	Paul Lochner
Profession:	Environmental Assessment and Management
Position in firm:	Manager: CSIR Environmental Management Services
Years' experience:	28 years
Nationality:	South African

BIO-SKETCH:

Paul Lochner is an environmental assessment practitioner (EAP) at the CSIR in Stellenbosch, with more than 28 years of experience in a wide range of environmental assessment and management studies. Paul commenced work at CSIR in 1992, after completing a B.Sc. degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at focused on wetlands and estuarine management; environmental engineering in the coastal zone; and coastal zone management plans. Since 2008, Paul has been the leader and manager of the Environmental Management Services (EMS) group within CSIR that has been at the forefront of advancing environmental assessment in South Africa. This group currently consists of approximately 10 to 20 environmental scientists, planners and engineers, with offices in Stellenbosch, Cape Town and Durban. Paul's particular experience is in environmental planning and assessment for renewable energy, electricity grid infrastructure, desalination, oil & gas, wetlands & coastal zone management, and industrial & port development. He has been closely involvement in the research and application of Strategic Environmental Assessment (SEA) in South Africa, and also has wide experience in Environmental & Social Impact Assessment, Environmental Management Programmes (EMPRs) and Environmental Screening Studies. He has been the project leader for over 40 SEAs and EIAs over the past 28 years. He also served as project leader for a suite of SEAs commissioned by the DFFE from 2014 to 2020. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Paul Lochner has been involved in to this date:

Duration	Project description	Role	Client
2019 - 2020	**Basic Assessments** for proposed PV and EGI Developments near Ceres	Project leader	Veroniva (PTY) Ltd
2019 - 2020	**Environmental scoping** for a Desalination Plant and Water Carriage System for water supply to Windhoek and the central coastal area of Namibia	Project author	NamWater (Namibia) and KfW Development Bank (Germany)
2019 (in progress)	**Environmental Performance Compliance Study** for Foundries in South Africa	Project reviewer	National Foundries Technology Network
2019	**Independent Expert review** of the ecology study as part of the EIA and EMPR for diamond prospecting at Bloemhof Dam Nature Reserve, North West province	Independent reviewer	DEA Appeals Office
2018-2019	**Greater Saldanha Bay Strategic Environmental Assessment (SEA):** Phase 1 Monitoring and Decision Support System	Project leader	Western Cape provincial government
2018-2019	**Environmental Screening Study** for a proposed 100 to 150 megalitre/day desalination facility for City of Cape Town, Phase 1: Pre-feasibility study	Project co-leader	City of Cape Town and iX Engineers

Duration	Project description	Role	Client
2018-2019	**EIA for 150 MW wind power project in Ghana**	Proposal and EIA Quality Assurance	Volta River Authority and Seljen Consult Ltd
2019	**Environmental Assessment** for the Kenhardt solar PV facility and electrical infrastructure (100 MW x 3), Northern Cape	Project leader	Scatec Solar Africa (Pty) Ltd
2017-2019	**SEA for Wind & Solar Photovoltaic Energy** development in South Africa (Phase 2)	Project reviewer	DEA & national Dept of Energy (DOE)
2017-2019	**SEA for the Expansion of EGI Corridors** in South Africa	Project reviewer	DEA, DOE, iGas, Eskom (national electricity utility)
2017-2019	**SEA for Energy Corridors** and development of a gas pipeline network for South Africa	Project reviewer	DEA, DOE, iGas, Eskom (national electricity utility)
2017-2019	**SEA for Aquaculture** Development in South Africa (marine and freshwater)	Project leader	DEA and national Dept of Agriculture Forestry and Fisheries (DAFF)
2018	**Environmental Assessments** for the Vryburg Solar project (115 MW x 3) in the Vryburg Renewable Energy Development Zone (REDZ)	Co-project manager and co-author	Veroniva & Scatec
2018	**EIA** for West Bank Waste Water Treatment works **marine outfall pipeline,** East London	Independent reviewer	WSP and Buffalo City Municipality
2017-2018	**Site selection and environmental screening** for a proposed 120 – 150 ML/day desalination plant for the City of Cape Town	Project leader	City of Cape Town and iX Engineers
2017-2018	**EIA and EMP for Icyari Coltan Mine**, Rwanda	Project reviewer	Mawarid Mining Rwanda Ltd (MMRL), UAE
2016-2017	**SEA for the Square Kilometre Array** radio-telescope in the Karoo, South Africa	Project leader	DEA and DST
2016-2017	**SEA for Shale Gas Development** in the Karoo region of South Africa	Project co-leader	DEA and other government departments
2015-2016	**SEA for the development of Electrical Grid Infrastructure** for South Africa	Project leader	DEA and Eskom (national electricity utility)
2017	EIA for the 75 MW x 12 **solar photovoltaic** energy projects near Dealesville, Free State	Project leader	Mainstream Renewable Power SA
2014-2015	EIA for Ishwati Emoyeni 140 MW **wind energy project** and supporting electrical infrastructure at Murraysburg, Western Cape	Project leader	Windlab South Africa
2012-2015	**SEA for identification of renewable energy zones** for wind and solar photovoltaic projects in South Africa	Project leader	DEA and other national government departments
2012-2013	**Environmental Screening Study (ESS) for a desalination plant** for the City of Cape Town	Project leader	City of Cape Town & WorleyParsons
2012-2013	EIA for the **desalination plant** for the Saldanha area	Project leader	West Coast District Municipality & WorleyParsons
2012-2013	EIA for the **manganese export terminal** at the Port of Ngqura and Coega Industrial Development Zone (IDZ)	Project leader	Transnet
2011 - 2012	EIA (x2) for **100 MW solar photovoltaic** project at Blocuso and 100 MW solar PV project at Roode Kop in the Northern Cape	Project leader	Mainstream Renewable Power
2011 – 2012	EIA (x2) for 75 MW **solar photovoltaic project** at GlenThorne and 75 MW project at Valleydora, in the Free State	Project leader	Solaire Direct
2010-2011	More than 10 Basic Environmental Assessments (BAs) for **solar photovoltaic projects** in the Western Cape, Northern Cape, Eastern Cape and Free State	Project leader	Conducted for Dutch, German, French and South African companies

Duration	Project description	Role	Client
2010/2011	**EIA for a 100 MW wind project at Zuurbron and a 50 MW wind project Broadlands** in the Eastern Cape	Project leader	WindCurrent SA (German-based company)
2010-2011	**EIAs (x4) for the proposed InnoWind wind energy projects near Swellendam, Heidelberg, Albertinia and Mossel Bay (totalling approx 210 MW),** Western Cape, South Africa	Project leader	InnoWind South Africa (Pty) Ltd
2009-2010	**EIA for the proposed Electrawinds wind energy facility** of 45-75 MW capacity in the Coega IDZ, Eastern Cape	Project leader	Electrawinds N.V. (Belgium)
2009-2010	**EIA for proposed 180 MW Jeffreys Bay wind energy project,** Eastern Cape	Project Leader and co-author	Mainstream Renewable Power South Africa
2009-2010	**EIA for the proposed 70 megalitre/day desalination plant** at Mile 6 near Swakopmund, Namibia	Project leader	NamWater, Namibia
2009	**ESS for a proposed Deepwater Port,** Container Hub and Industrial Development Zone, Ghana	Project Manager	Project Management International Pty Ltd
2009	**EMP for the Operational Phase of the Berg River Dam**, Franschoek, South Africa	Project leader and report co-author	TCTA (national water supply utility), South Africa
2006	**Environmental Impact Assessment** (**EIA)** for extension of Port of Ngqura, Eastern Cape	Project Leader and co-author	Transnet National Port Authority
2004-2005	**Environmental and Social Impact Assessment (ESIA) report** for the proposed alumina refinery near Sosnogorsk, Komi Republic, Russia	Project manager and co-author	Komi Aluminium Russia, IFC, European Bank for Reconstruction & Development (EBRD)
2005	**Guideline for Environmental Management Plans (EMPs)** for the Western Cape province	Author	Dept of Environmental Affairs & Development Planning, Western Cape
2003	**Environmental Management Plan** for the Operational Phase of the wetlands and canals at Century City, Cape Town	Project leader and lead author	Century City Property Owners' Association
2002	**Environmental Impact Assessment** for the proposed Pechiney aluminium smelter at Coega, South Africa	Project Manager and lead author	Pechiney, France
1999-2000	**Cape Action Plan for the Environment**: a biodiversity Strategy and Action Plan for the Cape Floral Kingdom - legal, institutional, policy, financial and socio-economic component	Project manager and contributing writer	World Wide Fund for Nature (WWF): South Africa and Global Environment Facility (GEF)
1999	**Management Plan** for the coastal zone between the Eerste and Lourens River, False Bay, South Africa	Project manager and lead author	Heartland Properties and Somchem (a Division of Denel)
1998	**Environmental Assessment** of the Mozal Matola Terminal Development proposed for the Port of Matola, Maputo, Mozambique	Project manager and author	SNC-Lavalin-EMS
1996-1997	**Strategic Environmental Assessment (SEA)** for the proposed Industrial Development Zone and Harbour at Coega, Port Elizabeth, South Africa	SEA project manager and report writer	Coega IDZ Initiative Section 21 Company
1995-1996	**Environmental Impact Assessment and EMP** for Development Scenarios for Thesen Island, Knysna, South Africa	Project manager and report writer	Thesen and Co.
1996	**Environmental Impact Assessment** for the Blouvlei wetlands at Century City, Cape Town	Project manager and report writer	Ilco Homes Ltd (now Monex Ltd)

Duration	Project description	Role	Client
1995	**Environmental Impact Assessment** for the Saldanha Steel Project, South Africa	Report author and project manager	Saldanha Steel Project
1994	**Environmental Impact Assessment** for the upgrading of resort facilities on Frégate Island, Seychelles	Project management, co-author, process facilitator	Schneid Israelite and Partners
1994	**Environmental Impact Assessment** for exploration drilling in offshore Area 2815, Namibia	Project manager and lead author	Chevron Overseas (Namibia) Limited
1994	**Management Plan** for the Rietvlei Wetland Reserve, Cape Town	Project manager and lead author	Southern African Nature Foundation (now WWF-SA)

EMPLOYMENT RECORD

- **1992 to present** Involved in coastal engineering studies; and various forms of environmental assessment and management studies. Council for Scientific and Industrial Research – Environmental Management Services (EMS) - Stellenbosch

QUALIFICATIONS/EDUCATION

- M. Phil. Environmental Science (University of Cape Town)
- B.Sc. Civil Engineering (awarded with Honours) (University of Cape Town)

LANGUAGE CAPABILITY

LANGUAGES	***Speaking***	***Reading***	***Writing***
English	Excellent	Excellent	Excellent
Afrikaans	Moderate	Moderate	Moderate

RECENT JOURNAL PUBLICATIONS AND PEER REVIEWED PAPERS

- A comprehensive list of publications is available on request, with a summary provided below of recent journal publications, book chapters and peer reviewed conference papers:
- Fischer D, Lochner P and Annergarn H, 2019. Evaluating the effectiveness of Strategic Environmental Assessment to facilitate renewable energy planning and improved decision-making: a South African case study, Impact Assessment and Project Appraisal - article ID: IAPA 1619389.
- Cape L., Retief F., Lochner P., Fischer T., and Bond A., 2018. Exploring pluralism: Different stakeholder views of the expected and realised value of strategic environmental assessment (SEA). Environmental Impact Assessment Review, Volume 69, March 2018, Pages 32-41.
- Cape L., Lochner P. and Fischer D., 2017. SEAs for major infrastructure programmes in SA. IAIA17 Conference Proceedings - 37th Annual Conference of the International Association for Impact Assessment, 4-7 April 2017 | Le Centre Sheraton Montreal | Montreal | Canada | www.iaia.org
- Schreiner, G.O., Scholes, R.J., Snyman-Van der Walt, L., De Jager, M., S, Esterhuyse., Dludla, A., Lochner, P.A., Wright, J., Atkinson, D., Hardcastle, P., Kotze, H. 2017. Advancing a participatory and science-based approach to policy formulation for shale gas development in South Africa. In: Eds Whitton, J., Cotton, M., Brasier, K. 2017. Citizen and other stakeholder participation in unconventional fossil fuel land use decision-making, policy formation, regulatory practice or other governance mechanisms. London: Routledge.
- Lochner P, Mabin M & Cape L, 2015, Recent Strategic Environmental Assessment experience in South Africa and national principles, in IAIA16 (Japan) Conference Proceedings.

CURRICULUM VITAE – 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	ABO Wind renewable energies (Pty) Ltd

Completion Date	Project description	Role	Client
		Assessment Practitioner	
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
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

Completion Date	Project description	Role	Client
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
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

Completion Date	Project description	Role	Client
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

9 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 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

Responsible Person(s)	Role and Responsibilities
	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; - 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) ;

Responsible Person(s)	Role and Responsibilities
	- 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; - 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; - 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;

Responsible Person(s)	Role and Responsibilities
	- 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.

10 APPENDIX C – SITE LAYOUT

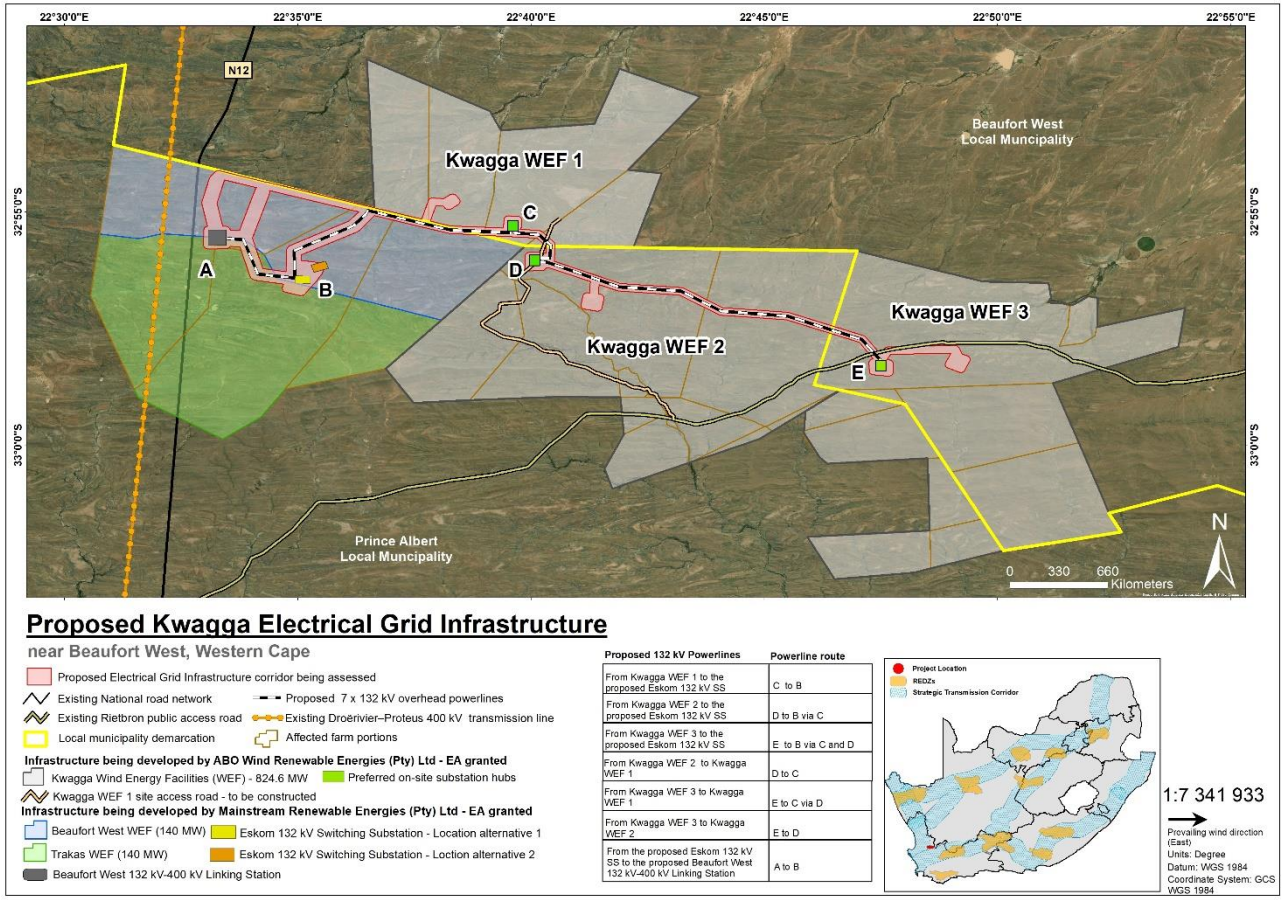

Figure 3. Locality of the seven proposed Kwagga 132 kV overhead transmission powerline projects

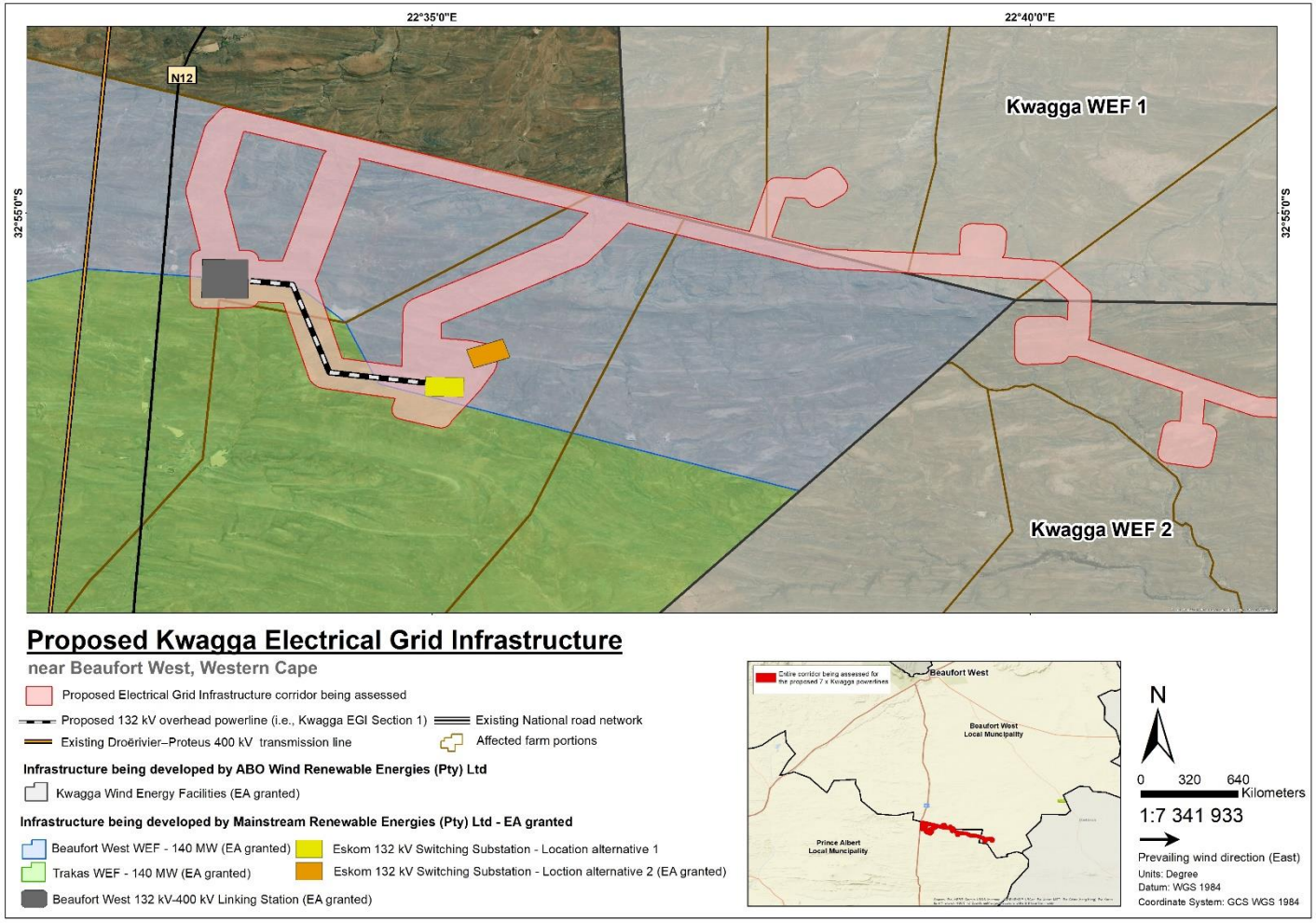

Figure 4. The proposed 132 kV overhead powerline i.e. Section 1 of the Kwagga EGI corridor, which extends between the proposed authorised Beaufort West 132 kV-400 kV Linking Station and the Eskom 132 kV Switching Substation

11 APPENDIX D – COMBINED LAYOUT AND SENSITIVITY MAP

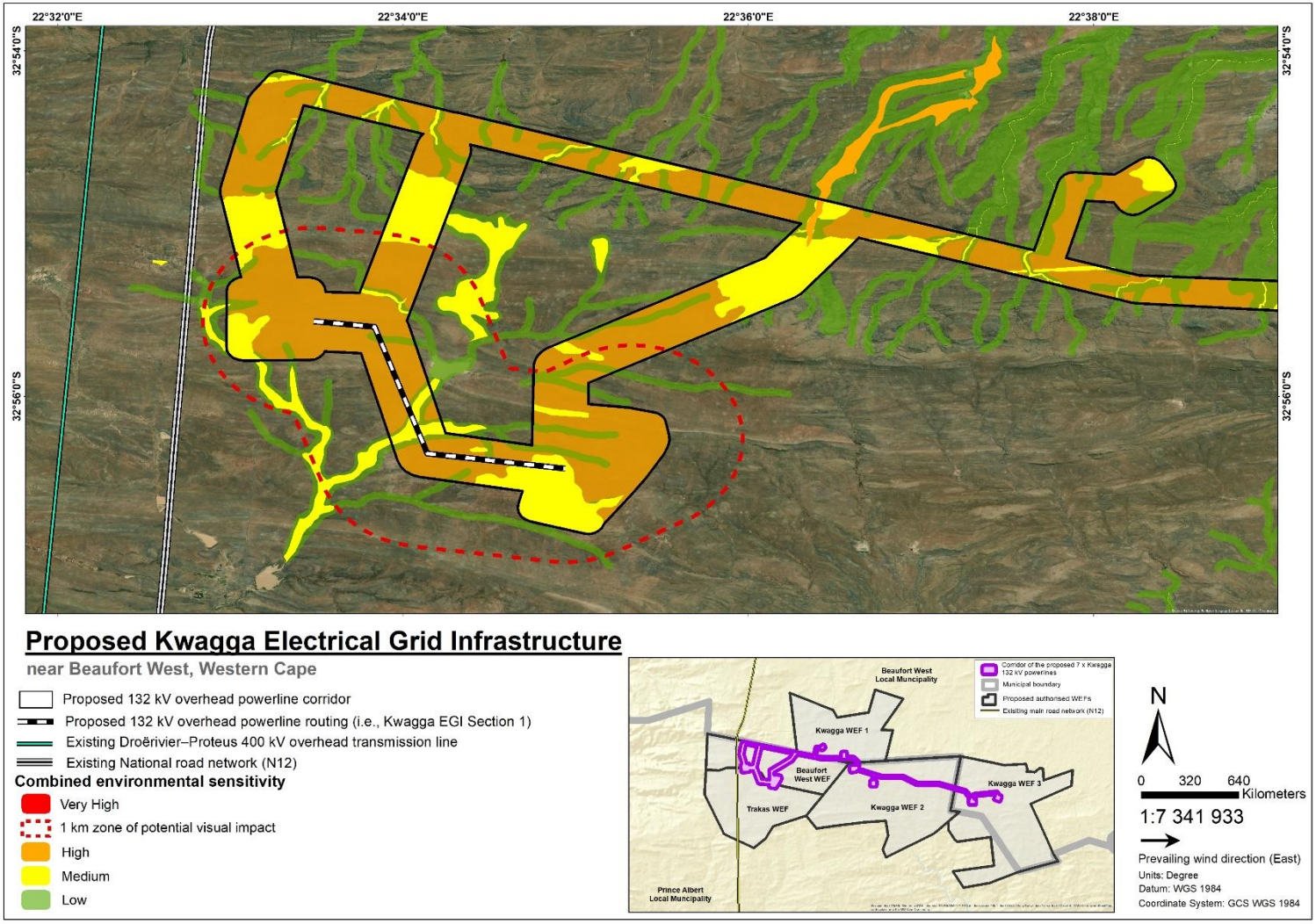

Figure 5. Combined environmental sensitivity map for the proposed 132 kV overhead powerline i.e. Section 1 of the Kwagga EGI corridor, which extends between the proposed authorised Beaufort West 132 kV-400 kV Linking Station and the Eskom 132 kV Switching Substation

12 APPENDIX E – PRE-APPROVED GAZETTED EMPR FOR POWER LINE DEVELOPMENT (GN 435)

PRE-APPROVED GENERIC EMPR TEMPLATE FOR OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE 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 overhead electricity transmission and distribution infrastructure. There is a list of aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure, 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 overhead electricity transmission and distribution infrastructure.

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;						

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
– 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: 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; – 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
– Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorised area; – An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – The access roads to tower positions must be signposted after access has been negotiated and before the commencement of 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 minimize 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; – 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 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 overhead transmission and distribution electricity infrastructure development activities; – Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause harm to the sensitive flora; – Any temporary fencing to restrict the movement of live-stock 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 DHSWS 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 and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the 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; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.						

5.7. Storm- and wastewater management

Impact management outcome: Impacts to the environment caused by stormwater 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 stormwater 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;						

Impact management outcome: Impacts to the environment caused by stormwater 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
– 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: Waste is 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; – 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 Department of Agriculture, Forestry and Fisheries 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*. Servitude: – Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager;						

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
– Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to distance as agreed between the land owner and the EA holder – Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognised waste disposal facility; – Vegetation must be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280; – Debris resulting from clearing and pruning must be disposed of at a recognised waste disposal facility, unless the landowners wish to retain the cut vegetation; – In the case of the development of new overhead transmission and distribution infrastructures, a one metre “trace-line” must be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along the ”trace-line”. Alternative methods of stringing which limit impact to the environment must always be considered.						

5.11. Protection of fauna

Impact management outcome: Minimise disturbance to fauna.						
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; – Nesting sites on existing parallel lines must documented; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds;						

Impact management outcome: Minimise disturbance to fauna.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bird guards and diverters must be installed on the new line as per the recommendations of the specialist; – 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: Minimise impact to heritage resources.						
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: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) 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; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours;						

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
f) 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; – 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; – 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);						

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 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. – 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;						

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
– 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; – 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: Unnecessary noise is prevented by ensuring that noise from construction activities 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: Erosion and sedimentation as a result of stockpiling are reduced.						
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. Finalising tower positions

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No vegetation clearing must occur during survey and pegging operations; – No new access roads must be developed to facilitate access for survey and pegging purposes; – Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; – The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO.						

5.26. Excavation and Installation of foundations

Impact management outcome: No environmental degradation occurs as a result of excavation or installation of foundations.						
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 recognised disposal 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*. – Batching of cement to be undertaken in accordance with Section *5.19 : Batching plants*; – Residual cement must be disposed of in accordance with Section *5.8: Solid and hazardous waste management*.						

5.27. Assembly and erecting towers

Impact management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Prior to erection, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation; – In sensitive areas, tower assembly must take place off-site or away from sensitive positions; – The crane used for tower assembly must be operated in a manner which minimises impact to the environment; – The number of crane trips to each site must be minimised; – Wheeled cranes must be utilised in preference to tracked cranes; – Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent of environmental impact;						

Impact management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Access to tower positions to be undertaken in accordance with access requirements in specified in Section 8.4: Access Roads; – Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: Vegetation clearing; – No levelling at tower sites must be permitted unless approved by the Development Project Manager or Developer Site Supervisor; – Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites; – Topsoil must be stored in heaps not higher than 1 m to prevent destruction of the seed bank within the topsoil; – Excavated slopes must be no greater that 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilise the slopes; – Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed; – Only existing disturbed areas are utilised as spoil areas; – Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum; – Surface water runoff is appropriately channeled through or around spoil areas; – During backfilling operations, care must be taken not to dump the topsoil at the bottom of the foundation and then put spoil on top of that; – The surface of the spoil is appropriately rehabilitated in accordance with the requirements specified in Section 5.29: Landscaping and rehabilitation; – The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season.						

5.28. 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
– Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid Access restricted areas and other sensitive areas; – The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks; – Refueling of the winch and tensioner stations must be undertaken in accordance with Section 5.17: Hazardous substances; – In the case of the development of overhead transmission and distribution infrastructure, a one metre "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along "trace-lines". Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used; – Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by using a helicopter; – Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/ protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period(s) during development, the persons affected must be given reasonable notice, in writing; – No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing; – Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner; – Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.						

5.29. Socio-economic

Impact management outcome: Socio-economic development is enhanced.						
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.						

5.30. 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: management of 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;						

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
– Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.31. 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 to a registered waste site and certificates of disposal provided; – 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 tower sites and 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;						

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
– 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; – 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.

13 APPENDIX F – CHANCE FOSSIL FINDS PROTOCOL

<table>
<tr><th colspan="3">Appendix 2: KWAGGA Electrical Grid Connection projects located south of Beaufort West, Western Cape</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 and other superficial deposits</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">Submit a Paleontological Heritage Work Plan for approval by Heritage Western Cape. 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>
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